DataSecure
Version 5.4.0

User Guide

SafeNet

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Preface

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

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Disclaimers

The foregoing integration was performed and tested only with specific versions of equipment and software and only in the configuration indicated. If your setup matches exactly, you should expect no trouble, and Customer Support can assist with any missteps. If your setup differs, then the foregoing is merely a template and you will need to adjust the instructions to fit your situation. Customer Support will attempt to assist, but cannot guarantee success in setups that we have not tested.

This product contains software that is subject to various public licenses. The source code form of such software and all derivative forms thereof can be copied from the following website: http://c3.safenet-inc.com/

We have attempted to make these documents complete, accurate, and useful, but we cannot guarantee them to be perfect. When we discover errors or omissions, or they are brought to our attention, we endeavor to correct them in succeeding releases of the product.

Technical Support

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.

Technical Support Contact Information:

Phone: 800-545-6608, 410-931-7520
Email: support@safenet-inc.com

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Chapter 1

Overview of the DataSecure

SafeNet DataSecures are the heart of all SafeNet data encryption and control solutions. Using hardware-based encryption, DataSecures cover the broadest variety of data types. They provide a unified platform with data encryption and granular access control capabilities that can be applied to database, applications, mainframe environments, and individual files. By providing centralized management of keys, policies, and essential functions, DataSecure simplifies administration, helps ensure compliance, and maximizes security.

Key Management

With DataSecure, all cryptographic keys are kept in the centralized, hardened appliance to simplify administration while helping ensure tight security for the broadest array of data types. Key versioning streamlines the time-consuming task of key rotation.

Policy Management

Administrators can set authentication and authorization policies that dictate which applications, databases, or file servers can be accessed by particular users in the clear. When combined with strong authentication, this policy-driven security provides a vital layer of protection. DataSecure also offers granular access controls to help you comply with the separation of duties required in many security mandates. An administrator can create a policy that prevents certain users from accessing sensitive data without interfering with their day-to-day system administration duties.

Logging, Auditing, and Reporting

When encrypting data within an enterprise, data, keys, and logs are often accessed, encrypted, managed, and generated on multiple devices, in multiple locations. To reduce the cost and complexity of security management, DataSecure provides a single, centralized interface for logging, auditing, and reporting access to data and keys. A centralized mechanism increases security and helps you ensure compliance with industry mandates and government regulations.

Device Configuration Overview

After you have unpacked, installed, and initialized the DataSecure as described in Chapter 2, “Appliance Installation” you can configure the device.

The following chapters describe how to configure the features of the DataSecure:

- **Chapter 4, “Key Servers”** - create cryptographic key servers that accept client requests from two protocols: NAE-XML for handling requests for cryptographic operations and KMIP for key management requests. You can set the IP, port, and authentication process (e.g., use of SSL) for each server you configure. create cryptographic key servers that accept key management requests using KMIP. You can set the IP, port, and authentication process (e.g., use of SSL) for each server you configure.

- **Chapter 5, "Health Check"** - enables client applications to check the availability of the key server by sending the key server an HTTP request.
- **Chapter 6, "DataSecure Clustering"** - enables multiple DataSecures to share configuration settings. Any changes made to these values on one cluster member are replicated to all members within the same cluster. This enables you to immediately share configuration changes with other Key Servers, and improves the failover capabilities of a high availability configuration.
- **Chapter 7, "Date, Time and NTP"** - set the system date and time, and configure NTP servers.
- **Chapter 8, "Network Interfaces"** - enables you to configure the DataSecure's network interface list and create VLAN tagged interfaces.
- **Chapter 9, "Gateways & Routing"** - enables you to configure the default gateway list, select the interface to use for outgoing connections, and configure a static route list.
- **Chapter 10, "Hostname & DNS"** - set the DataSecure's hostname and connect to any DNS servers in your network.
- **Chapter 11, "Network Interface Port Speed & Duplex"** - enables you to configure the port speed and duplex for the DataSecure's network interfaces.
- **Chapter 12, "High Availability"** - enable and configure high availability interfaces.
- **Chapter 13, "IP Authorization"** - specify which IP addresses are permitted to connect to the DataSecure and which services those IP addresses may access.
- **Chapter 14, "SNMP"** - enable monitoring of the DataSecure via SNMP.
- **Chapter 15, "Administrator Configuration"** - create and manage local administrator accounts.
- **Chapter 16, "LDAP Administrator"** - enable and configure LDAP administrator accounts.
- **Chapter 17, "Password Management"** - create password policies for all passwords used by the DataSecure: local administrators, local users, DataSecure clusters, and backups.
- **Chapter 18, "Multiple Credentials"** - stipulate that some administrative and key management operations require authorization from more than one administrator.
- **Chapter 19, "Remote Administrator"** - determine the IP addresses, ports, and certificates used for remote DataSecure administration via the Management Console and Command Line Interface.

The DataSecure's provides logs and statistics that enable you to monitor system health and performance. The following chapters describe how to configure system logs and view system and server statistics.

- **Chapter 20, "Logging"** - schedule log rotations, configure archiving details, transfer logs to an external device, and configure syslog.
- **Chapter 21, "Log Viewer"** - view log files stored on the DataSecure.
- **Chapter 22, "Statistics"** - view system and server statistics.

Regular maintenance of the DataSecure will involve creating (and possibly restoring) backups of the device configuration. You can also stop and restart services, upgrade software, install licenses, monitor system health, and diagnose network connectivity issues.

The following chapters describe how to perform regular device maintenance.

- **Chapter 23, "Backups"** - create and restore backups of system configuration.
- **Chapter 24, "Services"** - start and stop the key servers, web administration service, ssh administration service, and snmp agent, restart those services, enable those services to launch at system startup, restart the DataSecure, and halt the DataSecure.
- **Chapter 25, "Upgrade"** - upgrade software, upload licenses, and examine information about the DataSecure device, including Box ID and current software version.
- **Chapter 26, "System Health"** - view the status of the DataSecure's power supply and cooling fan.
- **Chapter 27, "Network Diagnostics"** - test the DataSecure's network connectivity by running ping, traceroute, host, or netstat commands

The following chapters explain how to manage keys, users, certificates, and the DataSecure's advanced security features:

- **Chapter 28, "Keys"** - create keys, create and manage versioned keys, create key templates, import keys, import certificates as keys, download RSA keys, delete keys, create key queries, and clone keys.
- **Chapter 29, "Authorization Policies"** - create an authorization policy and delete an authorization policy.
- **Chapter 30, "Local Users & Groups"** - create a local user, create a local group, remove a user from a group, delete a user, and delete a group.
- **Chapter 32, "LDAP User & Groups"** - set up the LDAP user server.
- **Chapter 33, "Certificates"** - create a server certificate for the DataSecure, create a client certificate, download a certificate, and import a certificate.
- **Chapter 34, "Certificate Authorities"** - manage the trusted CA list, view and download a local CA, create a local certificate authority, create an intermediate CA request, and install a CA certificate.
- **Chapter 35, "Certificate Revocation Lists"** - download and update certificate revocation lists.
- **Chapter 36, "High Security Features"** - configure the device for FIPS compliance, configure high security settings for the device, including disabling the use of FTP (for non-FIPS compliant hardware), and configure the device for Common Criteria compliance.
- **Chapter 37, "FIPS Status Server"** - enable the FIPS status server and view the FIPS status report.
- **Chapter 38, "SSL"** - enable ssl protocols and the session key timeout, and manage the ssl cipher priority.

Chapter 2

Appliance Installation

When you install your DataSecure, use the site preparation guidelines normally prescribed for networking devices to comply with temperature, altitude, power, and cleanliness standards. Before setting up the DataSecure, you should secure the device, collect the required equipment, and gather the required network information.

For more information about the appliance's environmental requirements, namely the operating temperatures and humidity, see Appendix B, "Hardware Specifications".

Step 1: Collect the Required Equipment

You will need the following equipment:

- Null modem cable
- Ethernet cable
- Power cable
- Console terminal or PC
- Phillips Screwdriver

Step 2: Gather the Required Network Information

During the initialization process, you must have the following information:

- An IP address for the DataSecure.
- The subnet mask for the network.
- The gateway for the network.
- A hostname for the DataSecure.
- A port on the DataSecure on which the web administration will be performed. The default port is 9443.

Step 3: Secure the DataSecure

You should secure the DataSecure in a standard 19-inch rack that provides sufficient space at the front and rear for cabling, airflow, and maintenance.

See Appendix B, "Hardware Specifications" for the dimensions.

To mount the DataSecure:

1 Open the bezel.

2 Position the rack mount brackets to align with holes in the rack posts.

3 Use a phillips screwdriver to start the screws into the mounting brackets. Do not tighten.

4 Properly align the device in the rack.

5 Use a phillips screwdriver to tighten the screws. This should securely attache the mounting brackets to the rack posts.

Step 4: Set Up and Initialize the DataSecure

Note: A full transcript of the installation script is provided below. Your experience may differ slightly, depending on your specific platform and the values you enter.

If you are configuring an i116, i150, i416, i426, i430, or an i450 for FIPS or Common Criteria compliance, you must also review Chapter 36, “High Security Features” before proceeding.

To set up a DataSecure:

1 Connect one end of the null modem cable to the serial port on the back panel of the DataSecure; then plug the other end of the null modem cable into the serial port of your console terminal or PC.

2 Use an ethernet cable to connect the ethernet interface to the network. On devices with multiple interfaces, use port 1.

3 Connect the power cable from the power supply on the back panel of the DataSecure to an AC power source.

Note: The i321, i426, i430, and i450 have two power supplies. As you are facing the back panel, the power supply on the left is the main power supply. The one on the right can be used for redundancy, but it is not required to configure the DataSecure.

4 Turn the power on.

For the i110 and i150, turn on the master power switch on the back panel. Unscrew the front plate to access the front panel components. Press the power switch on the front panel. Reattach the front plate.

For the i311, i321, and i400-series devices, turn on the power switch on the front panel.

The initial boot sequence and internal configuration can take several minutes.

5 While the DataSecure is performing the initial boot sequence, start a terminal emulation session using an application such as HyperTerminal or Minicom. Use the following port settings:

- VT100/ANSI
- 19200 bps (for the i150 and i450)

- 9600 bps (for the i110, i116, i311, i321, i416, i426, i430)
- 8 data bits
- No parity
- 1 stop bit
- Hardware flow control

Important! When “Hit F2 to Enter Setup” appears on the console, disregard this message. Entering setup allows you to set the BIOS supervisor password. If necessary, you should do this *after* completing the first–time initialization process. See “Setting the BIOS Supervisor Password” on page 248 for more information.

6 The initialization process begins after you power up the DataSecure.

```
Welcome to the DataSecure.
Before this system can be used, it must be configured.

Are you ready to begin setup? (y/halt): y
```

Enter `y` to continue or `halt` to abort the process. Entering `halt` shuts down the machine.

7 Create the admin account. You use this account to log in to the Management Console and the CLI. You can modify this account and create additional users later.

```
For further administrative access to this device you will
need an administrative account. An account called 'admin' will
be created and will be the primary administrative account.

Please enter a password for the admin account:
Please enter password again:

User 'admin' has been created.
```

Enter and confirm the password. The system creates the user if the password entries are successful.

WARNING: Remember the admin password. An administrator password can only be reset by another administrator with the appropriate access privileges. This is a fundamental security precaution. *If all administrator passwords are lost, you cannot re-configure the DataSecure. All keys and configuration data will be unrecoverable, and you must return the device to have the software reinstalled.*

8 Set the system time zone, date, and time.

```
Please select your time zone:
1: Samoa Time Zone
2: Hawaii Time Zone
...
  Enter time zone [5]:

  Enter the local date (MM/DD/YYYY) [03/02/2011]:
  Enter the local time (HH:MM:SS) [15:40:23]:
  The time and date have now been set.
```

You can view the full list of time zones on the console. The script displays default values for the time zone, date, and time in brackets. You can accept those defaults by pressing Enter, or you can enter specific values.

9 Set the network addresses for the DataSecure.

```
To support network based configuration, a single IP address
is needed to bind to. Once an IP address is provided all further
configuration can be done remotely using SSH or using the Web
administration site.

Note that this will configure Ethernet #1 on your device.

Please enter the following information:

IP address:
Subnet mask [255.255.255.0]:
Default gateway [10.20.30.1]:
Hostname:

You have entered the following configuration:

    IP address: 192.168.15.25
    Subnet mask: 255.255.255.0
    Default gateway: 192.168.15.1
    Hostname: box1.company.com

Is this correct? (y/n): y

Network settings have been successfully configured.
```

Enter and confirm the IP address, Subnet mask, Default gateway, and Hostname of your DataSecure.

The script displays default values for the Subnet mask, and Default gateway in brackets. You can accept those defaults by pressing Enter, or you can enter specific values.

Note: This procedure configures ethernet port 1.

10 Set the port number for the Management Console.

```
Further administration of this device can be done remotely.
Please enter the port number you wish the Web administration tool
to run from. The default value is recommended.

Enter the port number [9443]:
```

Enter the port number. The script displays the default port of 9443. You can accept this default by pressing Enter, or you can enter another value.

At this point, you've given the installation program everything it needs.

The DataSecure creates a DSA key, an RSA key, and a Web Admin certificate. These keys are used to authenticate the DataSecure to users making SSH and Web Admin connections to the DataSecure. Because the actual key is fairly large, the DataSecure displays the key fingerprint on the console.

```
Creating certificate for Web administration server...
Creating certificate for signing logs...
Creating SSH host keys...

SSH RSA key fingerprint:
2048 41:63:d3:ca:c9:ea:1f:f7:a1:84:8b:05:b4:a6:3b:64
SSH DSA key fingerprint:
2048 1d:04:d7:02:60:d5:f2:11:30:12:0a:d9:bb:19:c2:fe
```

```
Webadmin certificate fingerprint (SHA-256):
1024 ad:8b:9f:79:5f:de:88:a0:89:36:d6:51:cd:0a:7f:ff:
d3:88:cd:7a:4a:f0:95:b8:21:b7:19:21:3c:71:39:c1

Initializing the key store. This could take several minutes.
waiting for the server to shut down.... done
server stopped

Starting services...

The Web-based Management Console will now be available at this URL:
<https://192.168.1.2:9443>

This device has now been configured.
Press Enter to continue.
```

Tip: To prevent a “man in the middle” attack when connecting to the DataSecure, we recommend that you write down these fingerprints and compare them with what is presented when you connect to the DataSecure via SSH or HTTPS.

11 At the end of this configuration process, **setup is complete** and you can log into the DataSecure via the Management Console or the CLI.

```
YourDevice login: admin
Password: ******
YourDevice#
```

Use your admin username and password to log in to the system.

Chapter 3

The DataSecure's Management Interfaces

Once you have completed the initial configuration of the DataSecure, described in Chapter 2, "Appliance Installation", you can log in to either of the following management interfaces using a valid administrator account.

- **Management Console** - The management console is a graphic user interface that enables you to perform remote administration using a web browser.

  The web browser used to connect to the Management Console must be capable of high-grade 128-bit encryption. To access all functionality of the Management Console, javascript must be enabled on the browser.

- **Command Line Interface** - The command line interface (CLI) enables you to perform administrative functions either at the DataSecure's serial console or remotely using SSH.

  The serial console must use a terminal emulation program such as HyperTerminal. Remote CLI administration requires a terminal emulation program that supports SSH (PuTTY, Teraterm, SecureCRT, or F-Secure, for example). The SSH client should connect to the IP address defined in the first-time initialization process.

  For more information about the command line interface, see the *DataSecure CLI User Guide.*

If you attempt unsuccessfully to log in to a user account five consecutive times, that account is locked out immediately for a period of one minute. If SNMP traps are enabled and the SNMP service is running, a trap is sent to the appropriate SNMP Management Station.

Using the Management Console

To log in to the management console:

1 Type the following URL, using the IP address and port you set during the initialization process:
`https://IP-addresss:9443`

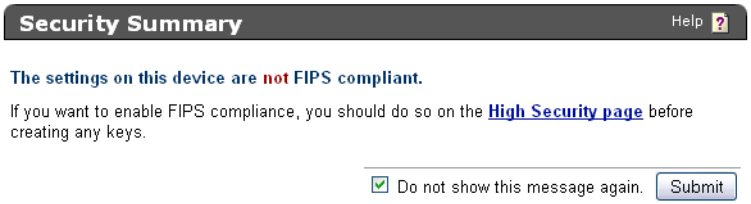
When connecting to the Management Console for the first time, your browser might display a certificate error notice. To avoid this message in the future, the browser can be instructed to accept the certificate for all sessions.

2 Enter a **Username**. When logging in for the first time, use the default username *admin*. You can create other administrator accounts using the Administrator Configuration page. This is described in Chapter 15, “Administrator Configuration”.

3 Enter the **Password**. When logging in for the first time, this is the password you created during initialization. Don’t lose this password.

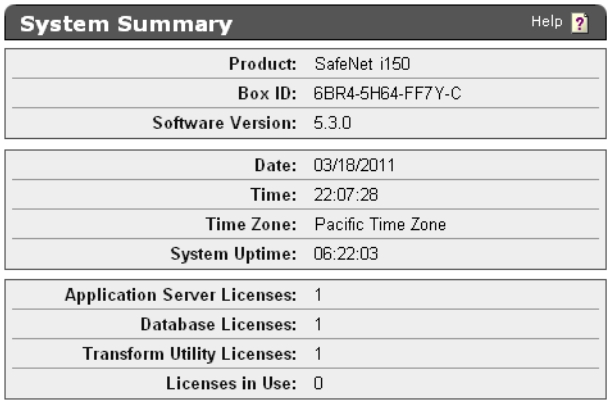
4 Click **Log In**. The Management Console displays the Home page, which includes the following parts:

- **Security Summary** - This section displays security-related information about your DataSecure.



Click the High Security page link to access the High Security page. You can enable FIPS compliance from there. You can select the **Do not show this message again** checkbox and click **Submit** to remove the Security Summary section from the Home page. Once you remove the Security Summary section from the Home page, you cannot restore that section.

- **System Summary** - This section displays system information about the DataSecure.

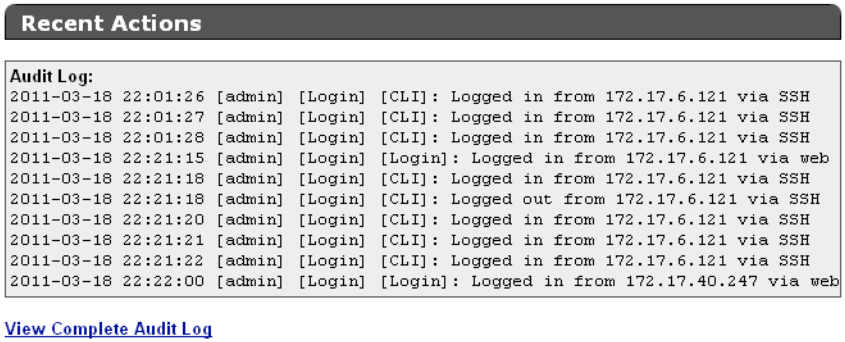


This section contains the following fields:

- **Product** - the product’s model name (e.g., SafeNet i150).
- **Box ID** - the device’s identification code. You will need this ID if you ever contact our customer support department.
- **Software Version** - version of the software currently running on the device.
- **Date** - current system date.
- **Time** - current system time.
- **Time Zone** -current system time zone.
- **System Uptime** - length of time that the system has been running since the last boot.

- **Application Server Licenses** - number of application server licenses currently in use.
- **Database Server Licenses** - number of database server licenses currently in use.
- **Transform Utility Licenses** - number of transform utility licenses currently in use.
- **Licenses in Use** - total number of licenses in use.

- **Recent Actions** - This section displays the most recent entries in the DataSecure's audit log. The audit log contains a record of all configuration changes and user input errors made to the DataSecure, whether through the Management Console or the CLI. Click **View Complete Audit Log** to view the entire log file.



Chapter 4

Key Servers

You can create Cryptographic Key Servers that accept client requests from two protocols: NAE-XML for handling requests for cryptographic operations and KMIP for key management requests. You can set the IP, port, and authentication process (e.g., use of SSL) for each server you configure.

NAE-XML Protocol

The Network-Attached Encryption - XML (NAE-XML) protocol is used to off-load cryptographic operations from clients to the DataSecure. DataSecure clients, such as application servers running Protect-App and databases running Protect-DB, send cryptographic requests via the NAE-XML protocol. The DataSecure is capable of performing asymmetric and symmetric encryption and decryption, MAC and MAC verification, keyed hashes, digital signatures and verifications, and random number generation.

For more information about connecting to the DataSecure using this interface, see the *XML Interface User Guide.* For information about specific client software, see the appropriate ProtectDB or ProtectApp user guide for your product.

KMIP

The Key Management Interoperability Protocol (KMIP) is used to transmit key management requests from clients to the DataSecure. DataSecure clients are able to submit the following requests to the DataSecure:

- Register
- Get
- GetAttibutes
- Query
- Locate
- Destroy

The DataSecure currently supports the following managed objects: templates, secret data, symmetric keys.

For more information about the DataSecure's implementation of KMIP, see Appendix D, "KMIP Support."

Authentication Overview

The communication between the key server and the client varies slightly, depending on whether your protocol configuration requires users to authenticate. If you decide not to authenticate, then users have

access only to global keys. Global keys are keys that are available to everyone, with no authentication required.

If you want to require authentication, then you must create keys for each user or group of users. An authenticated user has access to all global keys, all the keys owned by the user, and all keys accessible to groups to which that user belongs. In addition, a group of users can have an authorization policy assigned to it, which restricts the use of the keys accessible by that group to certain time periods or a certain number of operations per hour.

Authentication Options

The key server provides many options with respect to security and authentication, for each protocol. You can:

- **mandate SSL** by selecting **Use SSL** – You can choose between SSL connections and standard TCP connections; SSL connections are more secure since all data exchanged between client and server is encrypted.
- **allow global sessions** by disabling **Password Authentication** – You can allow clients to access and create global keys without providing a valid username and password to the key server; this obviously does not offer a high level of security.
- **disable global sessions** by enabling **Password Authentication** and/or enabling **Client Certificate Authentication** – You can disable global sessions altogether, which requires all users to provide either a valid username and password combination, or a client certificate signed by a CA trusted by the key server.
- **require client certificates** by enabling **Client Certificate Authentication** – You can require that clients present a client certificate in order to establish SSL connections. This client certificate can be the sole means of authenticating to the key server, or it can be used in tandem with a username and password combination.
- **enforce strong, two-factor authentication** by enabling **Client Certificate Authentication** and configuring the **Username Field in Client Certificate** field – You can take the require client certificates option one step further by having the key server derive the username from the certificate; that username is then compared against the username provided in the authentication request. If the usernames match and the password provided is correct, then the user is authenticated. This may be combined with the IP address requirement.
- **require the client IP address in the certificate** by enabling **Require Client Certificate to Contain Source IP** – You can require that the client certificate contain the client's IP address in the certificate's subjectAltName field. The key server compares that value with the source IP address of the authentication request. If the IPs match, then the user is authenticated. This may be combined with the two-factor authentication option described above.

We recommend that you enforce the most stringent security policy supported by the key server. Such a security policy would mandate SSL, disallow global sessions, and enforce strong, two-factor authentication and require that the client certificate contain the client IP address.

Key Access and Ownership

Keys can be created as global or owned by a particular user (keys are not owned by administrators). When you give group access permission for a key, all the users in that group can use that particular key (after authenticating to the server).

When the client requests that the server generate a new key, it can specify that the key should be exportable and/or deletable. An exportable key is a key that a client can export from the server. Once a key is generated as exportable, it can be exported only by the owner and any members of a group with the "Export" permission for that key.

A deletable key is a key that the client can delete from the server. Once a key is generated as deletable, only the owner of the key can delete the key.

Important! Administrators with Keys and Authorization Policies access control can delete any key regardless of whether it is marked as deletable.

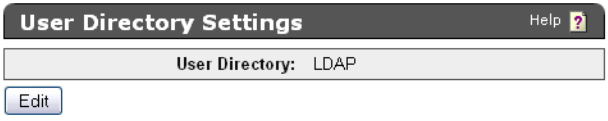
Clients that do not authenticate can only see global keys, which are accessible to all users. Likewise, any keys that the client generates during an unauthenticated connection are global keys. If a global key is marked as exportable or deletable during generation, then all users have permission to export or delete that key.

Configure the User Directory Settings

The User Directory Settings section determines if the DataSecure will employ a local of LDAP user directory when authenticating client requests. To use an LDAP directory, you must select LDAP here, and also configure the LDAP settings on the LDAP Server Configuration page (Security >> LDAP >> LDAP Server)

To configure the user directory settings:

1. Log in to the Management Console as an administrator with Key Server access control.
2. Navigate to the User Directory Settings section of the Cryptographic Key Server Configuration page (Device >> Key Server >> Key Server).



3. Click **Edit**.
4. Select *Local* or *LDAP* in the **User Directory** field. You can only choose one user directory at a time.

   Important! Selecting LDAP on a FIPS compliant device will take the device out of FIPS compliance - possibly in a manner that does not comply with FIPS standards. For information on disabling FIPS compliance, see Chapter 36, "High Security Features".

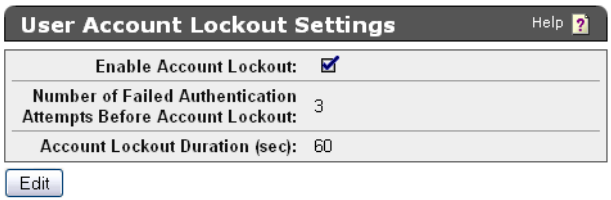
5. Click **Save**. This change applies to all key servers.

Configure the User Account Lockout Settings

To configure the user account lockout settings:

1 Log in to the Management Console as an administrator with Key Server access control.

2 Navigate to the User Account Lockout Settings section of the Cryptographic Key Server Configuration page (Device >> Key Server >> Key Server).



3 Click **Edit**.

4 Select **Enable Account Lockout** to prevent a user from logging in to the server for a given duration after a specified number of failed login attempts. When not enabled, users can make unlimited attempts to log in to an account.

5 Enter a value in the **Number of Failed Authentication Attempts Before Account Lockout** field. After this number of failed attempts, the system temporarily forbids access to the account. After the last failed authentication attempt, the system ignores any subsequent login requests until the end of the account lockout duration, at which time the counter is reset.

6 Enter a value in the **Account Lockout Duration** field. This is the period of time during which the account is not available during lockout.

7 Click **Save**.

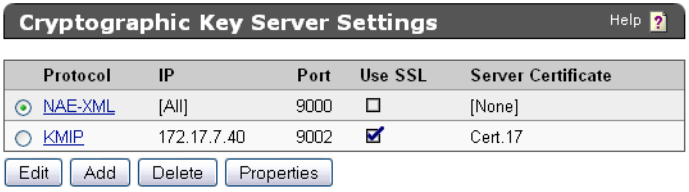
Manage the NAE-XML Server

By default, the key server is pre-configured for the NAE-XML protocol, though you will need to change some settings to enable SSL, enable clients to create, delete, and import keys, manage users, and export keys.

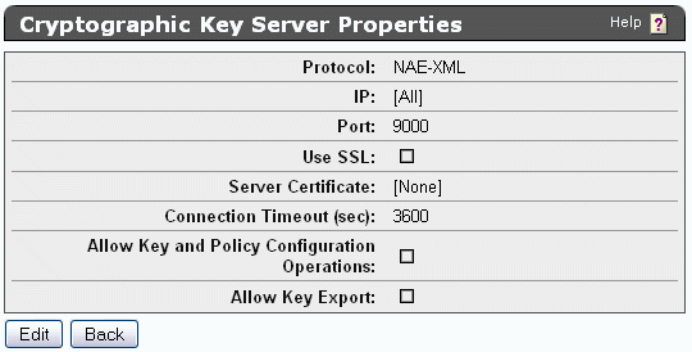
To manage the NAE-XML server:

1 Log in to the Management Console.

2 Navigate to the Cryptographic Key Server page (Security >> Key Server).



3 Select NAE-XML and click Properties, or click **Add** to create a new entry.



4 View the Cryptographic Key Server Properties. Click **Edit** to alter any values.

The available fields are:

- **IP** - IP address(es) on which the key server is enabled on the DataSecure. We strongly recommend that you select a *specific* IP address rather than using *[All]*. If you have multiple IP addresses available, using a single address here enables the key server to listen for traffic on only one IP address. This can greatly reduce system vulnerability to outside attacks.
- **Port** - port on which the server is listening for client requests. We recommend 9000 for NAE-XML.
- **Use SSL** - specify whether you want to require that clients connect to the key server using an SSL connection. If SSL is not enabled, the key server will not accept SSL connections.
- **Server Certificate** - required only when using SSL. must point to a server certificate signed by a local CA. This certificate will be used to authenticate the key server to clients.
- **Connection Timeout (sec)** - specifies how long a client connect can remain idle before the key server begins closing them. The default value is 3600, which is also the maximum.
- **Allow Key and Policy Configuration Operations** - when enabled, the key server allows the following actions:
  - key creation and deletion
  - key import
  - users with User Administration Permission can create, delete, and modify users and groups (available only through the XML interface).

  When this feature is disabled, only authentication, cryptographic, and random number generation requests are available.

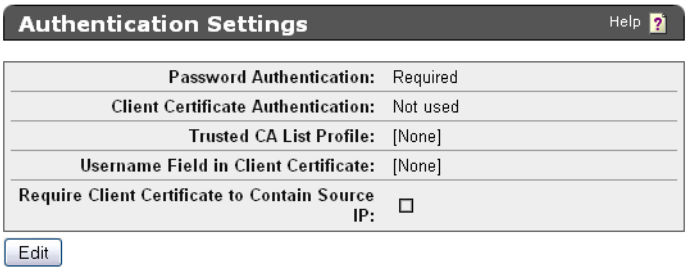
  Note: When using the multiple credentials feature, enabling this option allows users (and unauthenticated sessions) to perform the actions listed without being subjected to the multiple credentials rules. This may pose a security loophole. You might allow this access for automated scripts, or you might disallow it to tighten security.

  Important! Enabling this feature on a FIPS compliant device will take the device out of FIPS compliance - possibly in a manner that does not comply with FIPS standards. For information on disabling FIPS compliance, see Chapter 36, “High Security Features”.

- **Allow Key Export** - when enabled, the key server allows key export.

Important! Enabling this feature on a FIPS compliant device will take the device out of FIPS compliance - possibly in a manner that does not comply with FIPS standards. For information on disabling FIPS compliance, see Chapter 36, “High Security Features”.

5 View the Authentication Settings. Click **Edit** to alter any values.



The available fields are:

- **Password Authentication** - determines whether you require users to provide a username and password to access the key server when using KMIP. There are two options:
  - *Optional* - (default) no password authentication is required; global sessions are allowed; unauthenticated users can create global keys; all users can access global keys; only authenticated users can create and access non-global keys.
  - *Required* - password authentication is required; global sessions are not allowed; only non-global keys can be created; authenticated users can access global and non-global keys.
- **Client Certificate Authentication** - there are three options
  - *Not used* - (default) clients do not have to provide a client certificate to authenticate to the key server.
  - *Used for SSL session only* - clients must provide a certificate signed by a CA trusted by the DataSecure in order to establish an SSL connection. When you select this option, you must also select a Trusted CA List Profile.
  - *Used for SSL session and username* - clients must provide a certificate signed by a CA trusted by the DataSecure in order to establish an SSL connection; additionally, a username is derived from the client certificate. That username is the sole means of authentication if password authentication is optional and the client does not provide a username and password. If the client does provide a username, the key server compares the username derived from the certificate against the username in the authentication request. If the usernames match and the password is valid, the user is authenticated. If the usernames are not the same, the connection is closed immediately. When you select this option, you must also select a Trusted CA List Profile, and you must choose the field from which the username is derived.
- **Trusted CA List Profile** - select a profile to use to verify that client certificates are signed by a CA trusted by the DataSecure. This field is only used if you select *Used for SSL session only* or *Used for SSL session and username* above. As delivered, the default Trusted CA List profile contains no CAs. You must either add CAs to the default profile or create a new profile and populate is with at least one trusted CA before the key server can authenticate client certificates.

- **Username Field in Client Certificate** - specify the field from which to derive the username. This field is only used if you select *Used for SSL session and username* above. The username can come from the *UID* (user ID), *CN* (Common Name), *SN* (Surname), *E* (Email address), *E_ND* (Email without domain), or *OU* (Organizational Unit) field.

  If you select *E_ND*, the key server matches against the data to the left of the @ symbol in the email address in the certificate request. For example, if the certificate request contains the email address User1@company.com, then the key server matches against User1.
- **Require Client Certificate to Contain Source IP** - determines if the key server expects that the client certificate presented by the client application has an IP address in the subjectAltName field. The key server obtains the IP address from the subjectAltName and compares that the source IP address of the client application; if the two IP addresses match, the key server authenticates the user. If the two IP addresses do not match, the key server closes the connection with the client.

Add a KMIP Server

Because the KMIP Interface operates over SSL, KMIP server configuration is done in three parts. First, you must configure a local CA on the DataSecure. Second, you must create a server certificate signed by that local CA. Third, you must configure the KMIP server settings.

If there is already a local certificate authority on the DataSecure, you can skip to the second set of instructions. If there is already a server certificate, you can skip to the third set of instructions.

KMIP clients must provide certificates to connect to the DataSecure, which means the DataSecure must have access to signing CA to verify the certificate.

To create a local certificate authority:

1. Log in to the Management Console as an administrator with Certificate Authorities access control.
2. Navigate to the Create Local Certificate Authority section of the Certificate and CA Configuration page (Security >> Local CAs).

3 Enter the **Certificate Authority Name**, **Common Name**, **Organization Name**, **Organizational Unit Name**, **Locality Name**, **State or Province Name**, **Country Name**, **Email Address**, and **Key Size**.

4 Select either Self-signed Root CA or Intermediate CA Request as the **Certificate Authority Type**.

When you create a self-signed root CA, you must also specify a CA Certificate Duration and a Maximum User Certificate Duration, which become valid once you click **Create**. Once you create a self-signed root CA, you must add it to the trusted CA list for it to be recognized by the Key Server.

When you create an intermediate CA request, you must sign it with either an existing intermediate CA or your organization's root CA. Certificates signed by the intermediate CA can be verified by that same intermediate CA, by the root itself, or by any intermediate CAs that link the signing CA with the root. This enables you to de-centralize certificate signing and verification.

When creating an intermediate CA request, you must also specify a Maximum User Certificate Duration *when installing the certificate response*. This duration cannot be longer than the signing CA's duration.

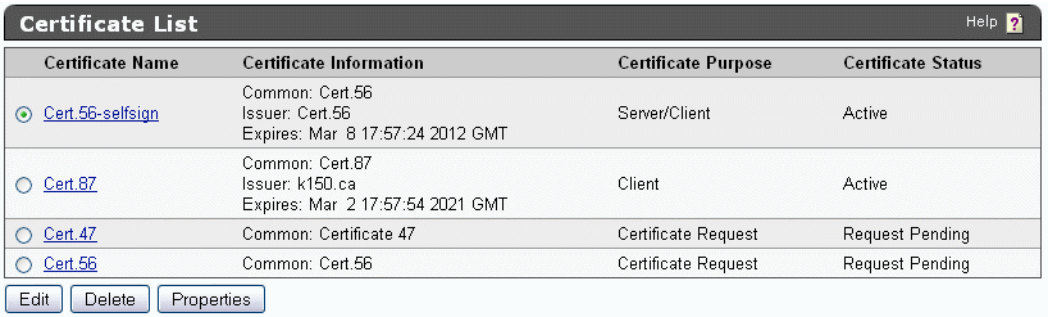
5 Click **Create** to create the DataSecure's local CA.

To create a server certificate, you must create a certificate request and sign it with the local CA:

1 Navigate to the Create Certificate Request section of the Certificate and CA Configuration page (Security >> SSL Certificates).

2 Enter the **Certificate Name**, **Common Name**, **Organization Name**, **Organizational Unit Name**, **Locality Name**, **State or Province Name**, **Country Name**, **Email Address**, and **Key Size** for the certificate. The DataSecure supports 768-bit, 1024-bit, and 2048-bit key sizes.

3 Click **Create Certificate Request**. The list shows the new request with a status of *Request Pending*.



4 Select the certificate request and click **Properties** to access the Certificate Request Information section.

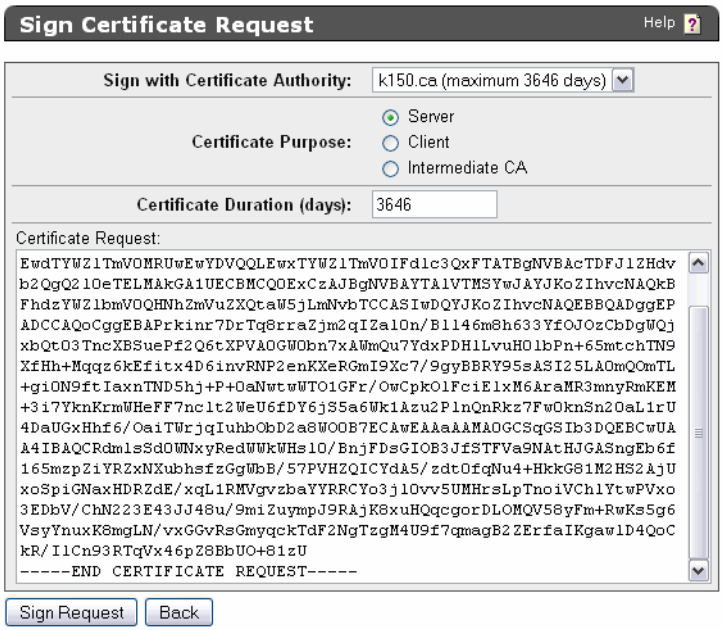
5 Copy the certificate request text. The certificate text looks similar, but not identical, to the following text.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIBmzCCAQQCAQAwWzEPMA0GA1UEAxMGZmxldGNoMQkwBwYDVQQKEwAxCTAHBgNVBAsTADEJM
AcGA1UEBxMAMQkwBwYDVQQIEwAxCzAJBgNVBAYTAlVTMQ8wDQYJKoZIhvcNAQkBFgAwgZ8wDQ
YJKoZIhvcAYBABTUxxgY0AMIGJAoGBAMUqA1t4m&Nm0sCcUqnt5Yug+qTSbgEFnvnYWUApHKD
lx5keC1lguQDU1ol2Xcc3YGrUviGCe4y0JIMK2giQ5b+ABQDemRiD11vInQqkhV6ngWBRD0lp
KCjU6QXDEE9KGCKBRh5uqL70rr2LErqxUuYwOu50Tfn4T3tKb1HGgfdzAgMBAAGgADANBgkqh
kiG9w0BAQQFAAOBgQCuYnv8vBzXEZpgLD71FfeDK2Zqh0FnfTHXAkHrj4JP3MCMF5nKHgOSRV
mImNHHy0cYKTDP+hor68R76XhLVapKMqNuUHUYf7CTB5JNHHy0cYKTNHHy0cYKTuV1Ce8nvvU
G+yp2Eh8aJ7thaua41xDFXPmIEXTqzXi1++DCWAdWaysojPCZugY7jNWXmg==
-----END CERTIFICATE REQUEST-----
```

Important! Be sure to include the first and last lines (-----BEGIN CERTIFICATE REQUEST----- and -----END CERTIFICATE REQUEST-----), and copy only the text in the certificate. Do not copy any extra white space.

6 Navigate to the Local Certificate Authority List section (Security >> Local CAs).

7 Select a CA and click **Sign Request**.



8 Paste the certificate request into the **Certificate Request** field.

9 Select *Server* as the **Certificate Purpose**, specify a **Certificate Duration** and click **Sign Request**. The newly-activated certificate displays on a new page.

10 Copy the certificate text.

11 Navigate back to the Certificate List section. (Security >> SSL Certificates)

12 Select the certificate request and click **Properties** to access the Certificate Request Information section.

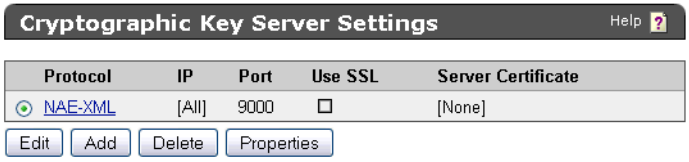
13 Click **Install Certificate**.

14 Paste the text of the signed certificate into the **Certificate Response** field.

15 Click **Save**. When you return to the main Certificate Configuration page, the certificate request is now an active certificate. It can be used in to establish SSL connections with client applications.

To configure the KMIP server settings:

1 Navigate to the Cryptographic Key Server Configuration page (Device >> Key Server).



2 Click **Add** in the Cryptographic Key Server Settings section.

3 Select *KMIP* for **Protocol**.

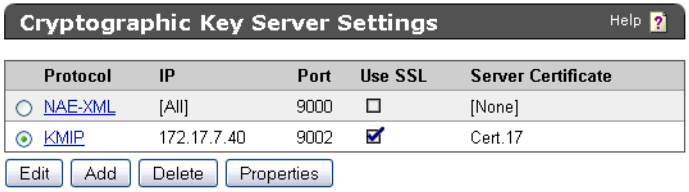
4 Select either *[All]* or a specific IP address for **IP**.

5 Select the **Port**. We recommend *9002*.

6 Select **Use SSL**. SSL is required for KMIP.

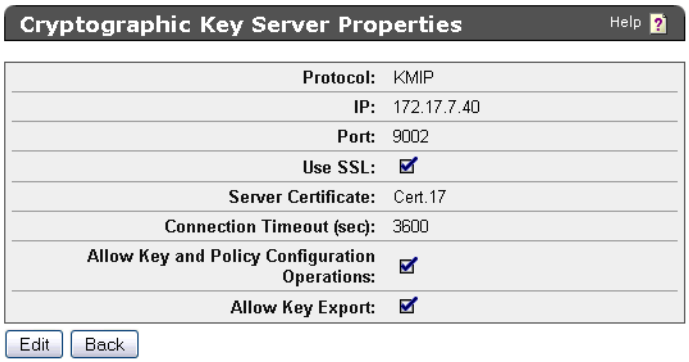
7 Select a **Server Certificate** from the drop-down list. The certificate you just created should be available for selection.

8 Click **Save**.



9 Select the KMIP link.

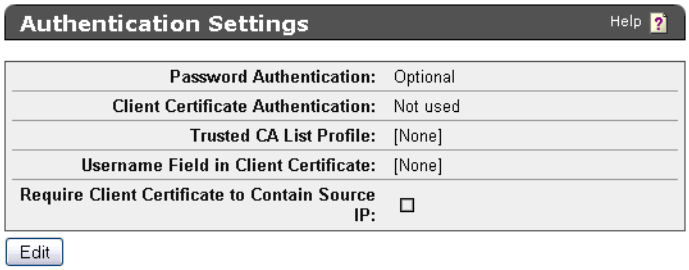
10 View the Cryptographic Key Server Properties. Click **Edit** to alter any values.



The available fields are:

- **IP** - IP address(es) on which the key server is enabled on the DataSecure. We strongly recommend that you select a *specific* IP address rather than using *[All]*. If you have multiple IP addresses available, using a single address here enables the key server to listen for traffic on only one IP address. This can greatly reduce system vulnerability to outside attacks.
- **Port** - port on which the key server is listening for client requests. We recommend 9002 for KMIP.
- **Use SSL** - required for KMIP.
- **Server Certificate** - must point to a server certificate signed by a local CA.
- **Connection Timeout (sec)** - specifies how long a client connect can remain idle before the key server begins closing them. The default value is 3600, which is also the maximum.
- **Allow Key and Policy Configuration Operations** - when enabled, the key server allows the following actions:
  - key creation and deletion
  - key import
- **Allow Key Export** - when enabled, the key server allows key export.

11 View the Authentication Settings. Click **Edit** to alter any values.



The available fields are:

- **Password Authentication** - determines whether you require users to provide a username and password to access the key server when using KMIP. There are two options:
  - *Optional* - (default) no password authentication is required; global sessions are allowed; unauthenticated users can create global keys; all users can access global keys; only authenticated users can create and access non-global keys.
  - *Required* - password authentication is required; global sessions are not allowed; only non-global keys can be created; authenticated users can access global and non-global keys.
- **Client Certificate Authentication** - You must enable this feature to comply with the KMIP standard. There are two options
  - *Used for SSL session only* - clients must provide a certificate signed by a CA trusted by the DataSecure in order to establish an SSL connection. When you select this option, you must also select a Trusted CA List Profile.
  - *Used for SSL session and username* - clients must provide a certificate signed by a CA trusted by the DataSecure in order to establish an SSL connection; additionally, a username is derived from the client certificate. That username is the sole means of authentication if password authentication is optional and the client does not provide a username and password. If the client does provide a username, the key server compares the username derived from the certificate against the username in the authentication request. If the usernames match and the password is valid, the user is authenticated. If the usernames are not the same, the connection is closed immediately. When you select this option, you must also select a Trusted CA List Profile, and you must choose the field from which the username is derived.
- **Trusted CA List Profile** - select a profile to use to verify that client certificates are signed by a CA trusted by the DataSecure. This field is only used if you select *Used for SSL session only* or *Used for SSL session and username* above. As delivered, the default Trusted CA List profile contains no CAs. You must either add CAs to the default profile or create a new profile and populate is with at least one trusted CA before the key server can authenticate client certificates.
- **Username Field in Client Certificate** - specify the field from which to derive the username. This field is only used if you select *Used for SSL session and username* above. The username can come from the *UID* (user ID), *CN* (Common Name), *SN* (Surname), *E* (Email address), *E_ND* (Email without domain), or *OU* (Organizational Unit) field.

If you select *E_ND*, the key server matches against the data to the left of the @ symbol in the email address in the certificate request. For example, if the certificate request contains the email address User1@company.com, then the key server matches against User1.

- **Require Client Certificate to Contain Source IP** - determines if the key server expects that the client certificate presented by the client application has an IP address in the subjectAltName field. The key server obtains the IP address from the subjectAltName and compares that the source IP address of the client application; if the two IP addresses match, the key server authenticates the user. If the two IP addresses do not match, the key server closes the connection with the client.

Chapter 5

Health Check

The Health Check feature enables client applications to check the availability of the key server by sending the key server an HTTP request. The Health Check feature listens for requests on a port that you specify in the Health Check section of the Cryptographic Key Server Configuration page. When a request is made to the DataSecure on the port that the Health Check feature is monitoring, the key server responds with one of two HTTP response codes:

- 200 OK – key server is available
- 500 Internal Server Error – key server is unavailable

In addition to being able to configure client applications to check the availability of the key server, you can also check the status of the key server by making an HTTP request from a web browser.

The Health Check feature responds to GET, POST, and HEAD requests, and it processes the entire request before responding. As such, we recommend that you send a small request. The recommended URL for accessing the Health Check feature is:

```
http://192.168.1.10:9080/
```

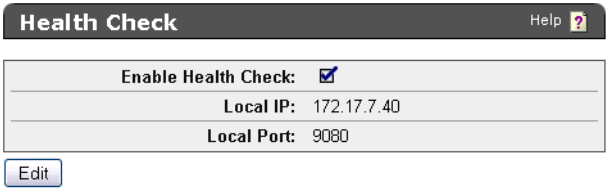
where 192.168.1.10 refers to the IP address of the key server to check, and 9080 is the port on which the Health Check feature is listening for requests. If the client is unable to connect to the key server or if the key server is unable to respond to a request, the client should assume the key server is down.

Enable Health Check

Use the Health Check section to enable the health check feature, and set the port and IP address.

To enable health check:

1. Log in to the Management Console.
2. Navigate to the Health Check section on the Cryptographic Key Server Configuration page (Device >> Device Configuration >> Key Server >> Health Check).



3. Select **Edit**.
4. Select **Enable Health Check**.

5 Enter the **Local IP**. This is the IP address on which you want to listen for health check requests. You can specify an individual IP address bound to the DataSecure, or you can specify *All*.

Tip: We strongly recommend that you limit the Health Check feature to a specific IP address. If you have four IP addresses bound to the DataSecure, and you enable the Health Check feature for all IP addresses, then the DataSecure listens for health check requests on four different IP addresses; whereas, if you specify a single IP address, the DataSecure listens for health check requests on only one IP address. This can greatly reduce system vulnerability to outside attacks.

6 Enter the **Local Port**. This is the port on which you want the DataSecure to listen for health check requests. The default value for this setting is 9080.

Chapter 6

DataSecure Clustering

DataSecure clustering enables multiple DataSecures to share configuration settings. Any changes made to these values on one cluster member are replicated to all members within the same cluster. This enables you to immediately share configuration changes with other DataSecures, and improves the failover capabilities of a high availability configuration.

When a configuration operation is performed on one cluster member, the cluster feature determines if the operation should be replicated throughout the cluster. If so, the DataSecure immediately sends a similar operation request to every other member using the cluster port.

If the replication succeeds for a device, the operation is recorded in the System Log. If the replication fails, the server waits 30 seconds and tries again. If three consecutive replications fail, the server records the failure in the System Log and sends an SNMP trap indicating that the cluster is out of sync. Once a device is out of sync, an administrator must synchronize it manually.

The following configuration settings *can* be replicated within a cluster. You may opt not to replicate some of these settings.

- Administrators
- Authorization Policies
- DNS
- Enterprise
- IP Authorization
- Key Server
- Keys
- Known CAs, CRLs, and Trusted CA List Profiles
- LDAP Server
- Local Certificate Authorities (CAs)
- Local Uses & Groups
- Log Signing Certificate
- Logging
- NTP
- ProtectDB Manager
- ProtectFile Manager
- Service Startup

- SNMP
- SSL

The following configuration settings *cannot* be replicated within a cluster:

- Network settings
- Certificates (other than the Log Signing Certificate)

Note: Items not replicated by the clustering feature can be replicated manually using the Backup and Restore mechanism described in Chapter 23, “Backups”.

The Cluster Key

A cluster uses a cluster key to authenticate members during replication and synchronization. When a cluster is created, this key is created automatically.

If a cluster member is stolen or the key is otherwise compromised, remove all devices from the cluster (this will effectively delete the cluster). You can then create a new cluster and add members using the new key.

The Cluster Password

A cluster key is protected by a cluster password, which is provided by the administrator when creating the cluster. This password must be provided when devices attempt to join a cluster, or when an administrator attempts to restore a cluster backup.

You can change the password by editing **Cluster Password** and **Confirm Cluster Password** on the Cluster Settings section of the Cluster Configuration page *for every member of the cluster*. You can do this if you forget the original password, for example. However, to restore an automatic synchronization backup, you will need the cluster password used when the backup was created. Therefore, if you forget a cluster password you can still maintain the cluster, but you will lose the backups that use that password.

Clusters and High Availability

If you are using both clustering and the High Availability feature, you should ensure that the master and slave devices belong to the same cluster. As part of the same cluster, the master and slave will automatically synchronize. This ensures that when the slave comes online, its configuration is current.

Multi-keys

Regardless of your cluster settings, multi-keys will not be replicated to DataSecures that are running software version 4.3 and older. This is because the multi-key functionality is not enabled on those devices.

Local Certificate Authority Replication

The cluster feature enables you to replicate local certificate authorities (CAs) within a cluster. This includes the CA’s public and private keys, the list of signed certificates, and the list of revoked certificates.

During synchronization, a DataSecure will inherit a new list of local CAs from the cluster. The device's old list of local CAs will be deleted. Should you need to access a deleted local CA, you can restore the automatic synchronization backup.

Note: When upgrading from a previous release, local CA replication is disabled by default.

Automatic Synchronization Backups

Prior to each synchronization, and when a DataSecure joins a cluster, the Key Server creates an automatic backup of the full list of items that can be replicated. Your synchronization backup may contain some configuration settings that you normally do not replicate.

These internal backups adhere to the following naming convention:

```
sync_autobackup_YYYYMMDD_HHMMSS
```

where YYYYMMDD is the year, month and day, and HHMMSS is the time.

Synchronization backups can be viewed and restored on the Backup and Restore page. To restore a backup, you must provide the cluster password used when the backup was created in the **Backup Password** field.

Clustering Enterprise Managers

An Enterprise Manager cluster is comprised of one primary and one or many secondary devices. These devices share configuration information and both poll EdgeSecures for status updates, but only the primary cluster member can configure and manage EdgeSecures. The secondary devices can be used as failover servers, but all EdgeSecure-related configuration and management operations are disabled. (The main purpose of clustering Enterprise Managers is to have multiple devices ready to step in, should the primary device go offline.)

All changes to global objects and profiles on the primary EM are replicated in real time to the secondary EMs. Once an operation is committed and the primary EM has started to push the changes to the EdgeSecures, that operation exists only on that primary device; it cannot be restarted on a secondary device if the primary is taken offline.

Clustering Enterprise Managers and DataSecures

Enterprise Managers can cluster with DataSecures that do not have the EM feature enabled. Among the EMs, you must select a primary device, but the DataSecures are ignorant of the primary/secondary designation.

All configuration understood by the DataSecures is replicated according to the cluster replication settings, the EM-specific settings are ignored.

For example, if a standard key is created on the primary EM, it is replicated to all members of the cluster, EMs and DataSecures alike. If a new profile is created on the primary EM, it can only be replicated to the secondary EMs: the DataSecures ignore this update.

The more complicated examples involve multi-keys and users with distinct passwords on EdgeSecures, as this functionality is not available on the DataSecures.

When a multi-key is created on the primary EM, it is replicated to the secondary EMs only. DataSecures will not have access to the multi-key.

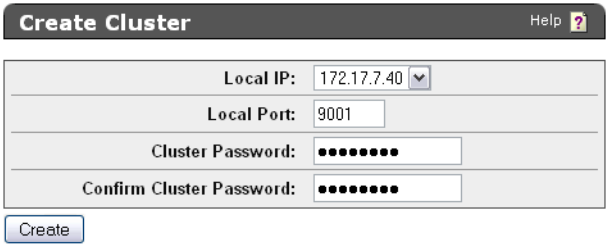
When a user with distinct passwords on EdgeSecures is created on the primary EM, it is replicated to the secondary EMs as such. On the DataSecures, however, this user is replicated as a user with the default password.

Tip: When maintaining a cluster of Enterprise Managers and DataSecures, we recommend that you only create users and keys on the primary EM device.

Creating a Cluster

You create a cluster on one DataSecure and then join other members to that cluster. To create a cluster:

1. Select a DataSecure to be the first cluster member. This device cannot currently be a member of a cluster.
2. Log in to the Management Console as an administrator with Cluster access control.
3. Navigate to the Create Cluster section on the Cluster Configuration page (Device >> Cluster).



4. Enter the **Local IP**. If the device has multiple network interfaces, the pull-down menu lists all available interfaces.
5. **Enter the Local Port**. The cluster port (typically 9001) must be different from the key server port (typically 9000).
6. Enter the **Cluster Password**. The requirements for the cluster password depend on your Password Management Settings. For information on password requirements, refer to Chapter 17, “Password Management”.
7. Click **Create Cluster**. A new cluster key is internally created, and this device appears in the Cluster Members list.
8. By default, your cluster’s replication settings will be compatible with DataSecure version 4.4 and above.
9. Click **Edit** to view or edit the entire list of replicated settings.

Configuring the Replication Settings

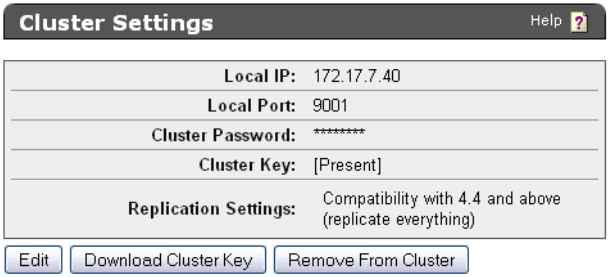
The Replication Settings determine which configuration settings are shared by the cluster members. Upon saving these settings on one device, that Key Server will push the new configuration out to the other cluster members. *No automatic synchronization backup will occur.* You should edit the replication settings only on a device that has a configuration you want to replicate.

To configure the replication settings for a cluster:

1 Select a DataSecure with configuration settings that you can push out to other cluster members.

2 Log in to the Management Console as an administrator with Cluster access control.

3 Navigate to the Cluster Settings section on the Cluster Configuration page (Device >> Cluster).



4 Click **Edit**.

5 Select an option for the **Replication Settings** field. Once you set the **Replication Settings** field and return to the edit mode of the Cluster Settings section, the items checked under Advanced Settings will reflect your current configuration. Available values are:

- Compatibility with 4.4 and above - replicates all configuration settings.
- Compatibility with 4.2 & 4.3 - replicates keys, Authorization Policies, Local users & Groups, and LDAP Server, and ProtectDB settings. (ProtectDB is not available for DataSecure.)
- Compatibility with 4.0 & 4.1 - replicates keys, Authorization Policies, Local users & Groups, and LDAP Server settings.
- Advanced Settings - You can select individual configuration settings to replicate.

Note: Certificates, with the exception of the Log Signing Certificate, can not be replicated within a cluster. However, if you are replicating Key Server settings, and those settings include the use of a specific server certificate, you must create a certificate with that name on each cluster member.

6 Click **Save** and confirm your changes. Once you confirm the settings, they will be replicated to the other cluster members. *No automatic synchronization backup will occur.*

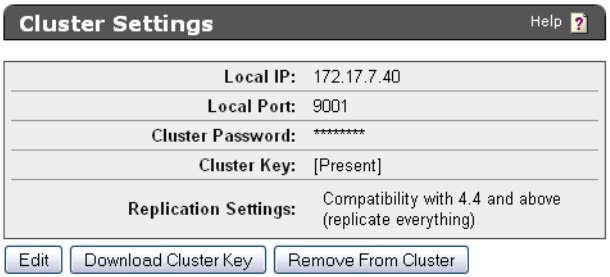
Joining a Cluster

You must know the IP and port number of another member of the cluster, and you need a local copy of the cluster key and the cluster password. A device can be a member of only one cluster.

To join a cluster:

1 Log in to the Management Console of a current cluster member as an administrator with Cluster access control.

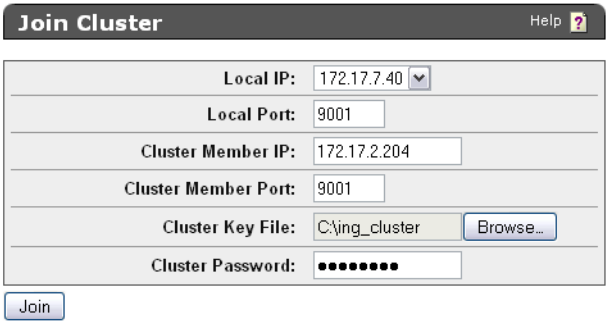
2 Navigate to the Cluster Settings section of the Cluster Configuration page (Device >> Cluster).



3 Click **Download Cluster Key** to save the key on your local file system. The cluster key contains authentication information used when passing information between cluster members.

4 Write down the **Local IP** and **Local Port** values.

5 Log in to the DataSecure that you want to add to the cluster and navigate to Join Cluster section on the Cluster Configuration page.



6 Enter the **Local IP**. If the device has multiple network interfaces, the pull-down menu lists all available interfaces.

7 Enter the **Local Port**. The cluster port (typically 9001) must be different from the key server port (typically 9000).

8 Enter the IP and port values from step 4 in the **Cluster Member IP** and **Cluster Member Port** fields.

9 Enter the **Cluster Password**.

10 Enter the location of the cluster key in the **Cluster Key** field. Click **Browse** to locate the downloaded cluster key file in your file system.

11 Click **Join Cluster**. After clicking this button you are asked to synchronize with the specified cluster member. Click **Confirm** to synchronize now, or **Cancel** if you want to synchronize manually later on. In either case, the local device becomes a member of the cluster.

WARNING: Synchronizing the local device with the cluster overwrites the existing configuration, which may include keys. You can access overwritten information using the synchronization backup. If you have any keys that only exist on the local device, you can use the backup and restore features to copy them to another DataSecure before synchronizing the local device.

Important! When adding a device running a higher software version than the existing cluster members, you will have to edit the cluster settings to ensure that the replication settings are correct. For more information, see “Configuring the Replication Settings” on page 37.

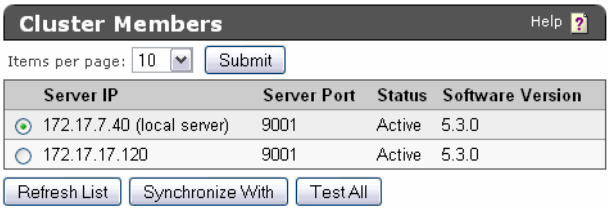
12 Delete the cluster key from the local file system on your workstation.

Synchronizing With a Cluster Member

To synchronize with a cluster member:

1 Log in to the Management Console that will be updated as an administrator with Cluster access control.

2 Navigate to the Cluster Members section of the Cluster Configuration page (Device >> Cluster).



3 Click **Refresh List** to update the list of server IPs that are members of this cluster. This will not update the **Status** of each cluster member.

4 Click **Test All** to verify the device’s connection to all the members of this cluster. This will update the **Status** for each cluster member.

5 View the server **Status**. Valid values are:

- *Active* - connected to the cluster.
- *Inactive* - not connected to the cluster
- *Pending Refresh* - the exact status of the device is unknown either because the device is currently synchronizing with the cluster or because there was no direct communication with that server. View the system log for information about synchronizations.

6 Select the server from which you will copy configuration settings.

7 Click **Synchronize With** and confirm this action. As part of the synchronization, the Key Server will create an automatic synchronization backup before installing the new configuration.

WARNING: Synchronizing the local device with the cluster overwrites the existing configuration, which may include keys. You can access overwritten information using the synchronization backup. If you have any keys that only exist on the local device, you can use the backup and restore features to copy them to another DataSecure before synchronizing the local device.

Setting up SSL in a Cluster

When using SSL in a cluster, the replication settings must include Key Server settings and all cluster members must use a server certificate with the same name, as indicated on the Key Server Settings section. The contents of those server certificates, however should be unique.

To configure SSL for a cluster:

1. Log in to the Management Console as an administrator with Certificate access control.
2. Navigate to the Create Certificate Request section on the Certificate and CA Configuration page (Device >> Cluster).
3. Create a certificate request.
4. Repeat steps 1, 2, and 3 for each device in the cluster. *Use the same name for each certificate request.*
5. Sign all of the certificate requests with the same CA. You can use a local CA on one of your devices, or another CA within your organization's PKI.
6. Install each signed certificate on the appropriate device.
7. Select a DataSecure with configuration settings that you can push out to other cluster members.
8. Log in to that device's Management Console as an administrator with Key Server access control.
9. Navigate to the Key Server Settings section on the Key Server Configuration page.
10. Select **Use SSL** and set **Server Certificate** to the newly created certificate.
11. Navigate to the Cluster Settings section on the Cluster Configuration page.
12. Set the **Replication Settings** field so that Key Server settings are replicated across the cluster by selecting Compatibility with 4.4 and above, or using Advanced Settings. The new SSL configuration will be replicated along with the other Key Server settings.
13. Click **Save** and confirm your changes. Once you confirm the settings, they will be replicated to the other cluster members. *No automatic synchronization backup will occur.*

Removing a Device from a Cluster

To remove a device from a cluster:

1. Log in the Management Console of the device that will be removed from the cluster as an administrator with Cluster access control.
2. Navigate to the Cluster Settings section of the Cluster Configuration page (Device >> Cluster).
3. Click **Remove From Cluster**. The device is removed from the cluster. The cluster key is also removed from the device.

To delete an entire cluster, you must remove each device individually. If this is the last device in the cluster, the final cluster key is removed and all other downloaded cluster keys from this cluster become invalid. If you later create a new cluster with this device, a new cluster key is generated.

Upgrading a Cluster

A cluster can be upgraded by upgrading one device at a time. Once all of the devices are running the new software, you can configure the replication settings as needed.

Tip: We recommend that you do not make configuration changes while upgrading a cluster.

To upgrade a cluster:

1. Log in to the Management Console as an administrator with Software Upgrade and System Health access control.
2. Upgrade the software on the device.
3. Repeat steps 1 and 2 for each member of the cluster.
4. Configure the replication settings on one member of the cluster. For more information, see “Configuring the Replication Settings” on page 37.

Deleting a Cluster

A cluster is deleted when the last member is removed from the cluster.

To delete a cluster:

1. Log in the Management Console of the device that will be removed from the cluster as an administrator with Cluster access control.
2. Navigate to the Cluster Settings section of the Cluster Configuration page (Device >> Cluster).
3. Click **Remove From Cluster**.
4. Repeat these steps for each member of the cluster.

Chapter 7

Date, Time and NTP

This feature enables you to set the system date and time, and configure NTP servers. The Network Time Protocol (NTP) is a protocol by which computers on a network synchronize their clocks against an NTP server. The DataSecure allows you to synchronize a clock manually or at regular intervals.

When the DataSecure attempts to synchronize its clock against the NTP server(s), one of three outcomes is possible:

- If the clock on the DataSecure is successfully synchronized, and the difference between the time on the DataSecure and the NTP server(s) is less than 0.5 seconds, the time on the DataSecure is gradually *slewed* to the real time.
- If the clock on the DataSecure is successfully synchronized, and the difference between the time on the DataSecure and the NTP server(s) is greater than 0.5 seconds, the time on the DataSecure is immediately *stepped* to the real time. This event is recorded in the System Log.
- If an error prevented the DataSecure from synchronizing its clock, an error message is recorded in the System Log.

Note: Synchronizing the time causes the Key Server to restart if the time change is greater than one minute. While restarting, the Key Server is unavailable for up to 60 seconds.

Setting the Date and Time on the DataSecure

To set the date and time on the DataSecure:

1 Log in to the Management Console as an administrator with Network and Date/Time access control.

2 Navigate to the Date and Time Settings section of the Date & Time Configuration page (Device >> Date & Time).

3 Click **Edit**. You cannot edit the DataSecure's **Date** and **Time** fields when NTP is enabled.

4 Modify the **Date**, **Time**, and **Time Zone** fields as follows:

- **Date** - Use the drop-down lists to set the month, day, and year.
- **Time** - Use the drop-down lists to define the current hour, minutes, and seconds.
- **Time Zone** - Use the drop down list to select a time zone.

5 Click **Save**.

If you adjust the date and time settings forward, any log rotations scheduled for the skipped time period will not occur. You can rotate those logs manually using the Log Viewer page.

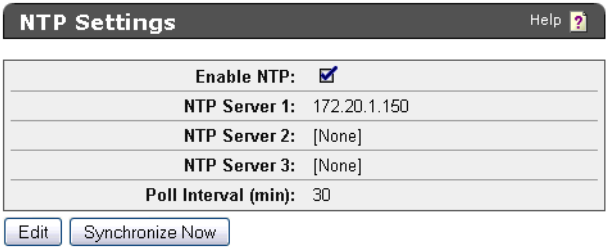
If you adjust the date and time settings backwards, any log rotations scheduled for the repeated time period will occur again.

Configuring an NTP Server Connection

To configure an NTP server connection:

1 Log in to the Management Console as an administrator with Network and Date/Time access control.

2 Navigate to the NTP Settings section of the Date & Time Configuration page (Device >> Date & Time).



3 Click **Edit**.

4 Select **Enable NTP** to enable the feature. Once enabled, you cannot manually set the time or date on the DataSecure. You can still modify the timezone.

5 Enter the IP addresses or hostnames of the servers in the **NTP Server** fields. You can list as many as three NTP servers. When clocks are synchronized, the DataSecure polls all the servers listed to determine the correct time.

6 Enter the **Poll Interval**, in minutes. This is the length of time between consecutive pools. The minimum value for this field is 5; the maximum value is 10080 (one week). This value must be a multiple of 5. If you attempt to set a value that is not a multiple of 5, the DataSecure rounds down to the nearest multiple of 5.

7 Click **Save**.

Manually Synchronizing with an NTP Server

The DataSecure will automatically synchronize with the NTP server according to the **Poll Interval** value indicated in the NTP section.

To manually synchronize with an NTP server:

1 Log in to the Management Console as an administrator with Network and Date/Time access control.

2 Navigate to the NTP Settings section of the Date & Time Configuration page (Device >> Date & Time).

3 Click **Synchronize Now** to synchronize the clock on the DataSecure immediately. The **Synchronize Now** button can be used even when automatic NTP synchronization is not enabled.

Chapter 8

Network Interfaces

The Network Configuration page enables you to configure the DataSecure's network interface list and create VLAN tagged interfaces.

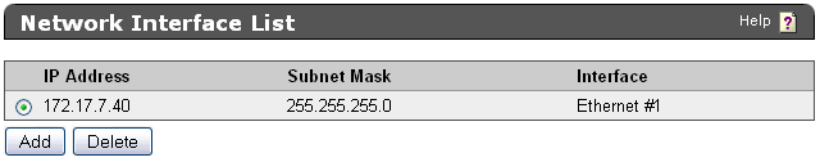
Configure Network Interfaces

Note: The first network interface (Ethernet #1) was configured as part of the installation process. Use the Network Interface List section to configure additional interfaces, or to reconfigure Ethernet #1.

To configure a network interface:

1 Log in to the Management Console.

2 Navigate to the Network Configuration page (Device >> Network).



3 Click **Add**.

4 Enter the **IP Address**.

5 Enter the **Subnet Mask**.

6 Enter the **Interface**. The number of interfaces on the DataSecure depends on the model. Network interfaces are located on the back of the device.

7 Click **Save**.

Configure VLAN Tagged Interfaces

The DataSecure can accept standard 802.3 Ethernet frames and 802.1Q Ethernet frames. In a typical Ethernet network, frames are no larger than 1514 bytes (excluding the checksum and preamble). The format of a frame in such a network is shown here:

Dest MAC Address	Source MAC Address	Length/ Type	Data
6 bytes	6 bytes	2 bytes	46 to 1500 bytes

Field	Description
Dest MAC Address	Identifies the station or stations that should receive the frame.
Source MAC Address	Identifies the station where the frame originated.
Length/Type	If this field is less than or equal to 1500, then it indicates the number of bytes in the subsequent Data field. If the value of this field is greater than or equal to 1536, then the it indicates protocol type.
Data	Contains the data transferred from the source station to the destination station or stations. The maximum size of this field is 1500 bytes.

The 802.1Q specification established a standard method for inserting Virtual LAN (VLAN) membership information into Ethernet frames. An extra field with a size of 4 bytes is inserted into VLAN Tagged ethernet frames immediately after the Source MAC Address. The format of a frame in such a VLAN Tagged Ethernet network is shown here:

Dest MAC Address	Source MAC Address	VLAN Tag	Length/ Type	Data
6 bytes	6 bytes	4 bytes	2 bytes	46 to 1500 bytes

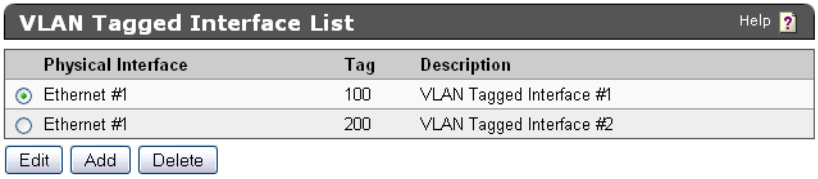
The VLAN Tag field uniquely identifies the VLAN to which the Ethernet frame belongs.

VLAN tagged interfaces behave in exactly the same way as non–VLAN tagged interfaces. You can assign a unique IP address to a VLAN tagged interface, just as you can to a non–VLAN tagged interface, and you can use that IP address wherever you have to supply a local IP address.

To configure a VLAN tagged interface:

1 Log in to the Management Console.

2 Navigate to the Network Configuration page (Device >> Network).



3 Click **Add** to create a VLAN tagged interface. You must then enter the following values:

- **Physical Interface** - select the physical interface on which you want to create the VLAN tagged interface
- **Tag** - supply a VLAN group number between 2 and 4094.
- **Description** - enter an optional description of no more than 256 characters.

You can have a maximum of 16 VLAN tagged interfaces on a DataSecure.

4 Click **Delete** to remove a VLAN tagged interface. You cannot delete a VLAN tagged interface if it is being used elsewhere in the environment. For example, you cannot delete a VLAN tagged interface if an IP address is bound to the VLAN tagged interface.

Chapter 9

Gateways & Routing

The Network Configuration page enables you to configure the default gateway list, select the interface to use for outgoing connections, and configure a static route list.

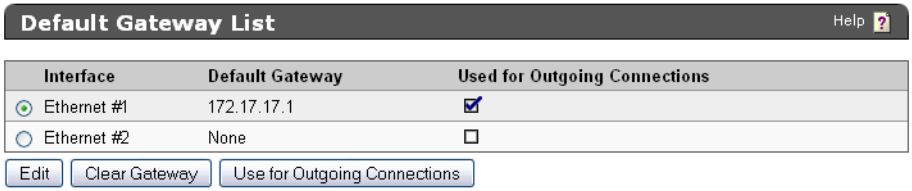
Configure the Default Gateway

The Default Gateway List section of the Network Configuration page provides a view of the default gateways used by the DataSecure for routing. A default gateway is used to identify the IP address to which all packets destined for a remote network are routed. One default gateway can be associated with each physical interface. Most network configurations require only a single default gateway. Multiple default gateways might be necessary for network configurations where multiple interfaces of the DataSecure are connected to the network.

Note: The **Default Gateway** was created during the DataSecure installation.

To configure the default gateway:

1. Log in to the Management Console.
2. Navigate to the Default Gateway List section of the Network Configuration page (Device >> Network >> Gateways & Routing). The number of interfaces displayed depends on the device hardware itself. All available interfaces are listed - even if they are not used or configured.



3. Select **Edit**.
4. Edit the Default Gateway field, if necessary. A blank Default Gateway indicates that no default gateway exists. The Default Gateway address cannot be a broadcast of network address as determined by the IP addresses on the system.
5. Select **Save.**
6. Select Clear Gateway to remove a default gateway.
7. Select **Used for Outgoing Connections** to use the selected interface for outgoing connections initiated by the DataSecure. If this gateway fails, all outgoing connections initiated by the DataSecure will fail. When using multiple interfaces, you must indicate which interface will handle outgoing connections. For devices with one gateway, that interface is automatically used for outgoing connections.

Examples of Default Gateway Configuration

The following examples illustrate the possible configurations. In each example, Ethernet #1 is bound to 172.17.7.16 and Ethernet #2 is bound to 10.20.41.16.

Example 1

```
Interface               Default Gateway   Used for Outgoing Connections
-------------------------------------------------------------------------
Ethernet #1             172.17.7.1        yes
Ethernet #2             none              no
```

All responses to incoming packets leave from 172.17.7.1 - except the responses to incoming packets from the 10.20.41.0 addresses (the local subnet of Ethernet #2). Those responses leave from Ethernet #2 interface.

All connections initiated by the DataSecure leave from 172.17.7.1.

Example 2

```
Interface               Default Gateway   Used for Outgoing Connections
-------------------------------------------------------------------------
Ethernet #1             none              no
Ethernet #2             10.20.41.1        yes
```

All responses to incoming packets leave from 10.20.41.1 - except the responses to incoming packets from the 172.17.7.0 addresses (the local subnet of Ethernet #1). Those responses leave from the Ethernet #1 interface.

All connections initiated by the DataSecure leave from 10.20.41.1.

Example 3

```
Interface               Default Gateway   Used for Outgoing Connections
-------------------------------------------------------------------------
Ethernet #1             172.17.7.1        yes
Ethernet #2             10.20.41.1        no
```

All responses to incoming packets destined for IPs bound to Ethernet #1 leave from 172.17.7.1. All responses to incoming packets destined for IPs bound to Ethernet #2 leave from 10.20.41.1.

If packets destined for Ethernet #1 are received by the Ethernet #2 interface, the response packets will still leave from 172.17.7.1. Likewise, any packets destined for Ethernet #2 that are received by the Ethernet #1 interface will still leave from 10.20.41.1.

If one of the default gateways should fail, the other interface is not affected. For example, if 172.17.7.1 fails, IPs bound to Ethernet #1 will be unreachable - but the Ethernet #2 interface will operate normally.

All connections initiated by the DataSecure (regardless of destination) leave from 172.17.7.1, because 'Used for Outgoing Connections' is configured for that gateway. If this gateway fails, all outgoing connections fail.

Example 4

```
Interface                Default Gateway   Used for Outgoing Connections
-------------------------------------------------------------------------
Ethernet #1              172.17.7.1        yes
Ethernet #2              10.20.41.1        no
```

This configuration is the same as example 3, but in this scenario there are some hosts and networks that are not reachable through 172.17.7.1. Most often these would be private or secure sub-networks. In such a case you would add a static route out of 10.20.41.1 so that the DataSecure can reach the additional hosts or networks. The static route is shown below:

```
IP Address               Subnet Mask       Gateway           Interface
-------------------------------------------------------------------------
66.230.200.0             255.255.255.0     10.20.41.1        Ethernet #2
```

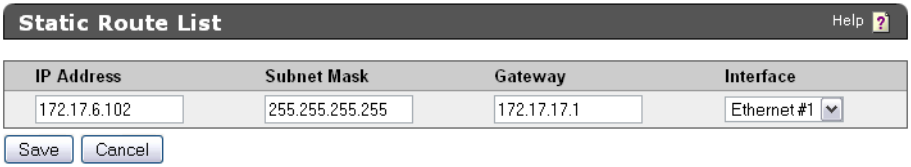
Configure a Static Route

The Static Route features allows you to explicitly specify a route from the DataSecure to another network device. Such a route is stored in the routing table on the DataSecure.

To configure the default gateway:

1 Log in to the Management Console.

2 Navigate to the Static Route List section (Device >> Network >> Gateways & Routing).



3 Click Add.

4 Enter an IP Address. This is the address you a trying to reach with this route. Valid values are IP or network addresses matching the specific Subnet Mask.

5 Enter the Subnet Mask associated with the IP Address/Network needed to identify the destination. Valid values are any subnet mask address.

6 Enter the Gateway used to reach the destination. A static route that does not include a gateway indicates that the destination address can be reached on the local subnet for the specified physical interface. Values for the Gateway field are constrained by the following:

- If you specify a value for the Gateway field, you must specify an IP address.
- The gateway must be reachable based on the network routes created by the addition of an IP address to the system.
- The gateway address cannot be a broadcast or network address as determined by the IP addresses on the system or the static route being added.
- The gateway must not be used by any other route on a different physical interface.

7 Click **Save**.

Chapter 10

Hostname & DNS

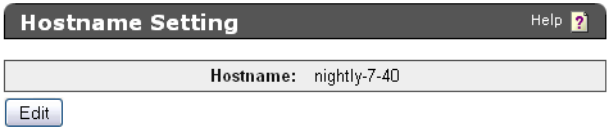
The Network Configuration page enables you to set the DataSecure's hostname and connect to any DNS servers in your network.

Set the Hostname

The hostname, which identifies each DataSecure in a network, is the unique name assigned to a DataSecure. It is initially assigned during installation.

To set the hostname:

1. Log in to the Management Console as an administrator with Network and Date/Time access control.
2. Navigate to the Hostname Setting section of the Network Configuration page (Device >> Network >> Hostname & DNS).

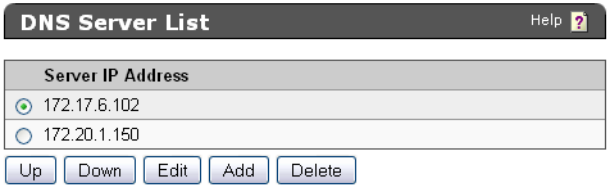


3. Click **Edit**.
4. Enter the **Hostname**. This string cannot be longer than 64 characters.
5. Click **Save**.

Configure DNS Server

Domain Name Service (DNS) settings are viewed and modified on the DNS Server List section on the DNS tab of the Network Configuration page. From this section, the user can opt to review the server list or use the buttons to prioritize, add, modify, or remove a DNS server.

1. Log in to the Management Console as an administrator with Network and Date/Time access control.
2. Navigate to the Hostname Setting section of the Network Configuration page (Device >> Network >> Hostname & DNS).



3 Click Edit or Add.

4 Enter a **Server IP Address** and select **Save**.

5 Use the **Up** and **Down** buttons to set the order in which the servers will be queried by the DataSecure.

Chapter 11

Network Interface Port Speed & Duplex

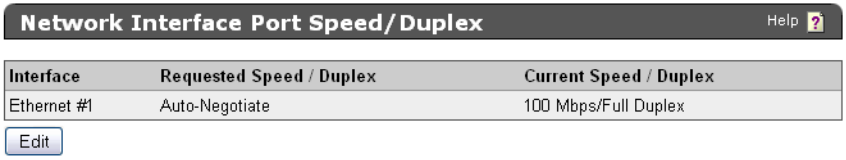
The Network Configuration page enables you to configure the port speed and duplex for the DataSecure's network interfaces.

Configure Network Interface Port Speed/Duplex

The DataSecure can auto-negotiate a port speed and duplex setting when communicating with other network devices. In some network configurations, however, you might want to force the DataSecure to use a particular port speed and duplex setting. The Port Speed tab on the Network Configuration page allows you to choose between Auto-Negotiate and a variety of port speed and duplex settings.

1 Log in to the Management Console as an administrator with Network and Date/Time access control.

2 Navigate to the Network Interface Port Speed/Duplex section of the Network Configuration page (Device >> Network >> Port Speed).



3 Click **Edit**.

4 Select one of the following options for each interface:

- Auto-Negotiate
- 10 Mbps/Half Duplex
- 10 Mbps/Full Duplex
- 100 Mbps/Half Duplex
- 100 Mbps/Full Duplex
- 1000 Mbps/Full Duplex

5 Click **Save**.

WARNING! The Port Speed/Duplex setting is an advanced feature that should only be used when you are certain of the port speed and duplex settings of the network device communicating with the DataSecure. Potential performance degradation can result if these settings do not match. We recommend that you leave the port speed and duplex setting on the DataSecure at Auto-Negotiate unless you know the settings of the network device it is communicating with.

Note: When a switch forces a port speed and the DataSecure is set to Auto-Negotiate, the DataSecure defaults to Half Duplex. Thus, when you force Full Duplex on the switch and leave the DataSecure set to Auto-Negotiate, the DataSecure may be unable to negotiate a connection with other network devices.

Chapter 12

High Availability

The High Availability feature provides failover functionality between two DataSecures. This mechanism is based on a standard failover protocol called VRRP (RFC 2338). Although modifications have been made to the VRRP protocol, the High Availability feature is still in compliance with most parts of the standard.

Important! High Availability is *not* supported on the i110 or the i116.

It is important to define a few terms before getting into the details of how High Availability is implemented on the DataSecure.

Terms

VIP: Virtual IP address. Stands for an IP address that is only accessible on the active machine. This is also referred to as a floating IP.

VRID: Virtual Router Identifier. Network interfaces across machines that have identical VRIDs constitute a virtual group. This is also known as Ethernet Group ID. This group shares a common set of VIPs.

VMAC: Virtual MAC. Is calculated and assigned to the network interfaces using the following algorithm according to RFC 2338.7.3: VMAC = 00:00:5E:00:01:

Master: A designated node that, when up and running, is the active device.

Slave: A designated node that is passive. If the master goes down, then the slave becomes the active device until the master is back up.

Monitor IP: IP address that is used as a source address to establish a monitored connection to the other devices in the virtual group.

Slave Advertisement Timeout: The time that needs to elapse before the slave assumes the master is inactive and becomes the active device.

Failover: The process by which control of network traffic shifts from the master device to the slave.

Failback: The process by which control of network traffic shifts back from the slave to the master.

Active device: In the VRRP group, this is the device that is receiving all network traffic. This is typically the master device; however, in case of failure on the master, the slave device becomes the active device.

Passive device: In the VRRP group, the slave starts out as the passive device. As the passive device, the role of the slave is to listen for VRRP messages from the master. In the event that the master is unable to send out those VRRP messages, the slave takes over as the active device, receiving all network traffic. As soon as the master is able to fulfill client traffic, the slave device stands down and the master again becomes the active device.

Supported Features

The DataSecure supports the following aspects of RFC 2338:

- There is always one active device called the master.
- There is always one passive device called the slave.
- You can configure which device is the master and which is the slave.
- The active device receives all the client traffic.
- The passive device stands by, waiting for the active device to failover. If the master becomes unavailable, then the slave takes control, becoming the active device.
- When the master becomes active again, a failback occurs. This means the master becomes the active device, once again taking control.
- Various network configuration, including multiple NICs, are supported.
- A failover is always a total failover, which means that in case of multiple network interfaces, we fail over all the interfaces.

Unsupported Features

The following features are not supported:

- Active–active mode.
- Automatic synchronization of the configuration files between the two DataSecures.
- Stateful failover.
- Hardware port tracking.
- Configurable priority values. Priority values are automatically assigned: master = 255, and slave = 100.

How High Availability Works

The master sends out VRRP multicast messages every second. These messages, sent only to other devices in the virtual group, indicate to the slave that the master is active. If the master goes down, the slave takes over as the active device.

The master and slave in a virtual group have the same virtual identifier. The passive device monitors the VRRP messages sent out by the master device. When the specified number of seconds elapse without a VRRP message from the master, the slave takes over as the active device.

Because the slave does not replicate user connections, when failover occurs, all connections that were active on the master must be re-established on the slave.

The DataSecure supports single arm configurations and dual–home configurations. The DataSecure does not support hybrid single–arm/dual home configurations.

Concepts

The master and slave must have identical configurations. When both the master and the slave device belong to the same cluster, you can ensure that the configuration is identical. For more information on clustering, please see Chapter 6, “DataSecure Clustering”.

- The group ID establishes a virtual group. This means that two different DataSecures configured in active/passive mode that share the same group ID constitute a virtual VRRP group. The VIPs assigned to the group are shared between the interfaces defined on each DataSecure.
- When a DataSecure fails over to the slave and the slave becomes active, the DataSecure must restart the NAE Server. While restarting, the NAE Server is unavailable for a brief period of time ranging from a few seconds to half a minute.
- In a virtual group, one DataSecure is designated the master. The master is active by default. The other DataSecure is the designated slave. The slave is passive.
- High Availability is implemented on a 1:1 basis, as opposed to a 1:N basis. This means that for each master, there is only one slave.
- At any given time, one DataSecure is active and one DataSecure is passive (provided, of course, that both DataSecures have not failed).
- If the master fails, then the slave takes over and becomes the active device. When the master comes back up, control fails back to the master and therefore the master becomes the active device again.
- A failover is always a total failover. This pertains to a DataSecure that is configured with multiple network interfaces. When such a failure is detected, all interfaces fail over to the other device.

Configuration

To enable High Availability, you must configure High Availability from the High Availability Configuration page, and you must configure the High Availability Interface List on the Network Configuration page of the Management Console.

Configuration Tips

- Configure the related switch for IP multicast support in order to eliminate unnecessary packet proliferation (most switches have this disabled by default and simply broadcast multicast packets on all ports, thus eliminating the cost-effectiveness of multicasting).
- If you are using the VRRP protocol for other devices that share the LAN with the DataSecure, it is necessary to carefully manage the VRIDs. It is important to avoid collisions.
- VRRP advertisements are not routable. Thus the two DataSecures need to be on the same LAN segment. Failure to do so breaks HA for the pair of DataSecures.

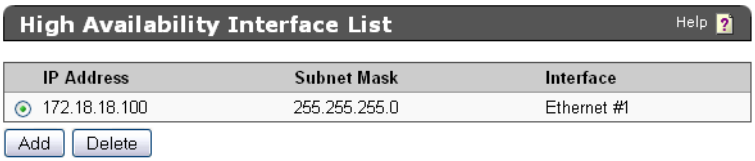
Note: Changes to the High Availability Settings section cause the Key Server to restart if High Availability is enabled and the device is set to master. While restarting, the Key Server is unavailable for a brief time ranging from a few seconds to half a minute. During this time, it is not unusual for the master to failover to the slave. As soon as the server restarts, the master becomes the active device again.

Tip: It is easy to misconfigure High Availability. As such, you should take measures to ensure that you have no over-lapping Group Identifiers.

Configure a High Availability Interface

To configure a high availability interface:

1. Log in to the Management Console.
2. Navigate to the High Availability Interface List on the Network Configuration page (Device >> Network).

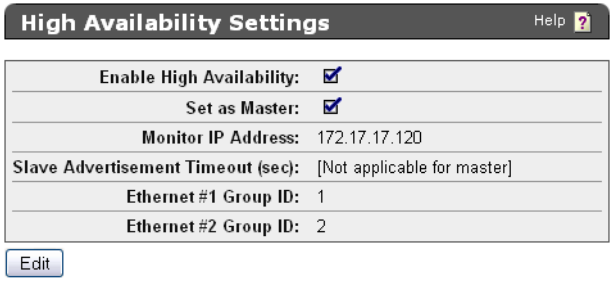


3. Click **Add**.
4. Enter the IP address.
5. Enter the **Subnet Mask**.
6. Enter the **Interface**. The number of available interfaces depends on the DataSecure model. Network interfaces are located on the back of the device.
7. Click **Save**.

Enable and Configure High Availability

To enable and configure high availability:

1. Log in the Management Console.
2. Navigate to the High Availability Interface Settings (Device >> Network >> High Availability).



3. Click **Edit**.
4. Select **Enable High Availability**.

5 Select **Set as Master** to set the device as the master. For all High Availability groups, there can be only one master.

6 Select a value in **Monitor IP Address**. This is the IP address bound to the DataSecure that is used as a source address to establish a monitored connection to the other device in the High Availability group.

7 Enter a value in the **Slave Advertisement Timeout (sec)** field. This is the time that must elapse before the slave assumes the master is inactive and thus takes over control and become the active device. The default value for this field is 3 seconds.

8 Enter a value for the **Ethernet Group ID**. This field allows you to specify the VRIDs for each interface. no two of these VRIDs can be the same. The corresponding VRIDs on master and slave establish a virtual group. Within that virtual group the VIPs are accessible only on the active device. (The default group id matches interface number).

   The corresponding VRIDS of the master and slave do not necessarily need to be assigned to the same Ethernet interfaces as long as they are connected via the same LAN. For practical reasons, it might be a natural and easy way to remember to configure things.

9 Click **Save**.

Chapter 13

IP Authorization

The IP Authorization feature enables you to specify which IP addresses are permitted to connect to the DataSecure and which services those IP addresses may access.

Once enabled, the DataSecure examines each network packet sent to the protected TCP ports. Authorized packets are processed; unauthorized packets are dropped and logged. You can view the unauthorized packets in the system log.

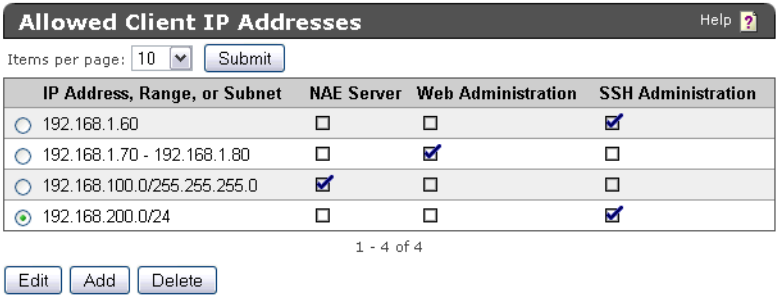
Configure the IP Authorization Feature

IP Authorization settings are viewed and modified from the IP Authorization tab on the Network Configuration page. Use the IP Authorization Settings section to view and set these settings for your DataSecure.

To configure the IP Authorization feature:

1 Log in to the Management Console as an administrator with Network and Date/Time access control.

2 Navigate to the Allowed Client IP Addresses section of the Network Configuration page (Device >> Network >> IP Authorization).



3 Click **Add**.

4 Enter a single IP address (e.g., 192.168.1.60), a range of addresses (e.g., 192,168.1.70 - 192.168.1.80), or a subnet (e.g., 192.168.100.0/255.255.255.0, or 192.168.200.0/24) in the **IP Address, Range, or Subnet** field.

You can grant access to various features but you cannot explicitly deny access to a specific client. In the event that a specific IP is listed individually and as part of a group, that IP address acquires the sum of listed permissions.

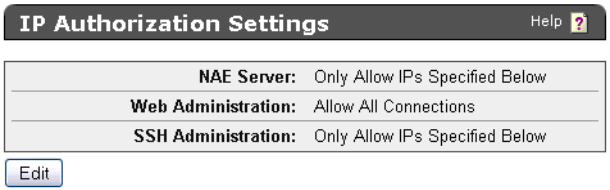
5 Select the services that will be available to this client using the **Key Server**, **Web Administration**, and **SSH Administration** fields.

Note: You can grant access to various features but you cannot explicitly deny access to a specific client. In the event that a specific IP is listed individually *and* as part of a group, that IP address acquires the sum of listed permissions.

6 Click **Save**.

7 Repeat steps 3 through 6 as needed. Use the **Add** and **Delete** buttons when needed.

8 Click **Edit** on the IP Authorization Settings section.



9 For each service select either *Allow All Connections* to grant access to all clients or *Only Allow IPs Specified Below* to grant access to only the clients listed in the Allowed Client IP Addresses section *with that service selected.*

10 Click **Save**.

Note: When updating this feature from the Management Console, the system ensures that the current administrator IP address maintains its web administration permissions. When updating this feature from the CLI, the system ensures that the active SSH administration permissions remain intact.

Chapter 14

SNMP

The SNMP protocol enables network and system administrators to remotely monitor devices on the network, such as switches, routers, proxies, and hubs. This protocol relies on three main concepts: network management station (NMS), agent, and Management Information Base (MIB). The NMS is configured on a network node and runs SNMP management software; agents run on network devices that are being monitored by the NMS; and the MIB defines what kind of information can be exchanged between the agent and the NMS.

SNMP is a request–response protocol used to communicate management information between an NMS and an agent. SNMP trap messages, sent from agents to managers, might indicate a warning or error condition or otherwise notify the manager about the agent's state. There are three versions of SNMP: SNMPv1, SNMPv2 and SNMPv3. The DataSecure supports all three versions of SNMP.

Note: There are many different versions of SNMPv2. The DataSecure supports SNMPv2c. For the sake of simplicity, throughout the rest of this document SNMPv2c is referred to simply as SNMPv2.

SNMPv1/v2 rely on the concept of a community to provide a low level of security for communications between the NMS and agent. In a SafeNet SNMPv1/v2 deployment, each SNMP request packet includes a community name, which is similar to a password and is associated with a certain MIB access level. When the DataSecure receives a request, the agent looks for the community name in its table. If the name is found and the source IP of the sender is in the access list for the community, the request is accepted and the MIB information is sent. If the name is not found or the source IP address is not in the access list, the request is denied.

Because SNMPv1/v2 cannot authenticate the source of a management message or provide encryption, it is possible for unauthorized users to perform SNMP network management functions. Likewise, it is also possible for unauthorized users to eavesdrop on management information as it passes from agents to the NMS. SNMPv3 incorporated all the capabilities of SNMPv1/v2, and introduced the concept of a User–based Security Model (USM), which consists of two important services: authentication and privacy. Additionally, SNMPv3 enhanced the existing View Access Control Model (VACM).

Authentication

The authentication piece of the USM ensures that a message was sent by the agent or NMS whose identifier appears as the source in the message header. Authentication also ensures that the message was not altered, artificially delayed, or replayed.

In SNMPv3, the agent and NMS share a key that is based on the username and password supplied when the username is created. The sender provides a means for authentication to the receiver by including a MAC with the SNMPv3 message it is sending. When the receiver gets the message, it uses the same secret key to recompute the MAC. If the receiver’s version of the code matches the value appended to the incoming message, then the receiver knows that the message originated from an authorized sender, and that the message was not altered in transit.

Privacy

The privacy piece of the USM allows managers and agents to encrypt messages to prevent eavesdropping. As is the case with authentication in SNMPv3, both the NMS and the agent must share a secret key. When an NMS and agent are configured for privacy, all traffic between them is encrypted with the DES algorithm. The sender encrypts all messages with the DES algorithm and its secret key, and sends the message to the receiver, who decrypts it using the DES algorithm and the same secret key.

Access Control

Access control in SNMP makes it possible for agents to provide different levels of MIB access to different managers. You can restrict access by allowing one NMS to view only standard MIBs and another NMS to view both standard MIBs and Enterprise MIBs.

Configuring SNMPv1/v2 on the DataSecure

The DataSecure supports all three versions of SNMP. From a configuration standpoint, SNMPv1/v2 are treated as a unit, and SNMPv3 is treated separately. SNMP requires an agent, a community, and a management station.

Please note that SafeNet SNMP agent is capable of providing the following SNMP functionality:

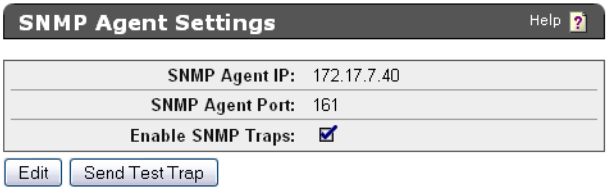
- it enables the NMS to access the MIBs on the DataSecure.
- it initiates trap messages to the NMS.

You can configure the SafeNet SNMP agent to provide either piece of functionality or both pieces. Both pieces of functionality are optional.

To configure a SafeNet agent to communicate with an NMS running SNMPv1/v2 software:

1 Log in to the DataSecure

2 Navigate to the SNMP Configuration page (Device >> SNMP).



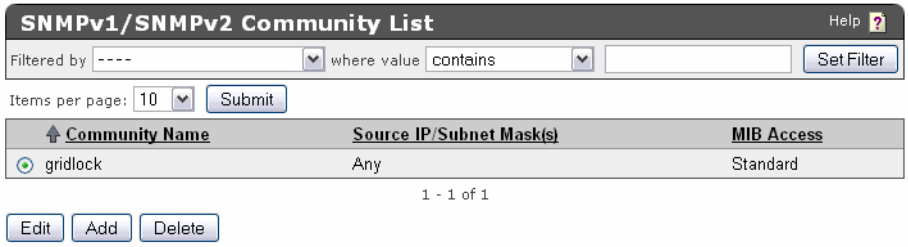
3 Click **Edit** in the SNMP Agent Settings section.

4 Select the **SNMP Agent IP**. You can select *All* or an individual IP address. We recommend that you specify an individual IP address.

5 Select the **SNMP Agent Port**. The default value is 161.

6 Select **Enable SNMP Traps**. By default, the DataSecure does not send SNMP traps.

7 Navigate to the SNMPv1/SNMPv2 Community List section (Device >> SNMP >> Communities & Usernames). The community list is used to configure the agent to communicate with an NMS running either SNMPv1 or SNMPv2 software. The community list is where you define from which SNMPv1/v2 management stations the DataSecure receives SNMP MIB requests.



When creating a community on the DataSecure, it is a good security practice to secure agents by filtering all SNMP requests by community name and source IP address. This filtering restricts where SNMP requests are allowed to come from, and greatly reduces system vulnerability to outside attacks.

Note: For security purposes, the SNMP community name is read–only. The `set` command is not allowed on the SNMP agent.

8 Click **Edit** or **Add**.

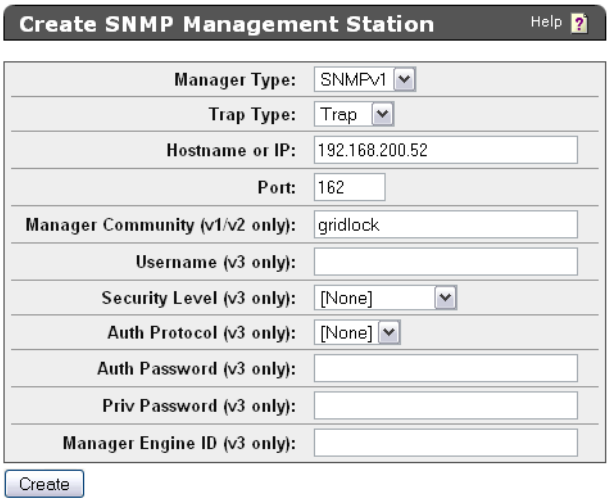
9 Enter a **Community Name**. This value can contain only alphanumeric characters and punctuation marks, and they cannot contain non-printing characters and whitespaces. Community names cannot exceed 64 characters. Avoid using the names “public” and “private” as these names are very commonly used.

10 Enter a **Source IP/Subnet Mask**. These are the IP address(es) allowed to access the agent. You can enter a specific IP address range, or you can enter a value of *Any*. If you are listing a specific IP address, you must also include the **Subnet Mask**. Separate the **Source IP** and **Subnet Mask** with a slash (/). If you are entering multiple **Source IP/Subnet Mask** pairs, you must separate each pair with a comma. We recommend that you limit access to the agent to particular IP addresses.

11 Select the community’s **MIB Access**. Can be either or both of the following:

- *Enterprise* - Contains information on caching, SSL, CPU utilization, and operational statistics.
- *Standard* - also known as MIB-II. contains information on network interface utilization, system health, and statistics for IP, TCP, ICMP, UDP, and SNMP.

12 Navigate to the Create SNMP Management Station section (Device >> SNMP >> Management Stations).



13 Enter the **Manager Type**. Select either *SNMPv1* or *SNMPv2*.

14 Enter the **Trap Type**. Select either *Trap* or *Inform*. We recommend that you always use Inform.

15 Enter the **Hostname or IP** of the NMS.

16 Enter the **Port**. The default value is 162.

17 Enter the **Manager Community**. This is the name used to send SNMP data to SNMPv1/v2 management station. The manager community is used by SNMPv1/v2 management stations to filter SNMP traps and is not related to the agent community name. The **Manager Community** name cannot exceed 64 characters.

18 Click **Create** to create the SNMP management station.

Configuring SNMPv3 on the DataSecure

The DataSecure supports all three versions of SNMP. From a configuration standpoint, SNMPv1/v2 are treated as a unit, and SNMPv3 is treated separately. Please note that SafeNet SNMP agent is capable of providing the following SNMP functionality:

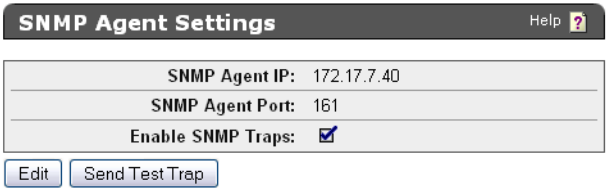
- it enables the NMS to access the MIBs on the DataSecure.
- it initiates trap messages to the NMS.

You can configure the SafeNet SNMP agent to provide either piece of functionality or both pieces. Both pieces of functionality are optional.

To configure a SafeNet agent to communicate with an NMS running SNMPv3 software:

1 Log in to the DataSecure

2 Navigate to the SNMP Configuration page (Device >> SNMP).



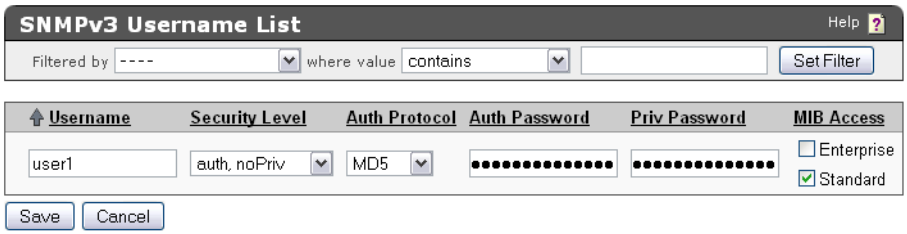
3 Click **Edit** in the SNMP Agent Settings section.

4 Select the **SNMP Agent IP**. You can select *All* or an individual IP address. We recommend that you specify an individual IP address.

5 Select the **SNMP Agent Port**. The default value is 161.

6 Select **Enable SNMP Traps**. By default, the DataSecure does not send SNMP traps.

7 Navigate to the SNMPv3 Username List section (Device >> SNMP >> Communities & Usernames). The username list is used to configure the agent to communicate with an NMS running SNMPv3 software. The username list is where you define from which SNMPv3 management stations the DataSecure receives SNMP MIB requests.



8 Click **Add** or **Edit**.

9 Enter a **Username**. The **username** defines from whom the DataSecure accepts SNMP messages, and it is one of many elements used to create a key that is shared between the NMS and the agent. Usernames can contain only alphanumeric characters and punctuation marks and they cannot contain non-printing characters and white spaces.

10 Select the **Security Level**. There are three options:

- auth, priv – authorization and privacy. This option takes full advantage of the enhanced security features in SNMPv3. This option means that the DataSecure authenticates the sender of the SNMP message; in addition, all data exchanged between the SafeNet agent and the NMS is encrypted using the DES algorithm and a secret key.
- auth, no priv – authorization, no privacy. This option allows you to guarantee that the DataSecure only accepts SNMP messages from trusted sources, but the data is not encrypted.
- no auth, no priv – no authorization, no privacy. This option is similar to the security offered in SNMPv1/v2. No encryption is performed, and the authenticity of the sender of the SNMP message is not guaranteed.

11 Select the **Auth Protocol**. Choose either *MD5, SHA*, or *None*.

12 Enter the **Auth Password**. This password is used to create the secret key that performs the MAC operation on the data shared between the SafeNet agent and the management station. The **Auth Password** must be between 8 and 256 characters.

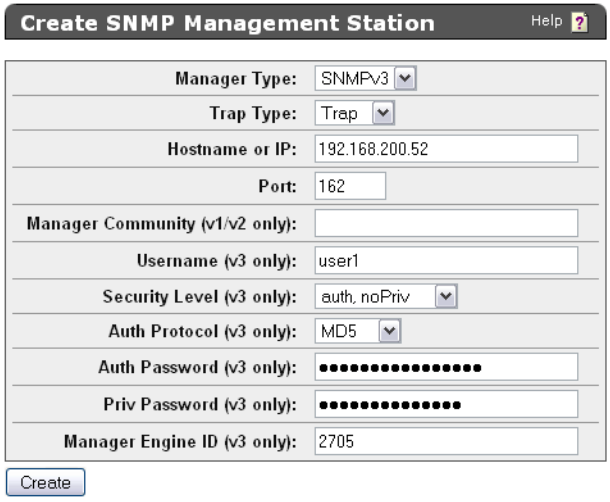
13 Enter the **Priv Password**. This password is used to create the secret key that performs the encrypt and decrypt operations on the data shared between the agent and the NMS. The **Priv Password** must be between 8 and 256 characters.

Note: If you select *auth, priv* for **Security Level**, enter a valid value in the **Auth Password** field, and then leave the **Priv Password** field blank, the **Auth Password** will also be used as the **Priv Password**.

14 Select the username's **MIB Access**. Can be either or both of the following:

- *Enterprise* - Contains information on caching, SSL, CPU utilization, and operational statistics.
- *Standard* - also known as MIB-II. contains information on network interface utilization, system health, and statistics for IP, TCP, ICMP, UDP, and SNMP.

15 Navigate to the Create SNMP Management Station section (Device >> SNMP >> Management Stations).



16 Enter the **Manager Type**. Select either *SNMPv1* or *SNMPv2*.

17 Enter the **Trap Type**. Select either *Trap* or *Inform*. We recommend that you always use Inform.

18 Enter the **Hostname or IP** of the NMS.

19 Enter the **Port**. The default value is 162.

20 Enter the **Username**. This is the name used to send SNMP data to SNMPv3 management stations. The **Username** is used to create a key that is shared by the agent and the NMS

21 Enter the **Security Level**. There are three options:

- auth, priv – authorization and privacy. This option takes full advantage of the enhanced security features in SNMPv3. This option means that the DataSecure is authenticated by the NMS when the DataSecure sends a trap; in addition, all data exchanged between the SafeNet agent and the NMS is encrypted using the DES algorithm and a secret key.
- auth, no priv – authorization, no privacy. This option allows you to specify that the DataSecure is authenticated by the NMS, but data that is exchanged between the agent and NMS is unencrypted.
- no auth, no priv – no authorization, no privacy. This option is similar to the security offered in SNMPv1/v2. No encryption is performed, and the authenticity of the sender of the SNMP message is not be guaranteed.

22 Select the **Auth Protocol**. Choose either *MD5, SHA*, or *None*.

23 Enter the **Auth Password**. This password is used to create the secret key that is used to authenticate the sender of SNMP messages. The **Auth Password** must be between 8 and 256 characters.

24 Enter the **Priv Password**. This password is used to create the secret key that performs the encrypt and decrypt operations on the data shared between the agent and the NMS. The **Priv Password** must be between 8 and 256 characters.

Note: If you select *auth, priv* for **Security Level**, enter a valid value in the **Auth Password** field, and then leave the **Priv Password** field blank, the **Auth Password** will also be used as the **Priv Password**.

25 Enter the **Manager Engine**, do not exceed 128 characters. This is a unique identifier for the manager entity that is used for authentication. The Manager Engine ID is not used when sending inform messages. The

26 Click **Create** to create the SNMP management station.

Enterprise MIB Overview

We distribute MIBs in SMIv2 format; if you want SMIv1, you can derive it from the SMIv2 MIB distributed by SafeNet. You can obtain the Enterprise MIBs at the Web Support Center. You must have a Web Support Center account before you can download the MIBs.

The Enterprise MIBs are broken out into the following functional groups:

- **System Statistics**. The System Statistics provide basic system information like system uptime, CPU utilization, Number of CPUs in the system, and Memory utilization. For a more thorough description of the System Statistics, please see Chapter 22, “Statistics”.
- **NAE Server Statistics**. NAE Server statistics are available through the MIBs; for each statistic set, you can view the following: current requests per second, maximum requests per second, successful operations, and failed operations. The following statistics are available:
  - Total Requests
  - Key operations
  - Key Generate Requests
  - Key Information Requests

- Key Delete Requests
- Key Query Requests
- Key Import Requests
- Key Export Requests
- Random Generate Requests
- Cryptographic Requests
- Authenticate Requests

- **Software Objects/Traps**. Software objects are broken out into the following groups:
  - Services – Traps are sent for any of the following events: service started or stopped, the system restarted a down service, a certificate expired, a certificate will expire soon, failed to transfer log, a client application attempts to use a certificate that has been revoked, multiple unsuccessful attempts to restart a service.
  - Security Warnings – an administrative experienced multiple password failures while attempting to log in, the system was reset to factory settings, the system was restored to default settings, configuration data was corrupted or modified.
  - Generic Security Objects – Content detected as defaced, invalid client certificate, multiple username/password failures from a user, wrong key in use, operation not permitted, other security warning.
  - DB Tools – data migration operation completed, key rotation operation completed, column unencryption operation completed.
  - Cluster Objects – Server joined/left cluster, success or failure notification for the following: key replication, key deletion, user or group replication, ldap configuration replication, authorization policy replication, cluster synchronization.
  - LDAP Notification Objects – LDAP server connection succeeded, LDAP server connection failed, switching to alternate LDAP server.
  - License Notification Objects – No licenses available.
- **Hardware Objects/Traps**.
  - System Notification Objects – system starting up/shutting down, system preparing to restart/halt.
  - Power Supply Notification Objects – Power supply operational/non-operational.
  - Fan Notification – Fault detected.
  - Disk Utilization – Disk usage exceeded.
  - High Availability Notification – System set as master, HA service is non-functional.
  - Accelerator Notification Object – Accelerator self test failed.
  - RAID Disk Notification – disk operational, disk failed, disk recovering, disk status unknown, disk removed, disk added.

Chapter 15

Administrator Configuration

An administrator is a user who can configure and manage the DataSecure. This is done using the Management Console and the Command Line Interface (CLI). An administrator's access control settings determine which features can be configured and which operations can be performed.

Important! Administrators are *not* users. Users use DataSecure client software to access the Key Server in order to perform some cryptographic function.

Using Multiple Administrator Accounts

Most likely, you will want to create multiple administrators. When doing so, you should assign access controls that mirror your organization's procedures. For example, if you separate the tasks of key management, system backup, and device configuration, you'll want to create unique administrators for each of those roles.

When creating an administrator, you should assign the *minimum* amount of access controls needed. For example, a backup administrator will only need the Backup & Restore access controls. (You'll probably also want to assign an Administrative Access access control to most of your administrators.)

Note: We strongly discourage the sharing of administrator accounts. Each administrator should have their own administrator account.

High Access Administrators

When creating or modifying an administrator, you can select the **High Access Administrator** field. High Access administrators have *all* access controls. They, therefore, have *full* control over the configuration of the DataSecure: they can create and delete administrator accounts, change administrator passwords, and assign and revoke access controls. When you select this option, you'll notice that the system will automatically enable *all* of the access controls for that administrator.

Important! Take great caution when creating High Access Administrators. It might be helpful to think of such administrators as super users who can change the passwords of local administrators, assign and revoke permissions, and create and delete administrators.

Both local and LDAP administrators can be High Access Administrators.

The `admin` account created during first-time initialization is a local High Access Administrator.

The Default Administrator

The DataSecure ships with a default administrator (`admin`). `admin` is a local High Access Administrator. Once the initial configuration is complete, you must log in as the `admin` administrator; thereafter, you can create different administrators and log in with a different username.

Local and LDAP Administrators

The DataSecure supports two types of administrators: local and LDAP. Functionally, local and LDAP administrators have the same capabilities. For example, both local and LDAP administrators can be High Access administrators.

You can have multiple local and LDAP administrators at the same time.

Local Administrators

Local administrators are created within the SafeNet environment, either on the local device, or on a member of a cluster. They are managed entirely on the DataSecure.

Local administrator usernames are restricted to letters and numbers only, must start with a letter, and can be up to 30 characters long.

Local administrator passwords must adhere to the DataSecure's password policies. These are discussed in Chapter 17, "Password Management".

Important! It is *absolutely crucial* that you remember the passwords for all of your local administrators. For security reasons, there is no way to reset a local administrator's password without logging into the DataSecure as a High Access Administrator. *If you lose or forget the passwords for all administrator accounts, you cannot configure the* DataSecure*, and you must ship it back to have the software reinstalled. All keys and configuration data will be unrecoverable.*

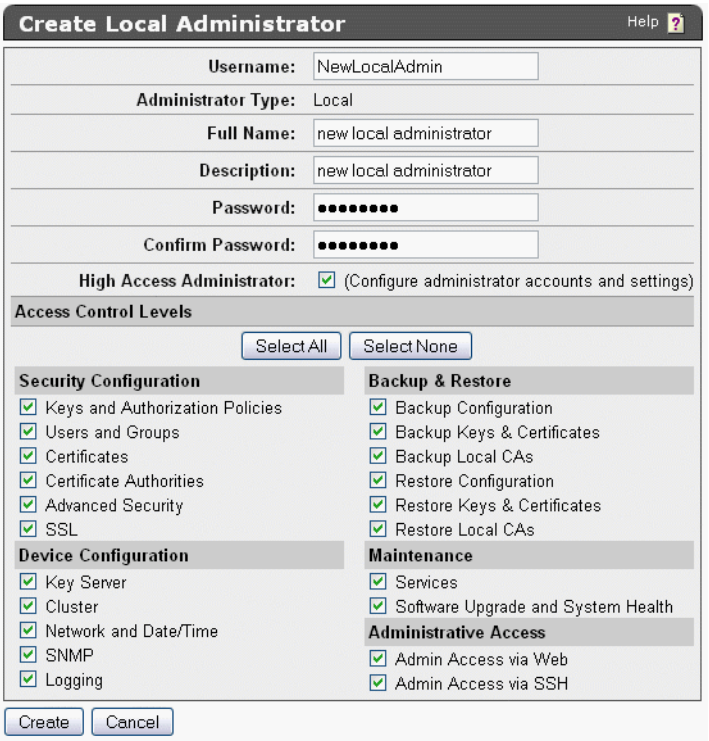
When a local administrator logs in to the CLI or the Management Console, the DataSecure authenticates the username and password with the values stored securely on the DataSecure. If the authentication succeeds, the administrator will be logged in to the DataSecure.

High Access Administrators can change the password of any local administrator. (Such an event is recorded in the Audit Log.) If one administrator changes the password of another local administrator, the administrator whose password changed is prompted to change his or her password immediately after logging in (with the new password) to the DataSecure. After changing the password, the administrator continues to the Management Console or the command prompt as usual.

Creating a Local Administrator

To create a local administrator account:

1. Log in the DataSecure as an administrator with High Access Administrator access control.
2. Navigate to the Administrator Configuration page (Device >> Administrators >> Administrators).
3. Click **Create Local Administrator**.



4 Enter a **Username**. **Usernames** must contain alphanumeric characters only and cannot be longer than 30 characters. You cannot include special characters or whitespace in the username. In addition, the first character must be a letter.

5 Enter values in the **Full Name** and **Description** fields.

6 Enter the **Password**. Immediately after logging in for the first time, the administrator must change the password. The requirements for the password depend on your Password Management settings. The value shown here is masked.

Important! When changing the password, be sure to clear the field first. If you do not clear the field first, the asterisks used to mask the value will become part of the new password.

7 Confirm the password in the **Confirm Password** field.

8 Select **High Access Administrator**, if you want to grant the administrator the ability to create, modify, and delete other administrator accounts, assign and modify access privileges for other administrators, and configure all administrator settings (administrators, LDAP administrator server, password management, multiple credentials, and remote administration).

Important! If you enable this checkbox, all other Access Control settings will automatically be checked. Any of the other Access Control settings can be disabled before creating the administrator account. However, since High Access Administrators can edit these settings, the new administrator will be able to re-enable any of the Access Control settings that were initially disabled.

WARNING: It is very important that you take great caution in granting the High Access Administrator access control option, which allows an administrator full control over the configuration of the DataSecure. Some of the privileges available to such an administrator are as follows: can change the passwords of other administrators, can assign him or herself additional permissions, and can create additional administrators.

9 Select the access controls for the administrator account. Use the **Select All** and **Select None** buttons as appropriate. Select from the following values:

- Keys and Authorization Policies: Create, modify and delete keys and establish authorization policies.
- Users and Groups: create and modify local users and groups and maintain LDAP server settings.
- Certificates: Create and import certificates.
- Certificate Authorities: Manage certificate authorities on the DataSecure.
- Advanced Security: Manage advanced security settings, including FIPS and Common Criteria configuration.
- SSL: Modify SSL configuration.
- Key Server: Enable and configure the Key Server.
- Cluster: create a cluster, join or remove this device from an existing cluster.
- Network and Date/Time: Configure network and date/time settings.
- SNMP: Manage SNMP community names and management stations.
- Logging: Modify logging settings.
- Backup Configuration: Create system backups that include everything but keys, certificates and local CAs.
- Backup Keys & Certificates: Create backups of keys and certificates
- Backup Local CAs: Create backups of local CAs.
- Restore Configuration: Restore system backups that include everything but keys, certificates and local CAs.
- Restore Keys and Certificates: Restore backups of keys and certificates.
- Restore Local CAs: Restore backups of local CAs.
- Services: Modify startup service setting.
- Software Upgrade and System Health: Upgrade to a new version of the DataSecure.
- Admin Access via Web: Administrate the DataSecure through the web interface.
- Admin Access via SSH: Administrate the DataSecure through SSH.

Note: The Admin Access access control options specify whether an administrator can configure the DataSecure from the Management Console and the CLI. You should note that administrators who cannot log in via either of these interfaces can only manage the DataSecure from a serial console connection, which would preclude that administrator from modifying almost all security configuration settings and some device configuration settings (e.g. Key Server, Keys, Users & Groups).

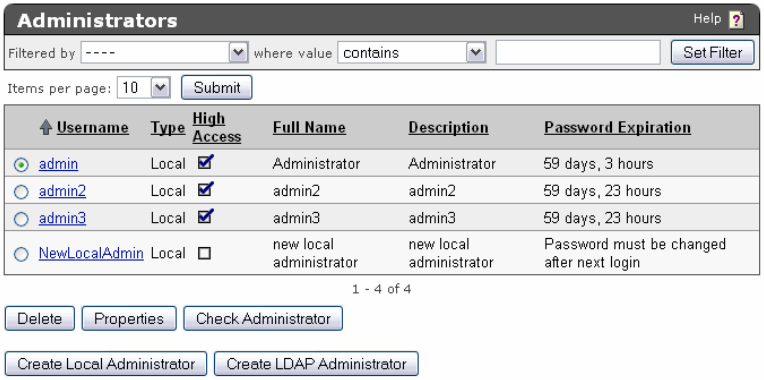
10 Click **Create.**

Deleting a Local Administrator

To delete a local administrator account:

1 Log in the DataSecure as an administrator with High Access Administrator access control.

2 Navigate to the Administrators section on the Administrator Configuration page (Device >> Administrators >> Administrators).



3 Select the administrator in the Administrators section.

4 Click **Delete**.

5 Confirm the action on the Secondary Approval section.

Note: For disaster recoverability purposes, the last local administrator account on a DataSecure *cannot* be deleted.

Chapter 16

LDAP Administrator

The DataSecure supports two types of administrators: local and LDAP. Functionally, local and LDAP administrators have the same capabilities. For example, both local and LDAP administrators can be High Access administrators.

You can have multiple local and LDAP administrators at the same time. Local administrators are detailed in Chapter 15, “Administrator Configuration”.

LDAP Administrators

LDAP administrators are based on user accounts managed on an LDAP server. The LDAP server is external to the DataSecure environment; the DataSecure does not store any information on the LDAP server.

One of the main benefits of using LDAP administrators is that you can centralize your administrator account management. If you already have an LDAP server set up, you do not have to configure local administrators.

LDAP administrator usernames can contain letters, numbers, spaces, and punctuation characters, and they can be up to 64 characters long.

Password management is controlled by the LDAP server, not the DataSecure. You use the LDAP server to configure your policies and store the passwords. LDAP administrators cannot change their passwords using the DataSecure. The configurable password settings, password history, and password expiration features on the DataSecure do not apply to LDAP administrators.

Important! Resetting forgotten passwords may be possible on your LDAP server. This can be both a benefit *and* a security risk. If all of your administrator passwords are forgotten, you may be able to use your LDAP server to reset an LDAP administrator password. Otherwise, it will be impossible to log into the device. However, this ability could also be used to hijack an LDAP administrator account.

When an LDAP administrator logs in to the CLI or the Management Console, the DataSecure connects to the LDAP server to authenticate the username and password. If the authentication succeeds, the administrator will be logged in to the DataSecure.

LDAP Administrator Server and FIPS Compliance

For more information about FIPS mode and other High Security settings, see Chapter 36, “High Security Features”.

If an LDAP Administrator Server is configured, the DataSecure cannot be in FIPS compliance. On a FIPS-compliant DataSecure, configuring the LDAP Administrator Server will take the DataSecure out of FIPS compliance. When you try to edit the LDAP Administrator Server on a FIPS-compliant DataSecure, the

Management Console displays a warning that configuring the LDAP Administrator Server will take the DataSecure out of FIPS compliance.

If the device is not in FIPS compliance because an LDAP Administrator Server is currently configured, clicking “Set FIPS Compliant” on the High Security Configuration page will result in an error. The LDAP Administrator Server settings must be cleared manually before the device can become FIPS-compliant.

Setting up the LDAP Administrator Server

In order to create an LDAP administrator, you must first configure the LDAP Administrator Server settings. These settings define an external LDAP server containing the list of users that can be designated as LDAP administrators. When creating an LDAP administrator on the DataSecure, you will choose the LDAP administrator from this list of users.

Configuration of the LDAP Administrator Server and the first LDAP administrator must be performed by a *local* administrator. Thereafter, you can use the LDAP administrator.

If you are using LDAP administrators, we recommend that you enable SSL in the LDAP Administrator Server settings. This ensures that the connection between the DataSecure and the LDAP server is secure. If you do not use SSL, then it is possible that the LDAP administrator passwords will travel in the clear during authentication, depending on the LDAP server's configuration (such as if the server is set to use “simple” authentication).

If you use LDAP administrators predominantly, at least one local administrator account must always exist, and that local administrator must be a High Access Administrator. This local High Access Administrator is needed in the event that connectivity to the LDAP server is lost, or if all administrator accounts on the LDAP server are removed or renamed.

Likewise, if you use the Multiple Credentials feature, there must exist at least as many *local* High Access Administrators as are needed to perform configuration operations. LDAP administrators are otherwise fully compatible with the Multiple Credentials feature.

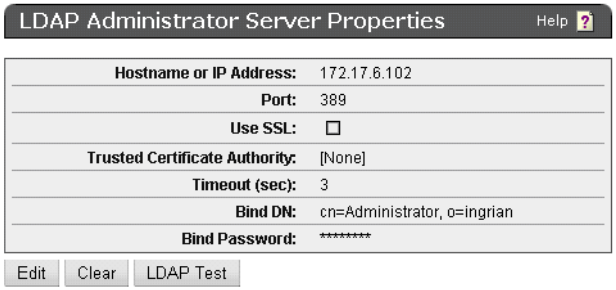
You configure LDAP servers for administrators separately from LDAP servers for users. This allows for greater flexibility, and simplifies cluster replication, since administrators and users are separately replicated.

An LDAP account cannot be designated as an administrator if there is already a local administrator account with the same username. Likewise, a local account cannot be created or renamed with the same username as an LDAP account which has been designated as an administrator.

Note: LDAP administrators cannot modify LDAP administrator server settings.

To set up the LDAP administrator server:

1. Log in to the DataSecure as a Local administrator with High Access Administrator access control.
2. Navigate to the LDAP Administrator Server Properties section of the Administrator Configuration page (Device >> Administrators >> LDAP Administrator Server).



3 Click **Edit**.

4 Enter the **Hostname or IP Address and Port** of the primary LDAP server. The port is typically 389.

5 Select **Use SSL** to enable SSL. By default, the DataSecure connects directly to the LDAP server over TCP.

6 If using SSL, enter the **Trusted Certificate Authority**. The CA will verify that the server certificate presented by LDAP servers are signed by a CA trusted by the DataSecure.

7 Enter a value in the **Timeout** field. This is the number of seconds to wait for the LDAP server during connections and searches. If the connection times out, the authorization fails.

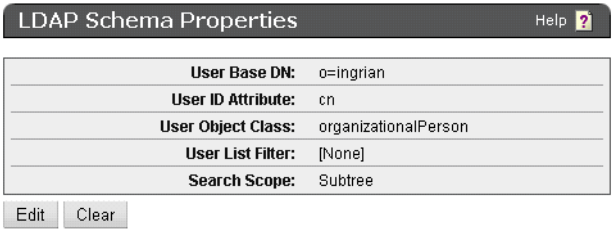
8 Enter the **Bind DN** (distinguished name) used to bind to the server. The device will bind using these credentials to perform searches for users and groups. If your LDAP server supports anonymous searches, you may leave this field and the **Blind Password** field empty.

9 Enter the **Bind Password**. This is password used to bind to the LDAP server.

10 Click **Save**.

11 Click **LDAP Test** to test the connection.

12 Set up the LDAP schema using the LDAP Schema Properties section (Device >> Administrators >> LDAP Administrator Server).



13 Click **Edit**.

14 Enter the values for your LDAP schema. All fields are required except User List Filter.

- User Base DN - the base distinguished name (DN) from which to begin the search for usernames.
- User ID Attribute - the attribute type for the user on which to search. The attribute type you choose must result in globally unique users.
- User Object Class - used to identify records of users that can be used for authentication.
- User List Filter - used for narrowing the search within the object class.

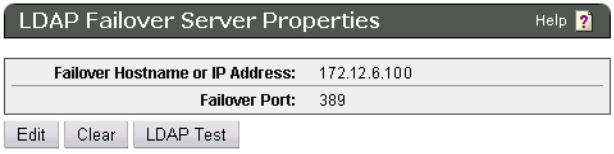
15 Choose the **Search Scope** to determine how deep with the LDAP user directory the system searches for a user. Can be either *One Level* **or *Subtree*.**

- One Level - search only the children of the base node.
- Subtree - search all the descendents of the base node. Depending on size of your LDAP directory, this can be very inefficient.

Note: The LDAP protocol supports four search scopes: base, onelevel, subtree and children. You can specify only onelevel and subtree at this time. Note that subtree includes base and children, so by specifying subtree, the search scope includes subtree, base, and children.

16 Click **Save**.

17 Set up the LDAP failover server using the LDAP Failover Server section (Device >> Administrators >> LDAP Administrator Server). When the primary LDAP server is down, the DataSecure shifts to the failover server and periodically retries the main server to see if it have become accessible again.



18 Click **Edit**.

19 Enter the **Failover Hostname or IP Address** and **Failover Port**.

20 Click **Save**.

21 Click **LDAP Test** to test the connection.

Creating an LDAP Administrator

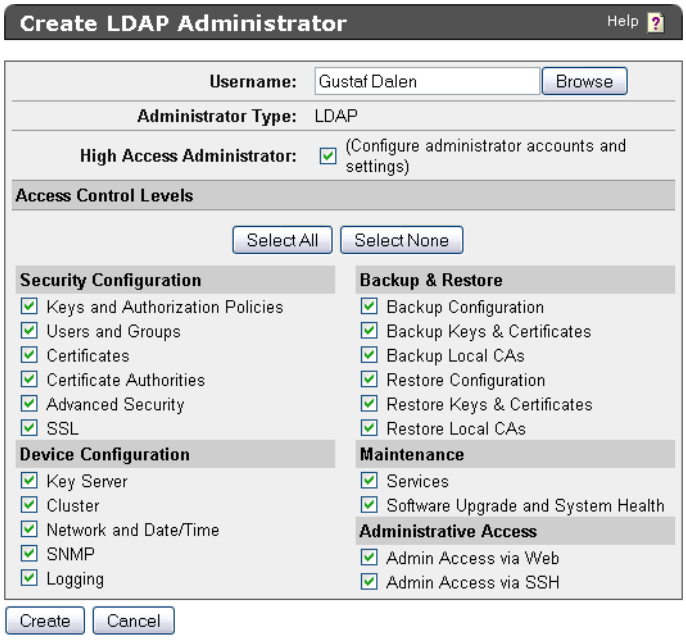
Note: You must configure the LDAP Administrator Server settings before you can create an LDAP administrator.

To create an administrator account:

1 Log in the DataSecure as an administrator with High Access Administrator access control.

2 Navigate to the Administrators section on the Administrator Configuration page (Device >> Administrators >> Administrators).

3 Click **Create LDAP Administrator**.



4 Select **High Access Administrator**, if you want to grant the administrator the ability to create, modify, and delete other administrator accounts, assign and modify access privileges for other administrators, and configure all administrator settings (administrators, LDAP administrator server, password management, multiple credentials, and remote administration).

Important! If you enable this checkbox, all other Access Control settings will automatically be checked. Any of the other Access Control settings can be disabled before creating the administrator account. However, since High Access Administrators can edit these settings, the new administrator will be able to re-enable any of the Access Control settings that were initially disabled.

WARNING: It is very important that you take great caution in granting the High Access Administrator access control option, which allows an administrator full control over the configuration of the DataSecure. Some of the privileges available to such an administrator are as follows: can change the passwords of other administrators, can assign him or herself additional permissions, and can create additional administrators.

5 Select the access controls for the administrator account. Use the **Select All** and **Select None** buttons as appropriate. Select from the following values:

- Keys and Authorization Policies: Create, modify and delete keys and establish authorization policies.
- Users and Groups: create and modify local users and groups and maintain LDAP server settings.
- Certificates: Create and import certificates.
- Certificate Authorities: Manage certificate authorities on the DataSecure.
- Advanced Security: Manage advanced security settings, including FIPS and Common Criteria configuration.

- SSL: Modify SSL configuration.
- Key Server: Enable and configure the Key Server.
- Cluster: create a cluster, join or remove this device from an existing cluster.
- Network and Date/Time: Configure network and date/time settings.
- SNMP: Manage SNMP community names and management stations.
- Logging: Modify logging settings.
- Backup Configuration: Create system backups that include everything but keys, certificates and local CAs.
- Backup Keys & Certificates: Create backups of keys and certificates
- Backup Local CAs: Create backups of local CAs.
- Restore Configuration: Restore system backups that include everything but keys, certificates and local CAs.
- Restore Keys and Certificates: Restore backups of keys and certificates.
- Restore Local CAs: Restore backups of local CAs.
- Services: Modify startup service setting.
- Software Upgrade and System Health: Upgrade to a new version of the DataSecure.
- Admin Access via Web: Administrate the DataSecure through the web interface.
- Admin Access via SSH: Administrate the DataSecure through SSH.

Note: The Admin Access access control options specify whether an administrator can configure the DataSecure from the Management Console and the CLI. You should note that administrators who cannot log in via either of these interfaces can only manage the DataSecure from a serial console connection, which would preclude that administrator from modifying almost all security configuration settings and some device configuration settings (e.g. Key Server, Keys, Users & Groups).

6 Click **Create.**

Deleting an LDAP Administrator

To delete an administrator account:

1 Log in the DataSecure as an administrator with High Access Administrator access control.

2 Navigate to the Administrators section on the Administrator Configuration page (Device >> Administrators >> Administrators).

3 Select the administrator in the Administrators section.

4 Click **Delete**.

5 Confirm the action on the Secondary Approval section.

Note: For disaster recoverability purposes, the last local administrator account on a DataSecure *cannot* be deleted.

Chapter 17

Password Management

All passwords on the DataSecure (local administrator, local user, DataSecure clusters, and backups) are subject to the same basic constraints. Passwords must contain at least five different characters. Passwords *must not*:

- contain only whitespace.
- resemble a phone number, dictionary word, or reversed dictionary word.
- be based on the username associated with the password.

In addition to these rules, an administrator may set up more constraints on the Password Settings for Local Administrators section.

Note: LDAP administrators cannot change their passwords on the DataSecure. LDAP passwords must be changed on the LDAP server.

Password Expiration

The password expiration feature allows you to specify a duration for administrator passwords. By default, this feature is disabled. When an administrator password expires, the system forces that administrator to create a new password after logging in with the expired password. (If the administrator is currently logged in when the password expires, that session continues as normal.)

The duration of passwords is unaffected by changes to the system time (either manual changes or changes due to NTP synchronization). This accomplishes two objectives: (1) an administrator cannot turn back the system time to prevent a password from expiring; (2) it avoids a scenario where many or all passwords expire simultaneously due to a large jump forward in the system time.

Password History

The password history feature enables the system to maintain a list of previously-used administrator passwords for each administrator. When an administrator creates a new password, the system checks that the entry does not exist on the password list. Once created, the new password is added to the administrator's password history.

The password history is only consulted when an administrator attempts to change his or her own password. It is not checked when one administrator changes another's password. This accomplishes two objectives: (1) administrators cannot determine the passwords of other administrators, and (2) it allows you to reset an administrator's password to a standardized temporary password.

By default, the password history feature is disabled. The system populates the password history with passwords created *after* the feature is enabled. Passwords currently in use when the feature is selected are *not* included in the password history. Likewise, passwords assigned during the administrator creation process are not retained by this feature. All password histories are cleared when the feature is disabled.

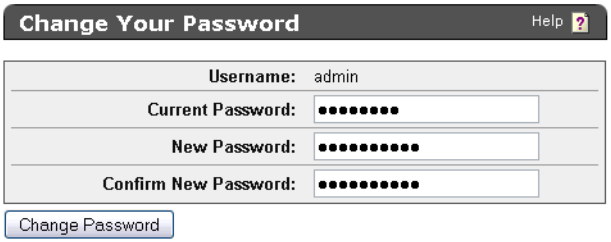
Changing Your Password

This section allows administrators to change their own password. Administrators can change their own passwords regardless of their access control settings. To change your own password simply enter your current password, and then enter a new password and confirm the new password.

Note: LDAP administrators cannot change their passwords on the DataSecure. LDAP administrator passwords must be changed on the LDAP server. LDAP administrator passwords are not subject to any of the constraints that apply to other passwords on the DataSecure.

To change your administrator account password:

1. Log in to the DataSecure using your administrator account.
2. Navigate to the Change Your Password section of the Administrator Configuration page (Device >> Device Configuration >> Administrators >> Password Management).



3. Enter your current password in the **Current Password** field.
4. Enter a new password in the **New Password** and **Confirm New Password** fields. The new password must adhere to all of the rules established in the Password Settings for Local Administrators section.
5. Click **Change Password**.

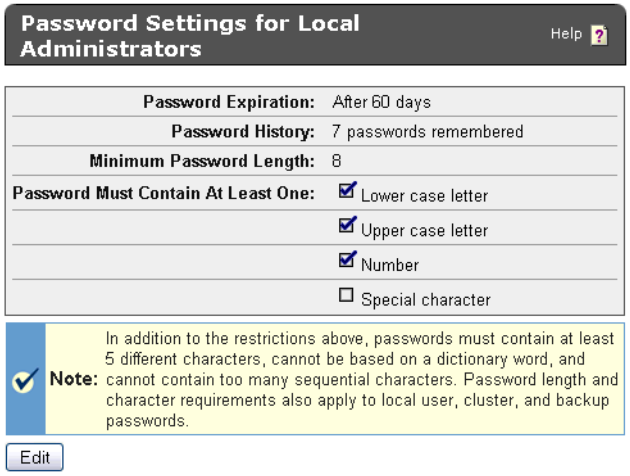
Configuring Password Settings for Local Administrators

The Password Settings for Local Administrators section allows you to specify additional password constraints for local administrator passwords. Some of these constraints (password length and character restrictions) also apply to local users, clusters, and backups. The password expiration and password history features apply only to administrators.You must have High Access Administrator access control to make changes to this section.

Note: These settings do not apply to LDAP administrator passwords. LDAP administrator passwords are not subject to any of the constraints that apply to other passwords on the DataSecure.

To configure password settings for local administrators:

1. Log in to the DataSecure as an administrator with High Access Administrator access control.
2. Navigate to the Password Settings for Local Administrators section of the Administrator Configuration page (Device >> Administrators >> Password Management).



3 Click **Edit**.

4 To enable password expiration, enter the *Maximum Password Age* in the **Password Expiration** field. The maximum is 365 days. Once enabled, this feature applies to all current administrator passwords - all current administrator passwords have the same duration period, regardless of when they may have been created initially. When an administrator's password reaches this age, the administrator will be forced to create a new password. You can view the status of an administrator's password by navigating to the Administrator Configuration page (Device >> Administrators >> Administrators). Select *Never* to disable the password expiration feature.

5 To enable password history, enter the *Num Passwords to Remember* in the **Password History** field. The acceptable range is from 1 to 25. When creating a new password, an administrator cannot use a value that exists in their password history. Select *Disabled* to disable the password history feature. Once disabled, the system deletes the existing password histories. This feature applies only to administrator passwords.

Note: The password history is only consulted when administrators attempt to change their own passwords. It is not checked when one administrator changes another's password.

6 Enter the **Minimum Password Length**.

7 Specify if the password must contain at least one: lower case letter, upper case letter, number, special character, or some combination of these values.

8 Click **Save**.

Note: Changes made to this section (with the exception of the Password Expiration feature) apply to passwords created after the changes are saved. For example, if all administrator passwords are 8 characters long, and you change the minimum password length to 12 characters, the administrators do not have to immediately change their passwords. Rather, the next time your administrators change their passwords, they must comply with the new rules.

Chapter 18

Multiple Credentials

If the DataSecure has multiple administrators, you can stipulate that some administrative and key management operations require authorization from more than one administrator. The multiple credentials feature provides an additional layer of security by protecting your high-level functions.

You can predetermine the number of administrators required to confirm certain operations, let administrators give their credentials to one another for a set period of time, and enable multiple credentials functionality within a clustered environment.

Operations Requiring Multiple Authentication

When the feature is enabled, the following operations require multiple authentication:

- Disable Multiple Credentials
- Create/Edit/Delete/Import Keys
- Edit a key's properties
- Add/Edit/Delete key group permissions
- Create/Edit/Delete users
- Create/Edit/Delete groups
- Add/Remove users from a group
- Create/Edit/Delete authorization policies
- Modify LDAP server settings
- Create/Edit/Delete administrators
- Restore backups
- Rollback system

Any request for these operations, from either the Management Console or the CLI, results in a request for additional administrator accounts and passwords. The operation only continues when those credentials are supplied. Otherwise, an error message appears.

Multiple Credentials in Clusters

To implement multiple credentials on DataSecures within a cluster, you must adhere to the following guidelines:

- All devices within the cluster must have the multiple credentials feature enabled. The feature can be enabled on one device and replicated to the others.

- For each device within the cluster, the number of administrators with High Access Administrator access control must be greater than or equal to the number of administrators required to authorize an operation. If not, the feature is not be enabled.

To add a new device to a cluster with multiple credentials enabled:

1. Make sure that the new device has the correct number of administrators with High Access Administrator access control.
2. Disable the multiple credentials feature for the cluster by disabling the feature for one device within the cluster. This action requires confirmation from multiple administrators.
3. Add the new device to the cluster. For information on adding a DataSecure to a cluster, refer to Chapter 6, “DataSecure Clustering”.
4. Enable the multiple credentials feature for the cluster by enabling the feature for one member.

Granting Credentials

Administrators can grant their credentials to another administrator for a specific period of time. This allows one administrator to execute several operations without having to enter multiple credentials for each request. The granting administrator can specify:

- The grantee
- The length of the grant
- The permitted operations

Credentials are granted for a particular administrator account, not a session. This lets an administrator grant credentials from a different computer.

Note: Credential grants cannot be inherited. One administrator can grant only their credentials to one other administrator.

An administrator can grant credentials for the following operations:

- Add/Modify keys
- Delete keys
- Add/Modify users and groups
- Delete users and groups
- Affect authorization policies
- Modify LDAP settings for users and groups

Administrators that are not normally permitted to execute any of these operations cannot grant credentials for them; those options are unavailable. Credentials cannot be granted for those operations not listed.

Note: Granting a credential does not affect that administrator’s access control privileges. For example, if an administrator does not have the access control for Keys and Authorization Policies configuration, she will never be able to create a key, even if another administrator grants credentials to her.

Important! If an administrator changes the DataSecure's system time or reboots it, all temporary administrator credentials immediately expire.

WARNING! If your DataSecure is configured to use NTP, modifications to the NTP system time can extend the life span of a granted credential.

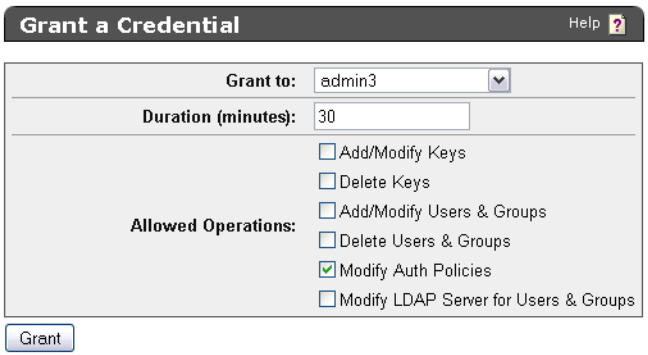
Note: Granted credentials are not included in backups.

Prior to granting credentials, you must select **Require Multiple Credentials** and **Allow Time-Limited Credentials** on the Multiple Credentials for Key Administration section.

To grant credentials:

1 Log in to the DataSecure as an administrator that will grant credentials to another.

2 Navigate to the Grant a Credential section on the Administrator Configuration page (Device >> Administrators >> Multiple Credentials).



3 Select the administrator that will receive the credentials in the **Grant to** field.

4 Enter the **Duration** that the credentials will be granted. This value must be less than the **Maximum Duration for Time-Limited Credentials** value in the Multiple Credentials for Key Administration section.

5 Select the operations for which you are granting credentials in the **Allowed Operations** field.

6 Click **Grant**. You can now view the granted credentials in the Credentials Granted section.

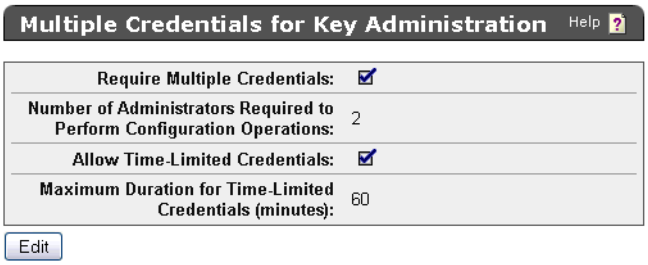
Configuring the Multiple Credentials Feature

Use the Multiple Credentials for Key Administration section to enable the multiple credentials feature, specify the number of administrators required for sensitive operations, enable the granting of credentials, and set the time period for credential grants.

To configure the multiple credentials feature:

1 Log in to the DataSecure as an administrator with High Access Administrator access control.

2 Navigate to the Multiple Credentials for Key Administration section on the Administrator Configuration page (Device >> Administrators >> Multiple Credentials).



3 Click **Edit**.

4 Select **Require Multiple Credentials**. This enables the multiple credentials feature. You must have High Access Administrator access control to enable this feature. Uncheck this field to disable the feature. Disabling multiple credentials is governed by the same rules as the operations that require multiple credentials: the specified number of administrators must authorize the disabling of the feature.

5 Specify the **Number of Administrators Required to Perform Configuration Operations**. There must be at least as many administrators with High Access Administrator access control as are required by this field.

6 To allow administrators to grant their credentials to other administrators for a limited time period select **Allow Time-Limited Credentials**. Enter the time period in the **Maximum Duration for Time-Limited Credentials** field.

7 Click **Save**.

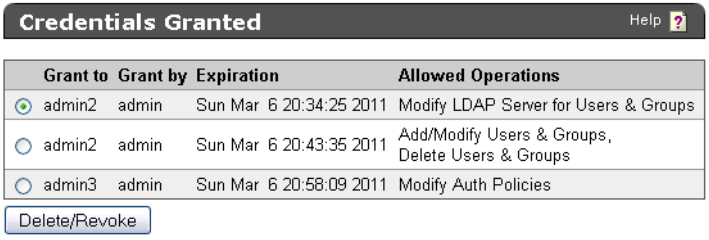
View and Revoke Granted Credentials

Once the multiple credentials feature is enabled, you'll want to track who is granting what to whom. The Credentials Granted section shows the credentials granted to or by the current administrator. Any credential grants that do not involve the current administrator are not displayed.

To view granted credentials:

1 Log in to the Management Console.

2 Navigate to the Credentials Granted section on the Administrator Configuration page (Device >> Device Configuration >> Administrators >> Multiple Credentials).



3 View the following fields:

- **Grant to** - the administrator receiving the credentials.
- **Grant by** - the administrator granting the credentials.
- **Expiration** - the date and time upon which the credential grant expires. Credential grants expire automatically if the DataSecure is rebooting or the system time is altered.
- **Allowed Operations** - lists the specific operations for which the credentials have been granted.

4 Click **Delete/Revoke** to cancel the grant. The credential grant will be removed from the system.

Chapter 19

Remote Administrator

You can administer the DataSecure locally and remotely. **Local administration** involves logging into the DataSecure from a machine that is physically connected to the device via a null modem cable. **Remote administration** involves logging into the DataSecure from the Management Console or an SSH session. The Remote Administration Settings, which are first specified during initial configuration, determine the IP addresses and ports that are used to administer the DataSecure.

The Web Admin User Authentication feature provides an additional security safeguard against unauthorized configuration of the DataSecure. When this feature is enabled, administrators are asked for a Client Certificate when they attempt to log in to the DataSecure. After presenting a client certificate, administrators can only log in to the DataSecure with a username that matches the common name field on the client certificate. For example, if the common name of the client certificate is *admin*, then the administrators can only log in as *admin*.

From the Remote Administrations Settings page, you can also recreate the Web Administration Certificate and the SSH Key used by the DataSecure. The Remote Admin Certificate is a self–signed certificate created during initial configuration that can be used to verify that the hostname in the certificate matches the hostname of the machine being logged into. Because the certificate is only presented to people logging into the Management Console, there is no reason to have the certificate signed by a Certificate Authority.

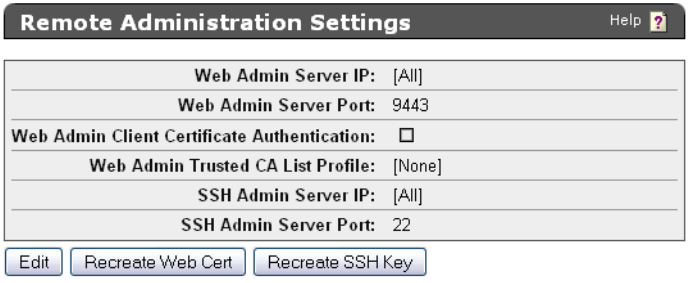
The SSH Key is used to generate a session key that is used for encryption and decryption operations while you are logged into the DataSecure.

Managing the Remote Administration Settings

To view and edit the remote administration settings:

1 Log on to the Management Console.

2 Navigate to the Remote Administration section (Device >> Administrators >> Remote Administrators).



3 View the section. Click **Edit** to change the values. Remember that changing some values may immediately sever your connection with the DataSecure. The section contains the following fields:

- **Web Admin Server IP** - The Web Admin Server IP address is the local IP address used to configure the DataSecure via the Management Console. You can select one specific IP address or you can select all of the IP addresses bound to the DataSecure. The URL used to connect to the Management Console is: https://IP-address:port.

Tip: We strongly recommend that you limit the Web Admin Server IP to a specific IP address. If you have four IP addresses bound to the DataSecure, and you select All instead of a specific IP address, then the DataSecure listens for Web Administration requests on four different IP addresses; whereas, if you specify a single IP address, the DataSecure listens for Web Administration requests on only one IP address. This can greatly reduce system vulnerability to outside attacks.

- **Web Admin Server Port** - The Web Admin Server Port specifies the port on which the server listens for requests. The default port is 9443.
- **Web Admin Client Certificate Authentication** - activates the Management Console Client Authentication feature, which requires that users present a client certificate when logging into the Management Console.

WARNING: This feature is immediately enabled when you select this checkbox. If you select this option through the Management Console, you will be immediately logged off and will need a valid client certificate to return. If needed, you can use the edit ras settings command from the CLI to disable this feature without presenting a certificate.

- **Web Admin Trusted CA List Profile** - This field allows you to select a profile to use to verify that client certificates are signed by a CA trusted by the DataSecure. This option is only valid if you require clients to provide a certificate to authenticate to the Key Server. For more information, see Chapter 34, “Certificate Authorities”.

  As delivered, the default Trusted CA List profile contains no CAs. You must either add CAs to the default profile or create a new profile and populate it with at least one trusted CA before the Key Server can authenticate client certificates.
- **SSH Admin Server IP** - The SSH Admin Server IP address is the IP address used to configure the DataSecure from the CLI. You can select one specific IP address or all of the IP addresses bound to the DataSecure.

Tip: We strongly recommend that you limit the SSH Admin Server IP to a specific IP address. If you have four IP addresses bound to the DataSecure, and you select All instead of a specific IP address, then the DataSecure listens for SSH Administration requests on four different IP addresses; whereas, if you specify a single IP address, the DataSecure listens for SSH Administration requests on only one IP address. This can greatly reduce system vulnerability to outside attacks.

- **SSH Admin Server Port** - The SSH Administration Server Port specifies the port on which the server listens for requests. The default port is 22.

Enabling the Web Admin User Authentication Feature

The Web Admin User Authentication feature requires a client certificate signed by a local CA on the DataSecure. The following instructions explain how to use the req.exe application to create the client certificate. Though we deliver the req.exe application with most of our client software, you can create the client certificate however you’d like.

Instructions for configuring Web Admin User Authentication are divided into the following sections:

- Generating a Client Certificate Request with req.exe
- Signing a Certificate Request and Downloading the Certificate
- Converting a Certificate from PEM to PKCS12 Format
- Importing a Certificate to a Web Browser
- Enabling the Web Admin User Authentication Feature

Generating a Client Certificate Request with req.exe

To generate a client certificate request:

1 Open a prompt window and navigate to the directory where the SafeNet Certificate Request Generator utility (req.exe) is installed.

2 Generate an RSA key and a client certificate request using the following command:

```
req -out clientreq -newkey rsa:1024 -keyout clientkey
```

where clientreq is the name of the certificate request being created, and clientkey is the name of the private key associated with the certificate request.

If you are using OpenSSL, use the following command:

```
openssl req -out clientreq -newkey rsa:1024 -keyout clientkey
```

Note: The certificate request and private key will both be created in the working directory by default. You can generate them in another directory by including a location in the request and key names. For example, to create them in the C:\client_certs folder, use the following command:

```
openssl req -out C:\client_certs\clientreq -newkey rsa:1024
-keyout C:\client_certs\clientkey
```

The key generation process will then request the following data:

- A PEM passphrase to encode the private key. The passphrase that encodes the private key is the first passphrase you provide after issuing the command above. You must specify this value in the Client Private Key Passphrase section of the IngrianNAE.properties file.
- The distinguished name. The distinguished name is a series of fields whose values are incorporated into the certificate request. These fields include country name, state or province name, locality name, organization name, organizational unit name, common name, email address, surname, user ID, and IP address.

Important! The **common name** field *must* be the username of a valid administrator account. When using this certificate, only that administrator account will be usable.

- A challenge password. This challenge password is NOT used in the SafeNet environment.
- An optional company name.

Signing a Certificate Request and Downloading the Certificate

This section describes how to sign a certificate request with a local CA and then download the certificate. You must download the certificate *immediately* after it is signed by the CA.

To sign a certificate request with a local CA:

1. Open the certificate request in a text editor.
2. Copy the text of the certificate request. The copied text must include the header (-----BEGIN CERTIFICATE REQUEST-----) and the footer (-----END CERTIFICATE REQUEST-----).
3. Log in to the DataSecure as an administrator with Certificates access control.
4. Navigate to the Local Certificate Authority List (Security >> CAs & SSL Certificates >> Local CAs). Select the local CA and click **Sign Request** to access the Sign Certificate Request section.
5. Modify the fields as shown:
   - **Sign with Certificate Authority** - Select the CA that signs the request.
   - **Certificate Purpose** - Select *Client*.
   - **Certificate Duration (days)** - Enter the life span of the certificate.
   - **Certificate Request** - Paste all text from the certificate request, including the header and footer.
6. Click **Sign Request**. This will take you to the CA Certificate Information section where the certificate is displayed in PEM format.
7. Click the **Download** button to save the certificate to your client.

Converting a Certificate from PEM to PKCS12 Format

The DataSecure can provide you with a certificate in PEM format. You must convert that certificate to PKCS12 before importing it to your web browser.

To convert a certificate from PEM to PKCS12 format:

1. Execute the following command if you are using openssl:

```
openssl pkcs12 -export -inkey <key filename> -in <cert filename> -out
<pkcs12 filename>
```

Importing a Certificate to a Web Browser

To import a certificate into Mozilla Firefox:

1. From the menu, go to Tools > Options.
2. Click **Advanced**.
3. Click the Security tab.
4. Click **View Certificates**.

5 Click the **Import a Certificate** button.

6 Click **Import** on the Your Certificates tab.

7 Enter the passwords when prompted.

To import a certificate into Microsoft Internet Explorer:

1 From the menu, go to Tools > Internet Options.

2 Click the Content tab.

3 Click **Certificates**.

4 Click **Import**.

The Import Certificate Wizard guides you through the rest of the certificate import process.

Enabling Web Admin User Authentication on the DataSecure

To enable Web Admin User Authentication on the DataSecure:

1 Log in to the Management Console.

2 Navigate to the Remote Administration Settings section (Device >> Administrators >> Remote Administration).

3 Click **Edit**.

4 Select **Web Admin User Authentication**.

5 Click **Save**.

Note: This feature is *immediately* enabled when you select **Web Admin User Authentication**. You will be logged out of the Management Console and will need a valid client certificate to return. If needed, you can use the `edit ras settings` command from the CLI to disable this feature without presenting a certificate.

Recreating the Web Cert

To recreate the web certificate:

1 Log in to the Management Console.

2 Navigate to the Remote Administration Settings section (Device >> Administrators >> Remote Administration).

3 Click **Recreate Web Cert** to generate a new certificate for the remote administration Management Console. After you click **Recreate Web Cert**, you are presented with an intermediate page that allows you to specify the duration of the Web Admin Certificate. After you specify a value in days, click **Create**. You must close all browser windows and restart the browser to reconnect to the Management Console.

Recreating the SSH Key

To enable Web Admin User Authentication on the DataSecure:

1. Log in to the Management Console.
2. Navigate to the Remote Administration Settings section (Device >> Administrators >> Remote Administration).
3. Click **Recreate SSH Key** to generate a new key for remote administration use via SSH. Recreating the key closes all active SSH connections.

Chapter 20

Logging

The DataSecure maintains a variety of logs to record administrative actions, network activity, cryptography requests, and more. You can schedule log rotations, configure the number of logs archived on the DataSecure, stipulate the maximum log file size, and transfer logs to a log server.

The following logs are created:

- **Activity Log** – Contains a record of each request received by the Key Server.
- **Audit Log** – Contains a record of all configuration changes and user input errors made to the DataSecure, whether through the Management Console or the CLI.
- **Client Event Log** – Contains a record of all client requests that have the <RecordEventRequest> element.
- **Database Encryption Log** – Contains a record of the data migration, unencryption, and key rotation operations performed by the DataSecure. This log is only produced when the Database Tools feature is enabled.
- **Enterprise Log** – Contains a record of all Enterprise Manager-related operations. This log is only produced when the Enterprise Manager feature is enabled.
- **Failover Log** - Contains a record of all requests received by the Enterprise Manager when it acts as a failover server for an EdgeSecure. This log is only produced when the Enterprise Manager feature is enabled.
- **ProtectFile Client Log** – Contains a record of all operations performed by the ProtectFile clients. This log is available only when the ProtectFile Manager is installed.
- **ProtectFile Manager Log** – Contains a record of all operations performed by the ProtectFile Manager. This log is available only when the ProtectFile Manager feature is enabled.
- **System Log** – Contains a record of all system events, such as: service starts, stops, and restarts; SNMP traps; hardware failures; successful or failed cluster replication and synchronization; failed log transfers; and license errors.
- **SQL Log** – Contains a record of all SQL statements that are run against a database for schema migration, data migration, and key rotation.

For each type of log, the current log entries are kept in a file named ‘Current’.

Log Rotation

When a log file is rotated, the Current log file is closed and renamed with a timestamp. This renamed file is then either stored in the log archive or transferred off of the DataSecure, depending on your configuration. A new Current log file is then created.

Log rotation occurs according to a configured schedule. Rotation can also occur earlier, if the log file grows to predetermined maximum size. You configure all of these parameters.

Your rotation schedule can be set to automatically rotate logs on a daily, weekly, or monthly basis, at any time of day. The system maintains these settings for each log type; your Activity and Audit logs, for example, can adhere to different schedules.

By specifying a maximum log file size, you can ensure that logs are rotated when they reach a certain size, regardless of their rotation schedule.

For example, you can schedule that system rotate the Audit Log every Sunday morning at 3:15 *or* when the file size reaches 100 MB, whichever comes first.

Log Archives

If you do not configure the log transfer feature, old log files are stored on the DataSecure. For each type of log, you can select the maximum number of log files that can be archived. When that maximum number is reached, any new addition to the log archive will remove the oldest log file.

For example, suppose you limit the number of archived System Logs to six and *do not* enable the log transfer feature. After six System Log rotations, the archive is full. The next time you rotate the System log, the oldest System log file on the DataSecure will be removed to make room for the latest System log file.

If you limit the number of archived System Logs to six and *do* enable the log transfer feature, logs that would normally be deleted are instead sent to the transfer destination.

If you set the number of archived logs to zero, no logs will be archived. Rotated logs will either be deleted or sent to the transfer destination, depending on your log transfer settings.

Important! The DataSecure should not be a permanent storage place for log files. You should transfer those files to another location.

Log Transfer

The DataSecure acts as a temporary repository for logs; *it is not meant to store log files permanently*. We recommend that you enable the log transfer feature and store your log files on a log server.

There are four different ways you can transfer a log file off of a DataSecure: SCP, FTP, browser download, and syslog. Because syslog and FTP are not secure protocols, we recommend that you use SCP to transfer your log files.

When a log is rotated, if you have configured a transfer destination for that log, the DataSecure attempts to transfer that log file to the location you have specified. If the file transfer fails, the log file sits in a queue as the DataSecure attempts to transfer the file every two hours until it is successfully transferred. If the DataSecure rotates the log before that file is successfully transferred, the DataSecure attempts to transfer both the current log file and the log file that previously failed to transfer.

Log File Naming Convention

When a log file is transferred off of the DataSecure, the following naming convention is applied:

<log type>.<archive number>.<datetime stamp>.<hostname>

Value	Description
log type	type of log (e.g., System Log, Audit Log.)
archive number	indicates the file's place in the log archive. 1 indicates the most recent log file.
datetime stamp	The date and time when the log file was created.
hostname	The hostname of the DataSecure.

For example, the filename audit.log.1.2011-04-04_160146.demo would identify this file as:

- An Audit Log.
- The first log file in the log index.
- A file created on 2011-04-04 at 16:01:46.
- A log from the DataSecure with the hostname 'demo'.

This naming convention allows you to transfer log files from multiple DataSecures to the same remote log server while avoiding the problem of overwriting log files due to naming conflicts. These file names are not visible from the CLI or the Management Console.

Syslog

The syslog protocol is used to transmit event notification messages across networks. Messages that are recorded in any of the logs can also be sent to an external server that is configured to receive messages via the syslog protocol. You can configure one or two syslog servers. When you configure two syslog servers, the DataSecure sends syslog messages to both.

You should be aware of the following before configuring syslog on your DataSecure.

- By default, the DataSecure transmits messages using syslog facility "local1;" however, this is configurable on a per–log–basis. Refer to RFC 3164, *"The BSD syslog Protocol,"* for details about syslog.
- Syslog is not a secure protocol. Event notification messages that are sent to an external server are not encrypted or signed. As such, it is not the recommended method for transferring logs from the DataSecure.
- Regardless of whether syslog is enabled or disabled for any particular log, all log messages continue to be saved to the normal log files on the DataSecure, and all logs still use the traditional rotation/transfer mechanism.
- Changes to the syslog configuration take effect immediately for all logs except the Audit Log. With regard to the Audit Log, all existing CLI sessions continue to abide by the syslog settings that were in effect when the CLI session began. Once a user ends a CLI session and logs back in, the new syslog settings take effect for that session.

Syslog Message Format

When messages on the DataSecure are syslogged, they appear at the remote syslog server with an additional prefix of `<timestamp> <origin_host_or_ip> <LogName>`

where `LogName` might be “System,” “Audit,” or “Activity,” depending on which log the message is from. The format of the timestamp and origin host/IP are determined by the remote syslog server software. Sometimes, the origin host/IP will be repeated twice in the message prefix. The message body (the elements after `LogName`) is the same as the entry in the local log file.

An example from the System Log is shown here:

original log message:

```
---------------------
2005-09-12 10:23:47 irwin.company.com NAE Server: Starting NAE Server
```

log message at syslog server (displays on one line):

```
-----------------------------------------------------
Sep 12 10:23:48 you.com demo System: 2005-09-12 10:23:47 you.com NAE Server:
Starting NAE Server
```

Secure Logs

The DataSecure allows you to sign your log files before moving them to another machine or downloading them, which makes them more secure than unsigned log files.

A Log Signing Certificate is created the first time the DataSecure is run and when the machine is restored to the factory defaults. If the Sign Log option is selected, a log file is signed with the Log Signing Certificate right before it is downloaded or moved off of the DataSecure. The signed log file is then sent to the specified host in multipart S/MIME email format. The first part of the signed log file contains the clear text log; the second part of the signed log file contains the signature in PEM encoded PKCS7 format. The certificate used to verify the signed log file is embedded within the signature, but it is insecure to simply rely on this embedded certificate for verification.

Signed logs do not appear in plaintext when downloaded.

Note: Signed logs files are significantly larger than unsigned logs. Specifically, the size of a signed log file is *approximately* equal to 2098 bytes plus 1.3864 times the size of the unsigned file. This means that logs securely transferred off of the DataSecure will be larger than the **Max Log File Size** value shown in the Rotation Schedule section.

Important! If you decide to recreate a Log Signing Certificate, it is very important to make a backup of the existing certificate so that old log files signed with the existing certificate can still be properly verified.

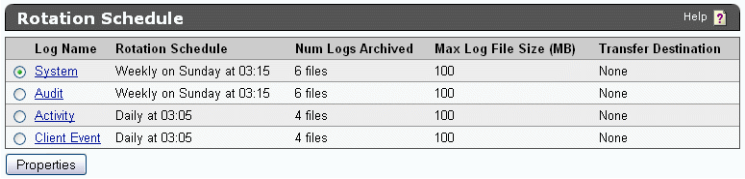
Tip: You should store your Log Signing Certificate separately from the signed logs files.

Configure Log Rotation

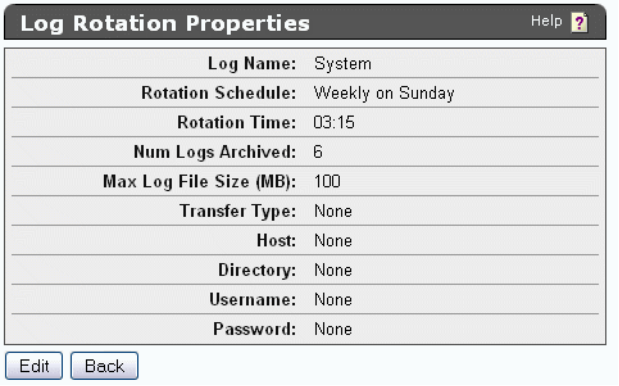
To configure log rotation:

1 Log in to the Management Console as an administrator with Logging access control.

2 Navigate to the Log Configuration page (Device >> Log Configuration >> Rotation & Syslog).



3 Select a log in the Rotation Schedule section and click **Properties**.



4 Click **Edit** on the Log Rotation Properties section. Enter values for the following fields:

- **Rotation Schedule** - specifies the frequency of log rotation. When a log is rotated, the current log is closed and a new log file is opened. Supported log rotation frequencies are:
  - *Daily* - happens at 3:05 AM.
  - *Weekly* - happens at 3:15 AM on Sundays.
  - *Monthly* - happens at 3:25 AM on the first day of the month.
- **Rotation Time** - specifies the time of day when the log rotation occurs.
- **Num Logs Archived** - number of files to retain. Once this limit is reached, a new log file causes the oldest log file to be removed. The maximum number of files you can retain is 64; the minimum is 0.
- **Max Log File Size (MB)** - specifies the maximum size log file. When the log file reaches the file size limit, the system rotates the current file and begins writing to a new file. This is the maximum size of the unsigned log file as it is stored on the DataSecure. Signed logs are considerably larger.
- **Transfer Destination** - destination the log files are sent to, as defined by the Host and Directory fields. The Username must have write access to the Host and Directory. Selecting *None* implies that log files will be stored internally on the DataSecure. Selecting *FTP* or *SCP* implies that the log file will be sent via FTP or SCP to the specified hostname.

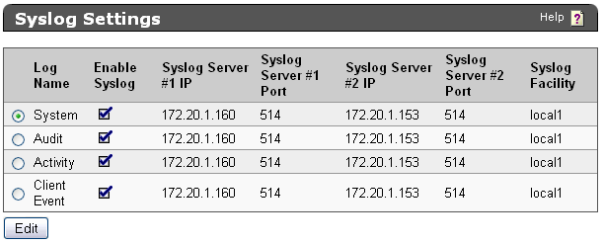
5 Click **Save**.

Enable Syslog

To enable syslog:

1 Log in to the Management Console as an administrator with Logging access control.

2 Navigate to the Log Configuration page (Device >> Log Configuration >> Rotation & Syslog).



3 Select a log in the Syslog Settings section and click **Edit**.

4 Select **Enable Syslog**.

5 Specify a hostname or IP address of the primary log server (Syslog Server #1) and the port that the syslog server is listening on. You can optionally specify a backup syslog server by entering an IP address and port for the Syslog Server #2 IP and Syslog Server #2 Port fields.

6 Enter the Syslog Facility. The default is local1. You can choose from local0 to local7.

7 Click **Save**.

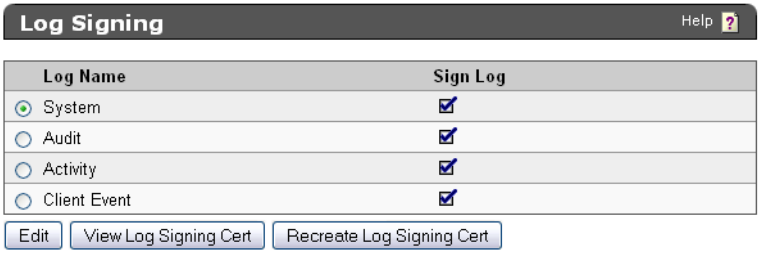
8 Repeat steps 3, 4 and 5 to enable syslog for multiple logs.

Enable Signed Logs

To enable signed logs:

1 Log in to the Management Console as an administrator with Logging access control.

2 Navigate to the Log Configuration page (Device >> Log Configuration).

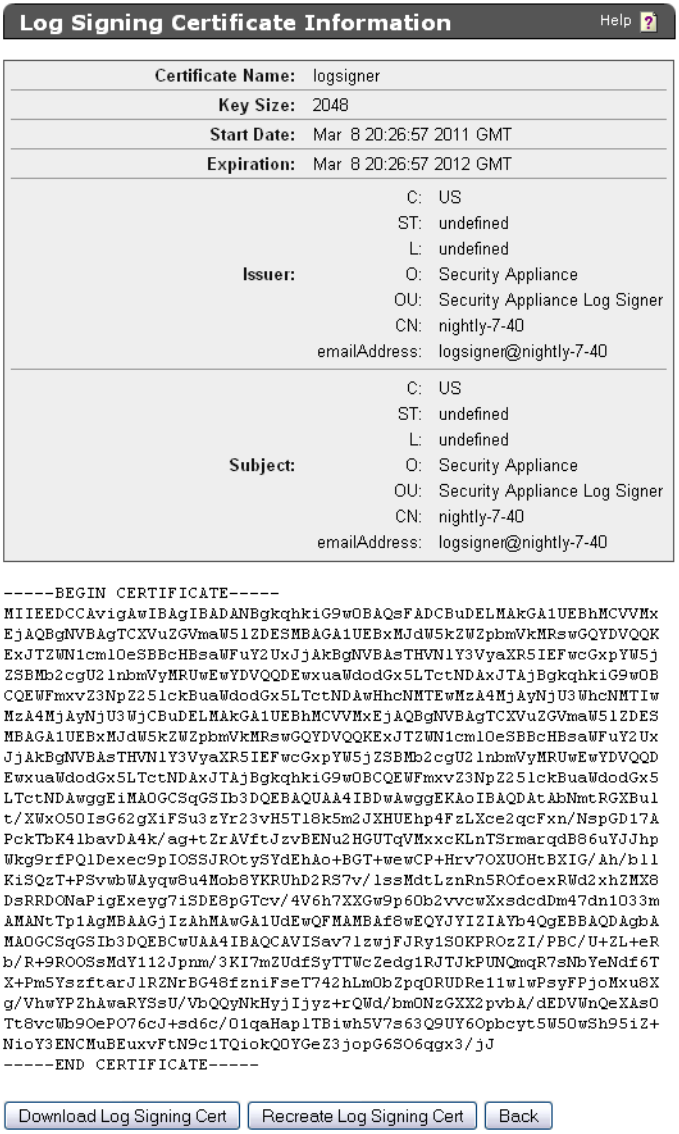


3 Click **Edit** in the Log Settings section.

4 Select **Sign Log** for the log(s) you would like to be signed.

5 Click **Save**. From now on, the system will sign the selected logs with the log signing certificate created when the DataSecure was initialized.

6 Click **View Log Signing Cert** to view the certificate used to sign the logs.



7 Click **Download Log Signing Cert** to download the certificate through the web browser.

8 Click **Recreate Log Signing Cert** to generate a new log signing certificate.

Verify a Secure Log Using Microsoft Outlook

To verify a secure log using Microsoft Outlook:

1. Move the log file off of the DataSecure or download it to a Windows machine.
2. Change the file extension on the log file to .eml. The file will now be recognized by Windows as an email file.
3. Double-click on the file. Outlook Express will open and display a help screen with a security header that reads “Digitally signed - signing digital ID is not trusted”.
4. Click **Continue**. A security warning will appear.
5. Click **View Digital ID**. The Signing Digital ID Properties dialog will appear.
6. Click the Details tab and scroll down to the Thumbprint field.
7. Download the Log Signing Certificate used to sign the log file from the DataSecure.
8. Double-click on the Log Signing Certificate. The Certificate dialog will appear.
9. Select the Details tab.
10. Scroll down to the Thumbprint field.
11. Compare the thumbprints of the Signing Digital ID Properties dialog and the Log Signing Certificate dialog. If the text strings are identical, the integrity of the log file is secure.

Verify a Secure Log Using OpenSSL

Prior to verifying a secure log, you must have installed OpenSSL on the machine that will verify the log file. You can use the procedure in both Windows and UNIX/Linux environments. If OpenSSL has not been installed on your Windows machine, you can find a Windows distribution here:

http://www.slproweb.com/products/Win32OpenSSL.html

To verify a secure log:

1. Log in to the Management Console as an administrator.
2. Navigate to the Log Configuration page (Device >> Log Configuration).
3. Click **View Log Signing Cert**.
4. Click **Download Log Signing Cert** and save the Log Signer certificate to your local machine.
5. Navigate to the log page (Device >> Logs & Statistics >> Log Viewer >> <select the log page>) and click **Download Entire Log**. Save the log file in the same directory as the log signer cert. (You can save both the log file and the certificate anywhere you like; for the sake of simplicity, these procedures assume that the two files are in the same directory.)

6 From the command prompt, enter the following command:

```
openssl smime -verify -in <signed log file> -nointern -certfile
<log cert file> -text -noverify
```

where <signed log file> is the log you downloaded in step 5, and <log cert file> is the log signer cert you downloaded in step 4.

After issuing the command, the text from the log file is displayed. If the text of the log file has not been modified, the system displays “Verification successful” below the log text, as shown here:

```
2006-07-06 09:15:02 [admin]: Logged in from 192.168.1.170 via web
2006-07-06 11:17:30 [admin]: Logged in from 192.168.1.170 via web
2006-07-06 11:24:26 [admin]: Downloaded Cert logsigner
2006-07-06 12:30:17 [admin]: User admin login has expired.
Verification successful
```

You can test this process by modifying the text in the log file and running the command from step 6 again. When you issue the command, the system again displays the text of the log file, but this time, it displays “Verification failure” after the text of the log file.

Chapter 21

Log Viewer

The DataSecure maintains logs and statistics you can use to monitor your system's performance. The Log Configuration and Log View pages enable you to configure log rotation schedules, syslog settings, specify log levels, and view and download logs.

System Logs

The **System Log** contains a record of all system events, such as:

- Failed log transfers.
- Hardware failures.
- License errors.
- Service starts, stops, and restarts.
- SNMP traps.
- Successful or failed cluster replication and synchronization.

Audit Logs

The **Audit Log** contains a record of all configuration changes and user input errors made to the DataSecure, whether through the Management Console or the CLI. The audit log cannot be cleared or manually rotated.

Each line in the audit log corresponds to one configuration change. Lines in the audit log contain the following information in the order shown:

- Date and time change was made.
- Username: the username that made the configuration change.
- Event: a text description of the configuration change.

Activity Logs

The **Activity Log** contains a record of each request received by the Key Server. For client requests that contain multiple cryptographic operations, each operation is logged as a separate entry in the Activity Log. Requests for cryptographic operations are not logged until the Key Server has received all the data from the client or an error has occurred. When there is no data for a particular field, a dash is inserted. The format of the Activity Log is as follows:

```
<date> <priority> <ip> <common name> <user> <request id> <request type> <key>
<detail> <error code> <message>
```

Field	Description
date	enclosed in brackets, the date field shows the date and time that the DataSecure finished processing the request, specified in the local time zone. The date and time are represented as follows: yyyy-mm-dd hh:mm:ss.
priority	ERROR or INFO, depending on the result of the request
ip	IP address of the client machine
common name	enclosed in brackets, the common name field displays the common name defined in the certificate that was provided by the client. This field only has data when you require client authentication.
user	authenticated user that issued the request
request id	request ID of the client request
request type	type of client request; the request type field is the name of the XML request without the suffix “Request.” For example, a KeyGenRequest log entry would have a request type value of “KeyGen.”
key	name of the key specified in the request
detail	enclosed in brackets, the detail field provides different information based on the type of request; the details field is described in the table below.
error code	numerical error code returned to the client
message	enclosed in brackets, the message field displays either “Success” if the server was able to fulfill the request, or, if there was an error, this field displays the error message that coincides with the appropriate numerical error code

As mentioned, the detail field provides different information depending on what the client requests. The following table lists the different types of requests the client might submit and then describes what information is present in the detail field for each request.

Request Type	Detail Information
authentication	username provided by the client
key generation	algorithm and key size; the value for the Deletable and Exportable options are listed as well if they are set by the client
key import	algorithm and key size specified in the request; the value for the Deletable and Exportable options are listed as well if they are set by the client
key deletion	nothing is listed in the detail field
key export	nothing is listed in the detail field
random number generation	size in bytes of the random number being generated
replication export	nothing is listed in the detail field
replication import	nothing is listed in the detail field
key information	nothing is listed in the detail field
key queries	nothing is listed in the detail field
cryptographic	ordinal number of the operation, the name of the operation, and the algorithm (including mode and padding)

Client Event Logs

The **Client Event Log** contains a record of each message sent by clients using the `<RecordMessageRequest>` element. The client event data must be base64 encoded. When there is no data for a particular field, a dash is inserted. The format of the Activity Log is as follows:

```
<date> <priority> <ip> <common name> <user> <request id> <message>
```

Field	Description
date	enclosed in brackets, the date field shows the date and time that the DataSecure finished processing the request, specified in the local time zone. The date and time are represented as follows: yyyy-mm-dd hh:mm:ss.
priority	ERROR or INFO, depending on the result of the request
ip	IP address of the client machine
common name	enclosed in brackets, the common name field displays the common name defined in the certificate that was provided by the client. This field only has data when you require client authentication.
user	authenticated user that issued the request
request id	request ID of the client request
message	enclosed in brackets, the message field displays the plaintext that corresponds with the base64 encoded message included in the client event.

Database Encryption Logs

The Database Encryption Log contains a record of the data migration, unencryption, and key rotation operations performed by the DataSecure. This log is only produced when the ProtectDB Manager feature is enabled.

An entry is made to this log whenever a column is encrypted or decrypted, or a key rotation operation is executed on a column. Log entries include the database column information, the number of rows encrypted or decrypted, the new key name (for key rotations), and a timestamp.

The format of the Database Encryption Log is as follows:

```
<date> <time> <operation> <database information: alias, hostname or IP, database user, database name> <table information: table name,  table owner> <column name> <operation information: key name>
```

A sample entry is shown here:

```
2005-10-27 04:49:21 SetEncryption database: [alias=master, host=192.168.1.129, user=app_user, dbname=master] table: [name=ingtst1, owner=dbo] column: [name=ssn] encryption: [key=yourkey]
```

SQL Logs

The SQL Log contains a record of all SQL statements that are run against a database for schema migration, data migration, and key rotation. The log entries include information necessary to identify each SQL operation, such as the database connection information, the user that executed the operation, the

purpose of the operation, and a timestamp. Some entries are abbreviated if they would be repetitive or if they would contain cleartext information. The format of the SQL Log is as follows:

```
<date> <time> <database type> <database server IP> <database user> <database name> <log level> <operation>
```

A sample entry is shown here:

```
2004-10-20 20:23:27 [SQLServer 192.168.1.129 SA CUSTOMER][INFO]:  INSERT INTO [CUST_TEMP] SELECT ING_ROW_ID,[CC_NUM] FROM [CUST]
```

ProtectFile Client Logs

For more information about configuring the ProtectFile client log, see the *SafeNet ProtectFile User Guide.*

The ProtectFile Client Log contains a record of the operations performed by ProtectFile clients on file servers. This log is produced only when ProtectFile is installed on a file server and configured in the Management Console.

Logs written by ProtectFile are stored on the file server and can be configured to uploaded to the DataSecure. After uploading to the DataSecure, the logs are validated, after which the logs are viewable either on the DataSecure under **ProtectFile Client** or from a syslog server, if configured.

Note: Log rotation can significantly impact performance on an i110™.

The ProtectFile client logs messages for the following file server events:

- File opens
- Data migration start and end
- Key rotation start and end
- Application errors and warnings

Each log message includes the following information:

- Time stamp
- Hostname/IP address
- User name
- File name
- Operation attempted

The format for log entries is:

```
<C> <timestamp> <file server user> <file server name> <file name> <operation>
```

Where C is:	Denoting:
• -	Log line has successfully validated.
• F	Log line did not validate.
• 0	No verification occurred for this line.

A sample entry is shown here:

```
- Tue Jan 02 14:11:37 2007 User: [jsmith] File server [hr-475], file [d:\hr-
stop\optionsq206.xls] File open
```

ProtectFile Manager Logs

The ProtectFile Manager Log contains a record of the cryptographic and key rotation operations performed by the ProtectFile Manager through the ProtectFile client. This log is only produced when the ProtectFile Manager feature is enabled and the ProtectFile client is installed.

An entry is made to this log whenever a directory or file is encrypted or decrypted, or a key rotation operation is executed on a directory or file. Log entries include the file server and directory, the previous state and the new state (including the key, recursive encryption on directories, and extensions to which the operation applied), and a timestamp.

The format of the ProtectFile Manager Log is as follows:

```
<date> <time> <log message> File server [file server], directory [directory or
file path], old state [key name: <blank=none or key name before operation>; re-
cursive: <blank=false, 1=true>; extensions: <blank=all or extensions list>], new
state [key name: <blank=none or key name after operation>; recursive: <blank=
false, 1=true>; extensions: <blank=all or extensions list>]
```

A sample entry is shown here:

```
2007-01-27 12:34:56 Operation completed successfully. File server [hr-475], di-
rectory [d:\hrstop], old state [key name: ; recursive: ; extensions: ], new state
[key name: hr55; recursive: 1; extensions: ]
```

Failover Logs

The Failover log contains a record of all requests received by the Enterprise Manager when it acts as a failover server for an EdgeSecure. This log is only produced when the Enterprise Manager feature is enabled.

The Failover Log contains a record of each request received by the Enterprise Manager on the Failover port. For client requests that contain multiple cryptographic operations, each operation is logged as a separate entry in the Failover Log. Requests for cryptographic operations are not logged until the Enterprise Manager has received all the data from the client or an error has occurred. When there is no data for a particular field, a dash is inserted. The format of the Failover Log is as follows:

```
<date> <priority> <ip> <common name> <edgesecure name> <user> <request id> <re-
quest type> <key> <detail> <error code> <message>
```

The following table describes the fields that are present in the Failover Log.

Field	Description
date	enclosed in brackets, the date field shows the date and time that the DataSecure finished processing the request, specified in the local time zone. The date and time are represented as follows: yyyy-mm-dd hh:mm:ss.
priority	ERROR or INFO, depending on the result of the request

Field	Description *(continued)*
ip	IP address of the client machine
common name	enclosed in brackets, the common name field displays the common name defined in the certificate that was provided by the client. This field only has data when you require client authentication.
edgesecure name	name of the EdgeSecure that submitted the request.
user	authenticated user that issued the request
request id	request ID of the client request
request type	type of client request; the request type field is the name of the XML request without the suffix “Request.” For example, a KeyGenRequest log entry would have a request type value of “KeyGen.”
key	name of the key specified in the request
detail	enclosed in brackets, the detail field provides different information based on the type of request; the details field is described in the table below.
error code	numerical error code returned to the client
message	enclosed in brackets, the message field displays either “Success” if the server was able to fulfill the request, or, if there was an error, this field displays the error message that coincides with the appropriate numerical error code

As mentioned, the detail field provides different information depending on what the client requests. The following table lists the different types of requests the client might submit and then describes what information is present in the detail field for each request.

Request Type	Detail Information
authentication	username provided by the client
key generation	algorithm and key size; the value for the Deletable and Exportable options are listed as well if they are set by the client
key import	algorithm and key size specified in the request; the value for the Deletable and Exportable options are listed as well if they are set by the client
key deletion	nothing is listed in the detail field
key export	nothing is listed in the detail field
random number generation	size in bytes of the random number being generated
replication export	nothing is listed in the detail field
replication import	nothing is listed in the detail field
key information	nothing is listed in the detail field
key queries	nothing is listed in the detail field
cryptographic	ordinal number of the operation, the name of the operation, and the algorithm (including mode and padding)

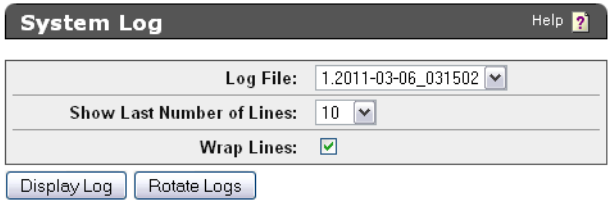
View Logs

To view the system log:

1 Log on to the Management Console.

2 Navigate to the Log Viewer page (Device >> Log Viewer).

3 Select the type of log to view in the left-hand navigation, either System, Audit, Activity, or Client Event.

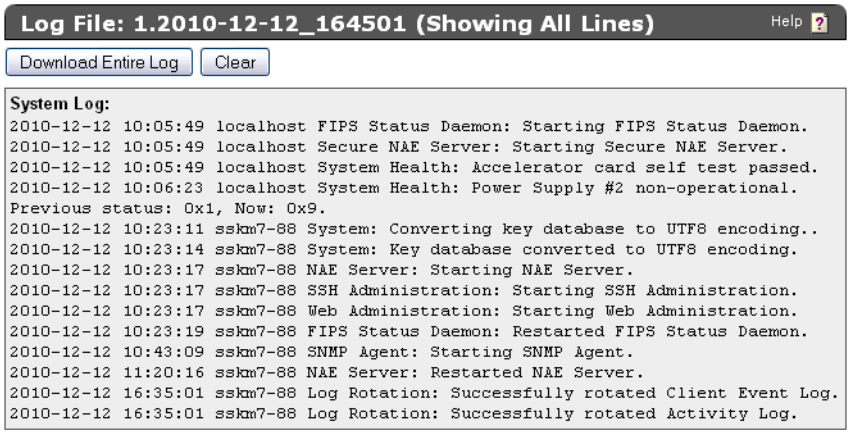


4 Select the file from the **Log File** list.

5 Select the number of lines to display in the **Show Last Number of Lines** field.

6 Select **Wrap Lines** to wrap long log entries in the display area.

7 Select **Display Log**. The log is now viewable in the display area:



Rotate Logs

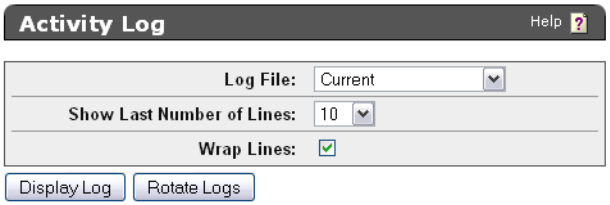
You can only rotate the system, activity, and client event logs. You cannot manually rotate the audit log.

To view the system log:

1 Log on to the Management Console.

2 Navigate to the Log Viewer page (Device >> Log Viewer).

3 Select the type of log to view in the left-hand navigation, either System, Activity, or Client Event. The current log file is displayed by default.



4 Select **Rotate Logs**. What was the current log will now be a log file with the current timestamp. You can view this by selecting the **Log File** drop-down list. The new current log will have the following entry "`Log Rotation: Successfully rotated x Log.`"

Clear Logs

You cannot clear an audit log.

To clear a log:

1 Log on to the Management Console.

2 Navigate to the Log Viewer page (Device >> Log Viewer).

3 Select the type of log to view in the left-hand navigation, either System, Activity, or Client Event. The current log file is displayed by default.

4 Choose a log in the **Log File** field.

5 Click **Display Log**.

6 Click **Clear**.

Download Logs

To download a log:

1 Log on to the Management Console.

2 Navigate to the Log Viewer page (Device >> Log Viewer).

3 Select the type of log to view in the left-hand navigation, either System, Audit, Activity, or Client Event. The current log file is displayed by default.

4 Choose a log in the **Log File** field.

5 Click **Display Log**.

6 Click **Download Entire Log** to download the log to your browser.

Chapter 22

Statistics

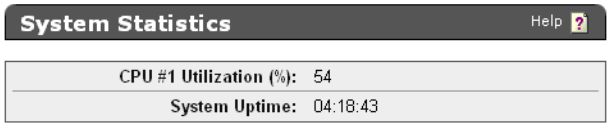
The Statistics page enables you to view real-time system statistics about client connections, network throughput, and cache, CPU, and memory utilization. The page displays information about requests made to the KMIP server; namely, calls to locate, register, get, get attributes, and query. The page also displays information about the cryptographic requests made to the NAE-XML server.

View System Statistics

The System Statistics section provides general system statistics, such as how much the CPUs are utilized and how long since the system was rebooted.

To view system statistics:

1. Log on the Management Console.
2. Navigate to the Statistics page (Device >> Statistics).
3. View the data in the System Statistics section.
   - **CPU Utilization** - the percentage of CPU time that in use for each CPU.
   - **System Uptime** - the duration of time elapsed since the last reboot.



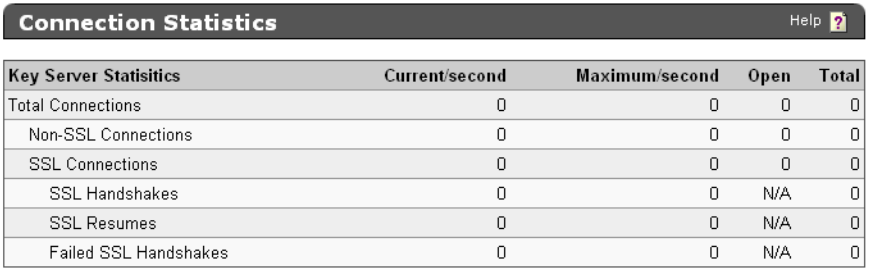
View Connection Statistics

The Connection Statistics section provides information on the total number of connections since the DataSecure was rebooted.

To view connection statistics:

1. Log on to the Management Console.
2. Navigate to the Statistics page (Device >> Statistics).
3. View the data in the Connection Statistics section. The section presents data for the following types of connections:
   - Total Connections
   - Non-SSL Connections
   - SSL Connections

- SSL Handshakes
- SSL Resumes
- Failed SSL Handshakes



Connection Statistics Help

Key Server Statisitics	Current/second	Maximum/second	Open	Total
Total Connections	0	0	0	0
Non-SSL Connections	0	0	0	0
SSL Connections	0	0	0	0
SSL Handshakes	0	0	N/A	0
SSL Resumes	0	0	N/A	0
Failed SSL Handshakes	0	0	N/A	0

For each connection type, the section shows the current connections per second (**Current/second**), the maximum connection number for each type (**Maximum/second**), the number of open connections (**Open**), and the total number of all connections (**Total**). Note that **Open** is not applicable to SSL Handshakes, SSL Resumes, and Failed SSL Handshakes, since those events do not remain open.

View Throughput Statistics

The Throughput section shows statistics for data traffic on each physical interface on the DataSecure.

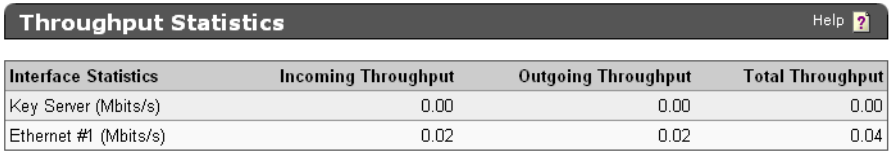
To view throughput statistics:

1 Log on to the Management Console.

2 Navigate to the Statistics page (Device >> Statistics).

3 View the data in the Throughput Statistics section. The section presents data for each interface on the DataSecure:

- **Key Server Interface Statistics** - This row expresses in megabits per second the amount of data passing through the Key Server. This traffic is generated when the DataSecure processes client requests. This does not include any overhead from the SSL, TCP, or IP protocols. Furthermore, this does not include traffic to the Management Console or the SSH administration tool.
  - **Incoming Throughput** – bytes flowing into the Key Server as a result of client requests.
  - **Outgoing Throughput** – bytes flowing out of the Key Server as a result of responses to client requests.
  - **Total Throughput** – the rate at which bytes are flowing into and out of the DataSecure for client traffic.
- **Ethernet Interface Statistics** - This row expresses in megabits per second the amount of data passing through each interface on the DataSecure. The Interface Statistics measure all traffic flowing through the box, including data generated from client requests, SSH connections, SNMP traps, log rotation, etc.
  - **Incoming Throughput** – bytes flowing into the DataSecure.
  - **Outgoing Throughput** – bytes flowing out of the DataSecure.
  - **Total Throughput** – sum of bytes flowing into and out of the DataSecure.



Interface Statistics	Incoming Throughput	Outgoing Throughput	Total Throughput
Key Server (Mbits/s)	0.00	0.00	0.00
Ethernet #1 (Mbits/s)	0.02	0.02	0.04

View License Usage

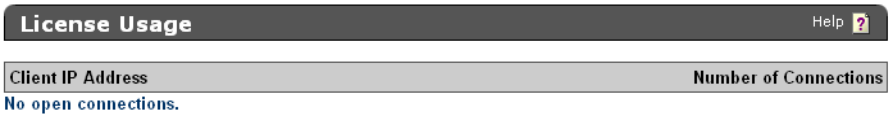
The License Usage section shows how many clients are connected to a DataSecure at any given time.

To view throughput statistics:

1 Log on to the Management Console.

2 Navigate to the Statistics page (Device >> Statistics).

3 View the data in the License Usage section. The section lists the **Client IP Address**es for each device connected to the DataSecure and displays the **Number of Connections** for each IP. Only client connections established on the Key Server Port (defined on the Key Server Configuration page) are counted. Administrative connections are not counted.



View NAE-XML Statistics

The NAE-XML Statistics section shows statistics for client usage of the Key Server via the NAE-XML protocol. Statistics are broken out by operation.

To view NAE-XML statistics:

1 Log on to the Management Console.

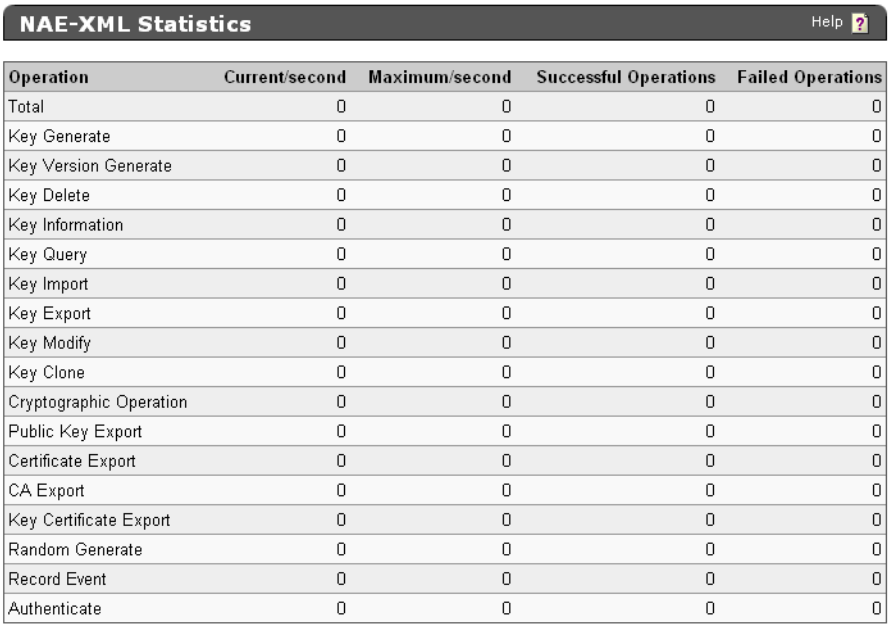
2 Navigate to the NAE-XML Statistics page (Device >> Statistics>> NAE-XML Statistics).

3 View the data in the NAE-XML Statistics section. The section displays the following fields:

- **Operations**
  - *Total* - total number of NAE-XML client requests since the DataSecure was last rebooted.
  - *Key Generate* - request to generate a cryptographic key.
  - *Key Version Generate* - request to generate a new version of a key.
  - *Key Delete* - request to delete a key.
  - *Key Information* - requests for information about a particular key.
  - *Key Query* - request to view all keys available to a client.
  - *Key Import* - request to import a key.
  - *Key Export* - request to export a key.
  - *Key Modify* - request to modify a key.

- *Key Clone* - request to clone a key.
- *Cryptographic Operation* - request to perform a cryptographic operation.
- *Public Key Export* - request to export a public key.
- *Certificate Export* - request to export a certificate.
- *CA Export* - request to export a CA.
- *Key Certificate Export* - request to export a key certificate.
- *Random Generate* - request to generate a random byte sequence.
- *Record Event* - request to record an event from a client
- *Authenticate* - request to authenticate.

- **Current/second** - shows how many of a given statistic were counted on the DataSecure in the second the NAE-XML Statistics were refreshed.
- **Maximum/second** - shows the maximum number of a given statistic that were counted by the DataSecure during any one second.
- **Successful Operations** - displays the number of successful operations.
- **Failed Operations** - displays the number of failed operations.



NAE-XML Statistics Help

Operation	Current/second	Maximum/second	Successful Operations	Failed Operations
Total	0	0	0	0
Key Generate	0	0	0	0
Key Version Generate	0	0	0	0
Key Delete	0	0	0	0
Key Information	0	0	0	0
Key Query	0	0	0	0
Key Import	0	0	0	0
Key Export	0	0	0	0
Key Modify	0	0	0	0
Key Clone	0	0	0	0
Cryptographic Operation	0	0	0	0
Public Key Export	0	0	0	0
Certificate Export	0	0	0	0
CA Export	0	0	0	0
Key Certificate Export	0	0	0	0
Random Generate	0	0	0	0
Record Event	0	0	0	0
Authenticate	0	0	0	0

Important! This page tracks client requests to the Key Server only. It does *not* include operations initiated directly by this device, such as operations performed through the Management Console.

View KMIP Statistics

The KMIP Statistics section shows statistics for client usage of the Key Server via the KMIP protocol. Statistics are broken out by operation.

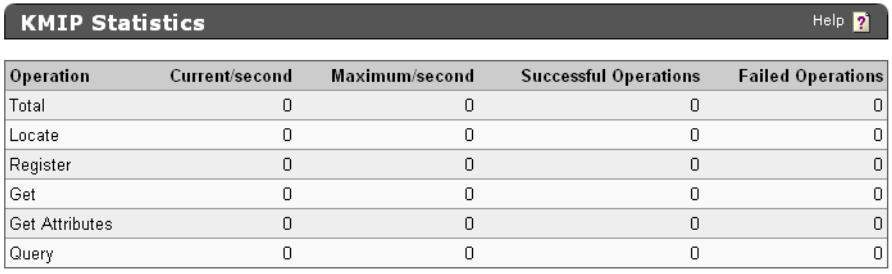
To view KMIP statistics:

1 Log on to the Management Console.

2 Navigate to the KMIP Statistics page (Device >> Statistics>> KMIP Statistics).

3 View the data in the KMIP Statistics section. The section displays the following fields:

- **Operation**
  - *Total* - total number of KMIP client requests since the DataSecure was last rebooted.
  - *Locate* - request to locate a key
  - *Register* - request to register a key
  - *Get* - request to get a key
  - *Get Attributes* - request to get key attributes
  - *Query* - key query requests
- **Current/second** - shows how many of a given statistic were counted on the DataSecure in the second the KMIP Statistics were refreshed.
- **Maximum/second** - shows the maximum number of a given statistic that were counted by the DataSecure during any one second.
- **Successful Operations** - displays the number of successful operations.
- **Failed Operations** - displays the number of failed operations.



Operation	Current/second	Maximum/second	Successful Operations	Failed Operations
Total	0	0	0	0
Locate	0	0	0	0
Register	0	0	0	0
Get	0	0	0	0
Get Attributes	0	0	0	0
Query	0	0	0	0

Important! This page tracks client requests to the Key Server only. It does *not* include operations initiated directly by this device, such as operations performed through the Management Console.

Chapter 23

Backups

Use the Backup and Restore page to create and restore backups of system configuration. You can also view backup files stored on the DataSecure.

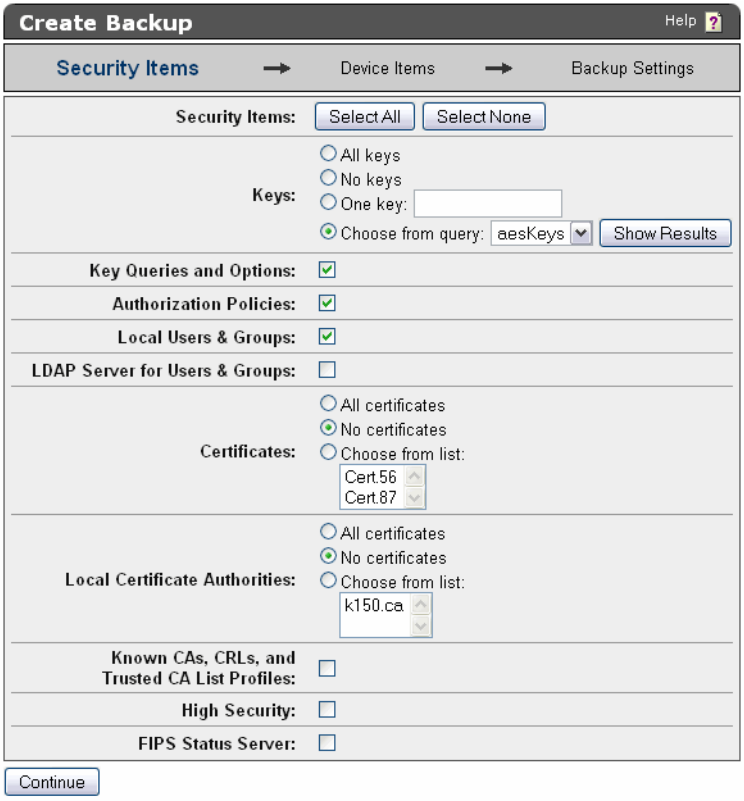
Creating a Backup

The DataSecure's backup mechanism allows you to back up information, on the device or externally, to be restored in case of a failure. Once a device is fully configured with networking information, user accounts, etc., we recommend that the entire configuration be backed up. Likewise, when you make changes to your configuration (adding keys and users, for example) you should update your backup files.

To create a backup:

1 Log on to the Management Console as an administrator with the appropriate backup access control. There are specific access controls for backing up configuration, keys & certificates, and local CAs.

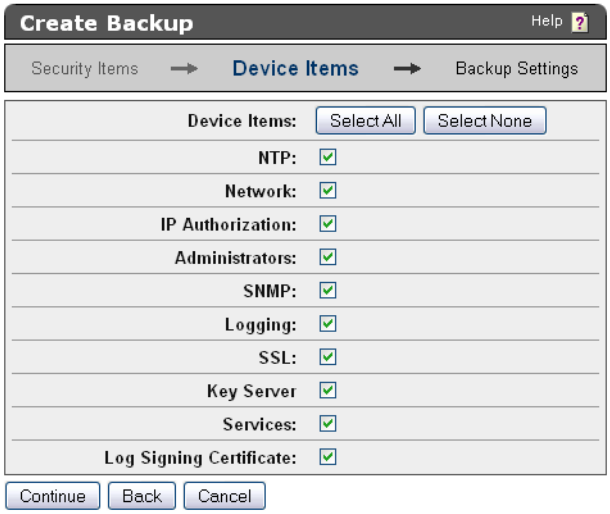
2 Navigate to the Backup and Restore page (Device >> Maintenance >> Backup & Restore).



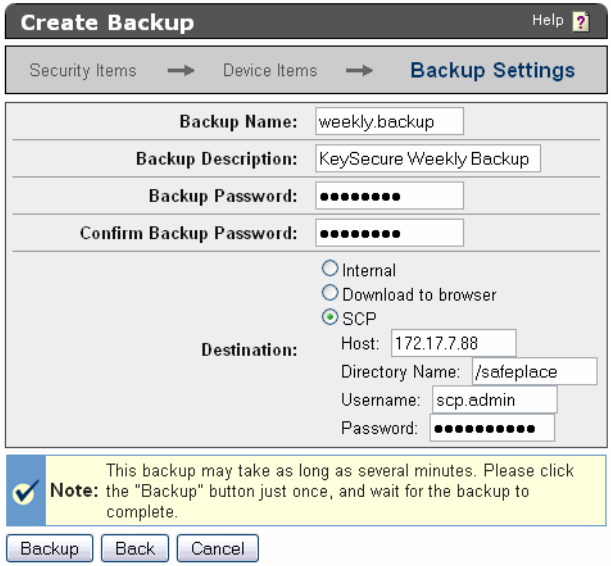
3 Select the configuration items to include in the backup file. Use **Select All** to select all items on the page. When selecting **Keys**, you have the option of selecting all keys, no keys, specific keys, or backing up the results of a query. You can view the query results using the **Show Results** button. When selecting **Certificates** and **Local Certificate Authorities**, you can select all, none, or select items from a list.

Note: The Log Signing Certificate is not included with the other certificates on the device. To backup the log signing certificate, you must specifically select it on the next page.

4 Select **Continue** to access the next group of configuration items.



5 Use **Select All**, **Select None**, and **Back** to perfect your list. Select **Continue** to access the Backup Settings page.



6 Configure the details of the backup file itself: name, description, and password:

- **Backup Name** - Enter a name for the backup. For backups stored externally, the backup filename is created by appending _0_bkp to this name. For large backups, the zero is incremented by 1 for each additional file. For example, backup *foo* could consist of two files: foo_0_bkp and foo_1_bkp.
- **Backup Description** - Enter a short description for the backup.
- **Backup Password** - Enter a password for your backup file. Remember, this file contains very value information and will likely have a long life span. Use an appropriately complex password.

WARNING: The backup file cannot be restored without this password.

7 Enter the **Destination** of the file. The backup configuration can be stored internally on the DataSecure, downloaded to a browser, or copied to another machine via FTP or SCP.

Note: If you are creating this backup in anticipation of doing a software upgrade immediately after, we recommend that you store the backup file *externally*.

Note: FTP will not be available if the device is FIPS compliant.

If you download the backup configuration to a browser, the backup configuration is encrypted and downloaded to your local machine. You must specify a name for the file; however, it is not necessary to specify an extension for the file.

If you select FTP or SCP to copy the backup configuration to another machine, you must provide the following:

- the destination host.
- the name of the directory on the destination host. (You must have write permission for this directory.)
- the username of the account on the destination host.
- the password for the user account on the destination host.

8 Select **Backup** to create and store the backup file.

Restoring a Backup

When restoring a backup, you can select which components of the backup file to restore - you do not have to restore all items in the file. When doing so, unselected items in the backup are ignored. If you choose to restore only NTP settings from a backup, no other configuration items would be affected by this restore.

In general, once you select which items to restore, the current settings for those items are cleared from the DataSecure before the settings from the backup file are restored in their place. So when you restore NTP settings, expect that DataSecure's current NTP settings will be overwritten by the data in the backup.

Restoring keys, certificates, or local CAs, in contrast, is an **additive** process. The DataSecure adds the keys, certificates, and local CAs from the backup file to the existing set of keys, certificates, and CAs. This is because keys, certificates, and local CAs are unique cryptographic objects that cannot be recreated. If your DataSecure has Key1 and Key2, restoring Key3 from the backup file will result in the DataSecure having Key1, Key2, and Key3.

If one of these objects is being restored on a device where there is already a similar object with the same name (for example, a key with the same name), the backup file *overwrites* the existing object. For example, your DataSecure has Key1, a global key, but the backup file has Key1, owned by user1. Restoring that backup file will remove the global Key1 and replace it with Key1 owned by user1.

Important! For versioned keys, this means that if your backup file contains a versioned key, the backup will overwrite the existing object *even if the existing object has newer versions*. Those newer versions will be *deleted*. You should backup each new key version upon creation.

To restore a backup

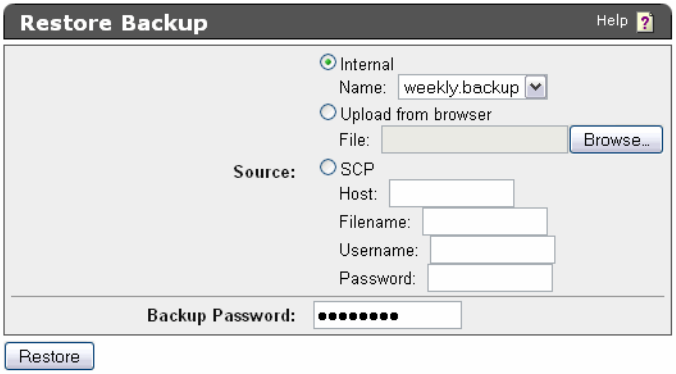
1. Log on to the Management Console as an administrator with the appropriate Restore access control. There are specific access controls for restoring configuration, keys & certificates, and local CAs.
2. Navigate to the Restore Backup section (Device >> Maintenance >> Backup & Restore >> Restore Backup).
3. Enter the **Source** of the backup. When restoring a backup that spans multiple files, specify the zeroth file here (for example, WeeklyBackup_0_bkp). Specifying the zeroth file indicates to the DataSecure that the backup contains multiple files; the DataSecure will then automatically transfer all of the backup files.

   The backup configuration might be stored internally or on another machine. If the backup configuration is stored locally, you can select it from the drop-down under the Internal option. If the backup configuration is stored on another machine, you can either upload the file through the browser or you can copy the file to the DataSecure via FTP or SCP.

   If you are copying the backup configuration to your DataSecure via FTP or SCP, you must provide the following:

   - the source host.
   - the name of the file on the source host. For backups that span multiple files, enter the <name>_0_bkp file here. The system will then upload all of the <name> files in that directory.
   - the username of the account on the source host.
   - the password for the user account on the source host.

   Backup files larger than 100 MB, and backups that span multiple files cannot be transferred through the browser. You must use SCP or FTP to upload these files.



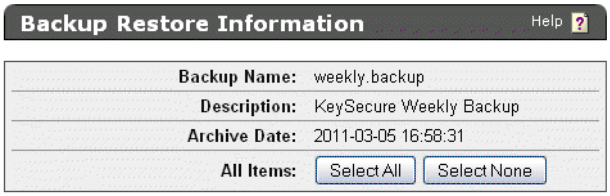
4 Enter the **Backup Password**.

5 Select **Restore**.

Important! When restoring a key to the DataSecure, the key must conform to the appliance's current **Number of Active Versions Allowed for a Key** setting on the Key and Policy Configuration page. If the key has more active versions than permitted by that setting, the key restore will fail.

To restore a key with more active versions than the system allows, you must change the **Number of Active Versions Allowed for a Key** setting before restoring the backup. You can then reduce the key's active versions and return the **Number of Active Versions Allowed for a Key** to its original value.

6 View the Backup Restore Information. Select the specific items to restore.



7 Enter the **Backup Password**, again.

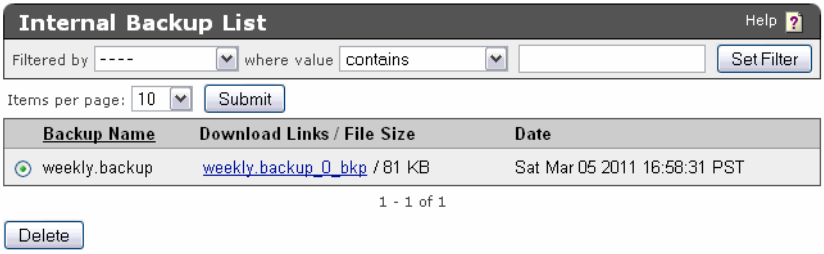
8 Click **Restore**.

View the List of Internal Backups

To view the list of internal backups:

1 Log on to the Management Console.

2 Navigate to the Internal Backups section (Device >> Maintenance >> Backup & Restore >> Internal Backups).



3 View the list of backup files stored on the device. Click the download link to download the files to the browser. Large backups will contain multiple files. Click **Delete** if confident enough to lose the backup information forever.

Chapter 24

Services

Use the Services Configuration page to start and stop the key servers, web administration service, ssh administration service, and snmp agent, restart those services, enable a service to launch at system startup, disable launch at system startup, restart the DataSecure, and halt the DataSecure.

The following services are available on the DataSecure:

- **NAE Server** - manages all incoming and outgoing connections, both secure and clear text.
- **SNMP Agent** - the Key Secure's SNMP service that enables it to send alerts over the network to monitor system activity.
- **SSH Administration** - the Command Line Interface (CLI) tool that enables administrators to configure the Key Secure over a remote ssh connection.
- **Web Administration** - the Management Console, that enables administrators to configure the Key Secure through a web browser.

Start, Stop, or Restart Services

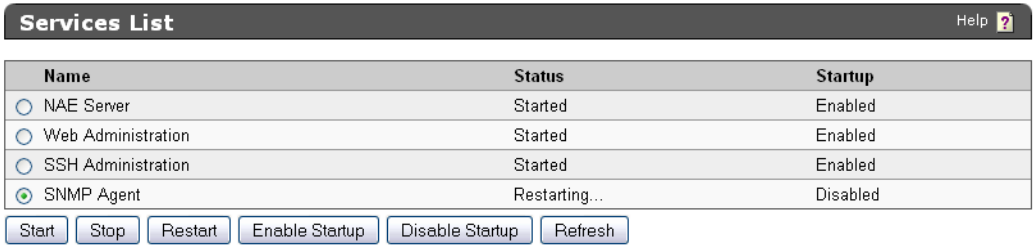
To start or stop a service:

1 Log on to the Management Console.

2 Navigate to the Services Configuration page (Device >> Maintenance >> Services).

3 Select the service.

4 Select either **Start**, **Stop**, or **Restart**. The service's **Status** will change to *Starting...*, *Stopping...*, or *Restarting...*.



5 Select **Refresh** to refresh the page and see the service's new status.

Launch a Service at System Startup

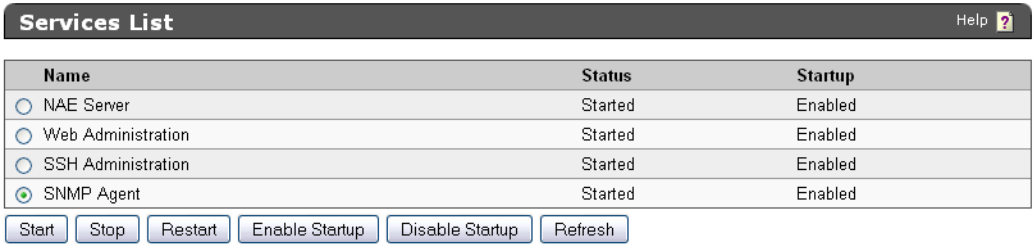
To configure that a service start when the DataSecure starts up:

1 Log on to the Management Console.

2 Navigate to the Services Configuration page (Device >> Maintenance >> Services).

3 Select the service

4 Click **Enable Startup**.



You can likewise disable a service at startup by selecting **Disable Startup**.

Restart the DataSecure

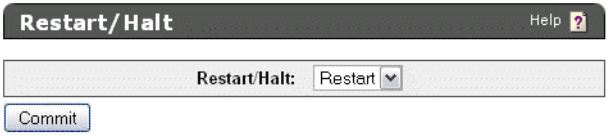
Important! Remove any peripheral devices connected to the keyboard, mouse, and video ports on the DataSecure before restarting. Use of these ports during the restart process can cause the process to hang.

To restart the DataSecure:

1 Log on to the Management Console.

2 Navigate to the Restart/Halt page (Device >> Maintenance >> Services).

3 Select *Restart* in the **Restart/Halt** field.



4 Click **Commit**. This will terminate all active connections to the DataSecure.

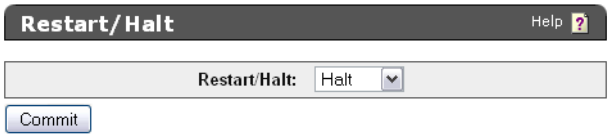
Halt the DataSecure

To restart the DataSecure:

1 Log on to the Management Console.

2 Navigate to the Restart/Halt page (Device >> Maintenance >> Services).

3 Select *Halt* in the **Restart/Halt** field.



4 Click **Commit**. This will terminate all active connections to the DataSecure.

Chapter 25

Upgrade

Use the System Information page to perform software upgrades, upload licenses, and examine information about the system, including Box ID and current software version.

View Device Information

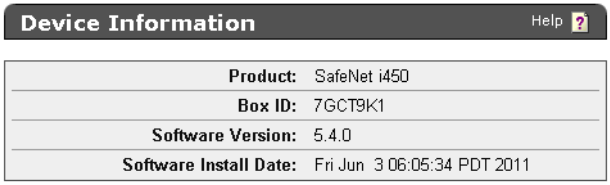
Device information is the product's model name (e.g., SafeNet i450), **Box ID**, **Software Version**, and **Software Install Date**. You will need to the **Box ID** should you ever contact our Customer Support Department. The software referred to is the software running on the DataSecure.

To view device information:

1 Log on to the Management Console.

2 Navigate to the Device Information page (Device >> Maintenance >> System Information & Upgrade).

3 View the information. The fields are not editable.



View License Information

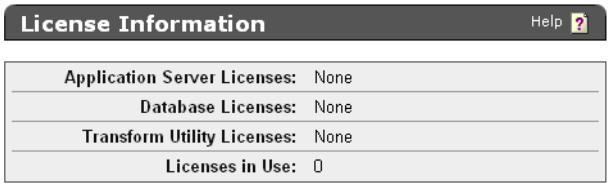
Licenses allow a set number of client devices to connect to the DataSecure at any particular time; once the set number of clients has been reached, subsequent connection requests are refused until another connection has been terminated. Before any clients can connect to the DataSecure, you must install a valid license. Licenses can be obtained from Customer Support.

To view license information:

1 Log on to the Management Console

2 Navigate to the License Information page (Device >> Maintenance >> System Information & Upgrade).

3 View the information. The fields are not editable.



View the Feature Activation List

The Feature Activation List displays the complete list of additional features running on the DataSecure, including their names, activation and expiration dates, and current status.

Installing and activating software on the DataSecure are separate processes. Software must be installed and activated on the DataSecure before it can be used. A software component might be installed but not active. Once activated, a component cannot be specifically de-activated. You would have to rollback the server software to a point before the software was activated.

To view the feature activation list:

1 Log on to the Management Console

2 Navigate to the Network Diagnostics page (Device >> Maintenance >> System Information & Upgrade).

3 View the information. The fields are not editable.

Feature Activation List Help

Description	Activation Date	Expiration Date	Status
ProtectDB Manager	N/A	Never	Active
ProtectFile Manager	N/A	Never	Active
Enterprise Manager	N/A	Never	Active
Demo License	N/A	Never	Active
SEED Algorithm	N/A	Never	Active
Tokenization Manager	N/A	Never	Active

Install Software Licenses

The software upgrade and installation mechanism can be used to install licenses.

License file installation must be applied to all DataSecures individually in a cluster - the file upload is not replicated across members of a cluster. If you have an existing license, and you have purchased additional licenses, you can simply install the new license file you receive from DataSecure.

To safeguard DataSecures, only license files signed by SafeNet, Inc. can be installed on the DataSecure.

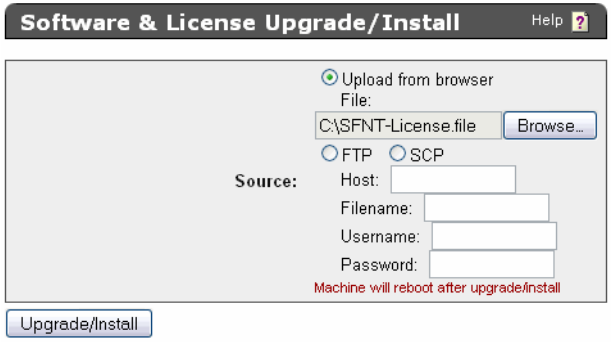
To install a software license:

1 Obtain the license

2 Log on the Management Console.

3 Navigate to the Software & License Upgrade/Install page (Device >> Maintenance >> System Information & Upgrade).

4 Select the method of uploading the license file. Either by selecting Upload from browser and clicking **Browse** to locate the file on the local drive or network. Or by selecting FTP or SCP and then specifying the Host (source host), Filename (the name of the file on the source host), Username (the username of the account on the source host), and password (the username password) needed to locate and access the file.



5 Click **Upgrade/Install** to upload the license file. The system will reboot when the file is uploaded.

Upgrade Software

The software upgrade and installation mechanism can be used to install new features, upgrade core software, and apply security patches. You can upgrade or install software from both the Management Console and the Command Line Interface. If you are interested in monitoring the status of the upgrade, you should perform the upgrade from the Command Line Interface.

Software upgrades must be applied to all DataSecures individually in a cluster - the file upload is not replicated across members of a cluster.

To safeguard DataSecures, only software files signed by SafeNet, Inc. can be installed on the DataSecure. Changes to multiple components of the system are bundled together in an encrypted software file provided by the Customer Service organization at SafeNet, Inc.

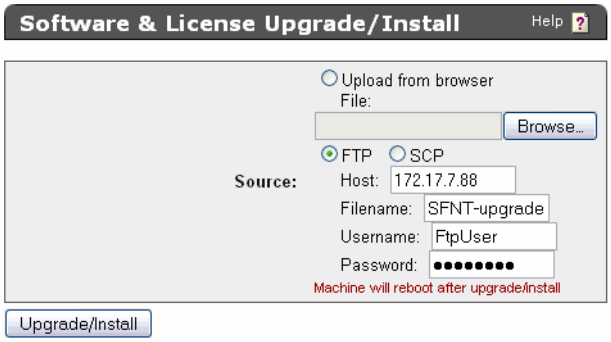
To install a software license:

1 Obtain the license

2 Log on the Management Console.

3 Navigate to the Software & License Upgrade/Install page (Device >> Maintenance >> System Information & Upgrade).

4 Select the method of uploading the software file. Either by selecting Upload from browser and clicking **Browse** to locate the file on the local drive or network. Or by selecting FTP or SCP and then specifying the Host (source host), Filename (the name of the file on the source host), Username (the username of the account on the source host), and password (the username password) needed to locate and access the file.



5 Click **Upgrade/Install** to upload the software file. The system will reboot when the file is uploaded.

Upgrade to a Patch Release

Patch releases are lightweight, which means that customers do not have to re-qualify an entire release. All patches are cumulative, which means that the functionality in patch one exists in patch two, and so on. Because patches are cumulative, we recommend that you always install the most recent patch. We use the following nomenclature for patch releases:

DataSecure Version 5.3.1p1

where DataSecure Version 5.3.1 refers to the “base release” upon which the patch is built, and “p1” refers to the number of the patch. In this case, “p1” implies that this is the first patch release for DataSecure Version 5.3.1 and there are no other patches for this release. If this were patch 4, that would imply that there are three previous patches for the particular base release.

Roll Back Software

Occasionally it is necessary to roll back DataSecure software to a previous version. The DataSecure allows you to roll back one version of the software. For example, if you were originally running DataSecure Version 5.3.0, upgraded to DataSecure Version 5.3.0p1, and finally upgraded to DataSecure Version 5.4.0, you would only be able to do a software rollback to DataSecure Version 5.3.0p1. As such, we recommend that you avoid doing multiple patch upgrades on the same base release. What you should do instead is roll back from the patch release to the base release before doing the upgrade to the patch release.

Using the preceding example, the order of operations would be:

- upgrade from DataSecure Version 5.3.0 to DataSecure Version 5.3.0p1
- do a software rollback to DataSecure Version 5.3.0

- upgrade from DataSecure Version 5.3.0 to DataSecure Version 5.4.0.

Note: The software rollback process can be performed from the CLI only; it cannot be performed from the Management Console.

Important! Before performing a software rollback, **it is very important that you create a secured external backup of your existing configuration.** In most cases, you can restore a backup after you have done the software rollback. If some features are supported in the more recent version of the software and not the base version you are rolling back to, those features will not be available after the software rollback.

Important! Rolling back the software returns your admin accounts to the settings they had before the last upgrade. If you cannot recall the old admin passwords you will not be able to log in to the DataSecure after the rollback. If you do not know the earlier admin passwords, you should backup your current configuration, run the 'reset factory settings' command, upgrade to the desired software version and then restore the backup.

Chapter 26

System Health

The System Health page enables you to view the status of the DataSecure's power supply and cooling fan.

When the DataSecure detects a change in the status of a power supply unit, the System Health page reflects the change and displays a warning message if appropriate. In addition, if your system is configured for SNMP, the DataSecure sends an SNMP trap to the SNMP Management Station indicating the change in status.

View Power Supply Status

The System Health page provides information on the status of the DataSecure's power supply. For DataSecure models with multiple power supplies, this page can inform administrators when one power supply is not receiving power, has been removed, or is damaged. For DataSecures with one power supply, this page will only inform administrators when the power supply is operational, since you won't be able to access the management console when that power supply is not functioning.

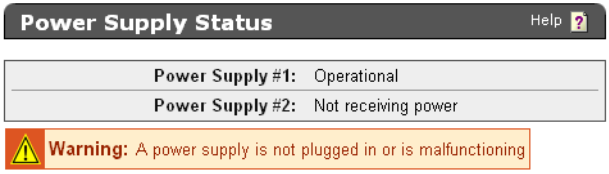
To view power supply status:

1 Log on to the Management Console.

2 Navigate to the System Health page (Device >> System Health).

3 View the **Power Supply** field. The following values are possible:

- Operational - The power supply unit is operational.
- Not receiving power - No power is supplied to the power supply unit. The system issues a warning stating that "A power supply is not plugged in or is malfunctioning."
- Removed or damaged - The power supply unit has been removed from the DataSecure. The system issues a warning stating that "A power supply has been removed or damaged."



View Cooling Fan Status

The Cooling Fan Status section provides information on the status all of the DataSecure's cooling fans.

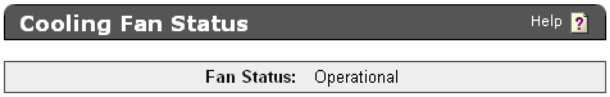
To view the status of a cooling fan:

1 Log on to the Management Console.

2 Navigate to the System Health page (Device >> System Health).

3 View the **Fan Status** field. The following values are possible:

- Operational - All fans are operational.
- Failure: One or more fans have stopped, lost power, or are broken. The system displays a warning message until the problem is resolved and power to the DataSecure is removed. The warning reads "Fan failure; please contact support immediately."



View RAID Status

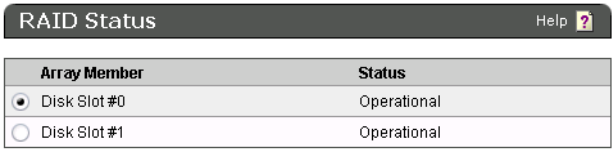
RAID, or Redundant Array of Inexpensive (or Independent) Disks, refers to the practice of combining multiple disk drives into an array for improved performance or reliability. SafeNet i321 platforms support RAID level 1, or mirroring, a technique in which data written to disk is copied to all members of the array.

The SafeNet i321 platforms have two SCSI disks, which can be inserted into any of the 6 slots available for hard disks. Additional disks should never be inserted into any of the available slots. The status of each disk is always available from the Management Console and the CLI. If one of the disks fails or is removed, the system immediately begins writing to and reading from the remaining operational disk without any loss of data or service.

To view RAID status:

1 Log on to the Management Console.

2 Navigate to the RAID Status section of the System Health page (Device >> System Health).



3 View the **Status** field for each Array Member. An **Array Member** refers to the physical disk slot of the hard disk. The **Status** can be one of the following:

- Operational – indicates that the disk is mirrored and in use.
- Failed – indicates that a disk has failed. In this case, a warning message is displayed, and, if configured, an SNMP trap is sent. Additionally, the event is noted in the System Log.

- Recovery – indicates that a failed disk has been replaced and data from the Operational disk is being copied to the new disk. In this case, a warning message is displayed, and, if configured, an SNMP trap is sent. Additionally, the event is noted in the System Log.
- Unknown – indicates that the disk status could not be determined. In this case, a warning message is displayed, and, if configured, an SNMP trap is sent. Additionally, the event is noted in the System Log.

Recovery

You can replace a disk—provided there is at least one other operational disk—while the system is up and running; this feature is called hot-swap. Hot–spare is not supported by the SafeNet i321 platforms. When you replace a disk, the status of the newly–added disk is "Recovery," which indicates that data from the operational disk is being copied to the new disk. The DataSecure is fully operational while the newly added disk is in the "Recovery" state. The recovery process can take 15 to 30 minutes, depending on the amount of data on the disk and the number of requests the NAE Server must fulfill while the recovery is in progress.

WARNING! It is extremely important that you not reboot the system when a disk is in the recovery state. Such an action could render the system unstable or unusable. If the system experiences a power outage while a disk is recovering, we recommend that the recovering disk be physically unplugged before powering the system up. Once the system is powered up, you should physically insert the disk, then add the disk via the RAID interface provided in the Management Console or CLI.

SNMP Traps Associated with RAID

The following list describes the traps that might be sent as a result of a change in the RAID status of a DataSecure.

1. Disk operational – This trap is sent when the status of a disk in RAID changes to "Operational." This can happen if:
   - A new disk that was added to RAID has completed synchronizing with the active member in the array, and its status has changed from "Recovering" to "Operational."
   - The disk has been having hardware errors causing its previous status to be "Failed," and the RAID software does not detect such errors anymore.
   - The status of a disk changed from "Unknown" to "Operational."
2. Disk failed – This trap is sent when the status of a disk in RAID changes to "Failed." This can happen if the disk experiences a hardware failure. Note that the failure may have been determined based on just a few transient errors, and the status of the disk may change to "Operational" later. In any event, we recommend that a disk whose status is reported as "Failed" be replaced as soon as possible to prevent the loss of redundancy resulting from operating with unreliable hardware.

3 Disk recovering – This trap is sent when the status of a disk in RAID changes to “Recovering.” This trap will normally not be sent because the initial status of a newly added disk is “Recovering,” and a “Disk added” trap is sent instead. Sometimes, there may be a small window after a disk has been added to RAID where its status is “Unknown,” and then changes to “Recovering,” causing this trap to be sent.

4 Disk status unknown – This trap is sent when the status of a disk in RAID changes to “Unknown.” This usually indicates an unexpected hardware or software error.

5 Disk removed – This trap is sent when a disk is removed from RAID. The removal can be an event requested by the administrator through the user interface, or a physical removal of the disk without removing it from the array through the user interface first.

6 Disk added – This trap is sent when a disk is added to RAID by inserting a new disk in one of the disk slots and then adding it to the array through the user interface.

Adding a Disk

To add a disk through the Management Console:

1 Insert the disk into any of the available disk slots on the DataSecure, and take note of the slot you insert the disk into.

2 Log on to the Management Console.

3 Navigate to the RAID Status section of the System Health page (Device >> System Health).

4 The **Add** button is enabled when there is only one operational disk. If there are two operational disks, the **Add** button is not shown.

5 Click **Add**. You are prompted to select the slot number of the newly–added disk.

6 Confirm that you want to add the disk at the confirmation page.

To add a disk through the CLI:

1 Insert the disk into any of the available disk slots on the DataSecure, and take note of the slot you insert the disk into.

2 Log in to the CLI and enter config mode (type **`config`**).

3 Issue the following command: raid add <disk_slot_number>

4 Confirm that you want to add the disk.

Immediately after confirming that you want to add a disk (when executed from either the CLI or the Management Console), if SNMP is enabled, two traps are sent to the appropriate management station, and the event is noted in the System Log. The add disk operation should take between 10 and 15 seconds to complete. Once the operation is complete, you are returned to the System Health page or the command prompt, depending on where you are performing the add disk operation. When the system is again responsive, you will notice that the newly added disk is in the recovery state, during which time the data from the operational disk is copied to the newly added disk. To verify that the disk is in the recovery state

from the CLI, issue the `show system health` command. Once recovery is completed (typically after 15 to 30 minutes), the status of the newly added disk changes to operational, traps are sent (if SNMP is enabled), and the event is noted in the System Log.

WARNING! Never boot the DataSecure with a disk that has not been added to the array through the Management Console or the CLI.

Removing a Disk

There are two scenarios in which you might remove a disk:

- RAID detects that there is a problem with the disk and changes the status of the disk to “Failed.”
- RAID is unable to detect the state of the disk and changes the status to “Unknown.”

Note: We recommend that you not physically unplug a disk that is part of a RAID configuration without first removing it through the Management Console or the CLI. If a disk is unplugged in this manner, SNMP traps are sent (if SNMP is enabled) and the event is noted in the System Log.

To remove a disk through the Management Console:

1. Log on to the Management Console.
2. Navigate to the RAID Status section of the System Health page (Device >> System Health).
3. If there is only one operational disk, the **Remove** button is disabled. You should also note that if a disk is in the recovery state, the other (only operational) disk cannot be removed.
4. Select the disk you want to remove.
5. Click **Remove**.
6. Confirm that you want to remove the disk at the confirmation page.

   Important! The system will be unresponsive for about 15 seconds. It is imperative that you not unplug the disk until the system says that it has been removed in RAID software.
7. Unplug the disk from the DataSecure.

To remove a disk through the CLI:

1. Log in to the CLI and enter config mode (type **`config`**).
2. Issue the following command: `raid remove <disk_slot_number>`
3. Confirm that you want to remove the disk.

   Important! The system will be unresponsive for about 15 seconds. It is imperative that you not unplug the disk until the system says that it has been removed in RAID software.
4. Unplug the disk from the DataSecure.

   Important! Always unplug a disk that has been removed through the RAID interface provided in the Management Console or CLI. It the disk remains plugged in, it is possible that the DataSecure will attempt to boot from the disk during subsequent reboots. This can lead to system instability.

If SNMP is enabled, two traps are sent immediately after confirmation, and the event is noted in the System Log. The remove disk operation should take between 10 and 15 seconds to complete. Once the operation is complete, you are returned to the System Health page or the command prompt (depending on where you are performing the remove disk operation). When the system is again responsive, you will notice that the newly–removed disk is no longer displayed in the RAID Status section of the System Health page or the show system health command.

Chapter 27

Network Diagnostics

You can test the DataSecure's network connectivity by running ping, traceroute, host, or netstat commands.

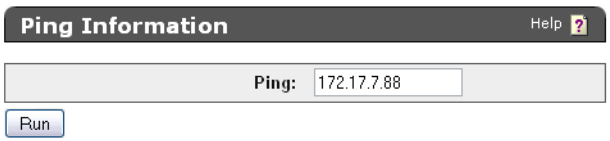
Ping a Hostname or IP

To ping a hostname or IP:

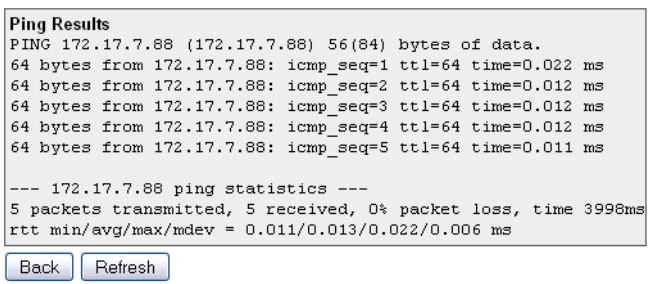
1 Log on to the Management Console.

2 Navigate to the Network Diagnostics page (Device >> Maintenance >> Network Diagnostics).

3 Enter the hostname or ip of the target system in the **Ping** field.



4 Click **Run**. View the Ping Results.



Run Traceroute

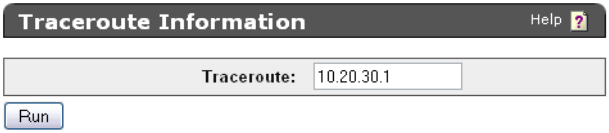
The traceroute command examines the path that packets take between the DataSecure and the target destination.

To run a traceroute:

1 Log on to the Management Console.

2 Navigate to the Network Diagnostics page (Device >> Maintenance >> Network Diagnostics).

3 Enter the hostname or ip of the target system in the **Traceroute** field.



4 Click **Run**.

Check DNS for a Hostname or IP

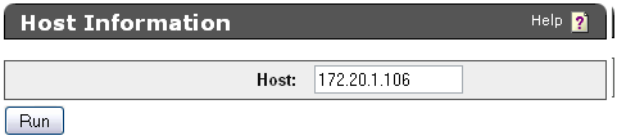
The host must be registered with the DNS configured on the DataSecure. Be sure to add the DNS server to the DataSecure's DNS server list before using this feature (Device >> Network >> Hostname & DNS).

To run the host command:

1 Log on to the Management Console.

2 Navigate to the Network Diagnostics page (Device >> Maintenance >> Network Diagnostics).

3 Enter the hostname or ip of the target system in the **Host** field.



4 Click **Run**.

Run Netstat

The netstat command returns a list of all active network connections to the DataSecure.

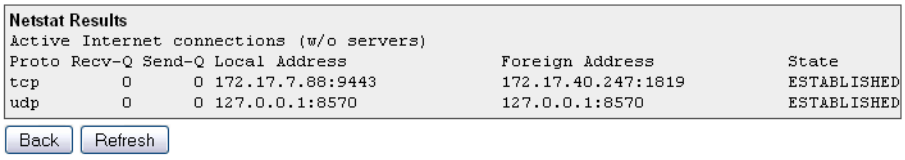
To run netstat:

1 Log on to the Management Console.

2 Navigate to the Network Diagnostics page (Device >> Maintenance >> Network Diagnostics).

3 Click **Run** in the Netstat Information section.

The results will be similar to the following:



Heading	Description
Proto	The protocol used by the connection. Either TCP, UDP, or RAW.
Recv-Q	The number of bytes received from the remote host waiting to be read.
Send-Q	The number of bytes awaiting acknowledgement by the remote host.
Local Address	The local address or hostname and port number of the connection.
Foreign Address	The remote address or hostname and port number of the connection.
State	The state of the connection.

Chapter 28

Keys

The DataSecure can create and store keys. A key is composed of two main parts: the key bytes and the key metadata. The key bytes are the bytes used by the cryptographic algorithm (together with the input data) to produce either plaintext or ciphertext.

The key metadata contains information about the key byte: key name, owner username, algorithm, key size, creation date, group permissions, and any custom attributes that you create. The metadata also indicates if the key is a versioned key, and if it is deletable or exportable.

When running the current software version, the i4xx platforms can hold at least 1 million keys. Earlier platforms (i1xx, i3xx) can hold at least 25,000 keys.

Key Ownership

Cryptographic keys can be global or owned by a particular user. Global keys are keys that are available to everyone, with no authentication required. Additionally, group permissions can be assigned to a key. For example, you might give members of Group1 permission to encrypt and members of Group2 permission to decrypt. Using authorization policies, you can set usage limitations for keys.

For more information, see Chapter 29, “Authorization Policies”.

Accessing Keys During Authenticated and Global Sessions

As the administrator of the DataSecure, you can define how your clients authenticate to the server. A client might be an application or a database, for example. There are two kinds of client sessions: authenticated and unauthenticated (global). When a client authenticates, it authenticates either as a local user or as a user in the LDAP user directory that the server is configured to use. An authenticated client has access to all global keys, all the keys owned by the user, and all keys accessible to groups to which that user belongs. If a client does not authenticate to the server, then that client has access only to global keys. On the NAE server, keys can be:

- Generated on the Management Console by an administrator.
- Generated by an NAE client, such as the SafeNet JCE Provider.
- Imported through the Management Console or through one of the NAE clients.
- Marked as exportable, deletable, neither or both. An exportable key is a key that a client can export from the server. Similarly, a deletable key is a key that the client can delete from the server.

WARNING! Do not delete keys that might be needed to decrypt data at some point in the future. Once you delete a key, there is no way to decrypt data that was encrypted with that key. As such, you should be extremely cautious when making decisions about deleting keys.

Versioned Keys

A versioned key maintains the same key metadata, but has a unique set of bytes for each version. Thus, each version is different enough for encryption purposes, but similar enough to allow for easy management.

Each key version has its own key bytes, default IV, state, and creation date. The state determines which key operations are available for a key version. Possible states are: active, restricted, and retired.

- Active: encryption and decryption and all key management options are allowed.
- Restricted: only key information operations are allowed.
- Retired: no operations or access to key management is allowed.

The state, combined with the key type and group permissions determine how the key version can be used. Ultimately, a key version can only be used when: the key's group permissions permit the operation, the key version's state permits the operation, and the request comes from a member of the permitted group.

A key can have a maximum of 4000 versions.

NAE Multi-keys

When the Enterprise Manager feature is enabled, administrators have the option of creating keys of a specific Key Type: either standard key or multi-key. A standard key has one set of bytes for each device that uses it. A multi-key has a *unique set of bytes for each device* that uses it. This unique set of bytes is referred to as an instance. Thus, each multi-key instance is different enough for encryption purposes, but similar enough to permit some centralized management.

When a multi-key is added to a profile, a new instance of the key is created for every profile member. Each instance is identified by the EdgeSecure ID to which it is replicated. (Likewise, when a new EdgeSecure connects to a profile that uses a multi-key, it is given its own multi-key instance.)

Should an EdgeSecure be removed from a profile, its multi-key instance is placed on the list of orphaned instances. If the EdgeSecure later returns to the profile, or joins another profile that uses the same multi-key, the orphaned key is reclaimed.

Instances of a multi-key cannot be deleted while they are being used by a EdgeSecure. You can, however, regenerate a multi-key instance which both creates a new multi-key instance and renames the previous instance as a standard key. This facilitates backup and rotation of multi-key instances.

Authorization Policies

An authorization policy enables you to limit how a group may use a key. You implement an authorization policy when establishing a key's group permissions. The policies are applied to a key separately for each group; groups that share a key do not necessarily share the same authorization policy.

Note: The key owner is never limited by the key's policy restrictions.

Authorization policies define two kinds of limits:

- **Rate Limits:** The number of cryptographic operations (per hour) that members of the group can perform. The default is unlimited operations. If a user attempts to perform an operation and has exceeded the rate limit, an error is returned and the connection is closed.

  Note: Rate limiting is done on a per-user basis, not on a per-group basis. If the limit is 500 operations, each user in the group can perform 500 operations with the key.

- **Time Limits:** The hours or days in which members of the group can perform operations. The default is unlimited access. If a member of a restricted group attempts to use the key outside of the designated time, an error is returned and the connection is closed.

Once an authorization policy is defined it is associated with a key and a group through the Group Permissions section in the Management Console. Individual keys can be associated with multiple groups which may in turn have differing or conflicting authorization policies. In this case, the server chooses the least restrictive authorization policy available (the most operations per hour for the current time of day).

By default, no authorization policies are assigned to any group.

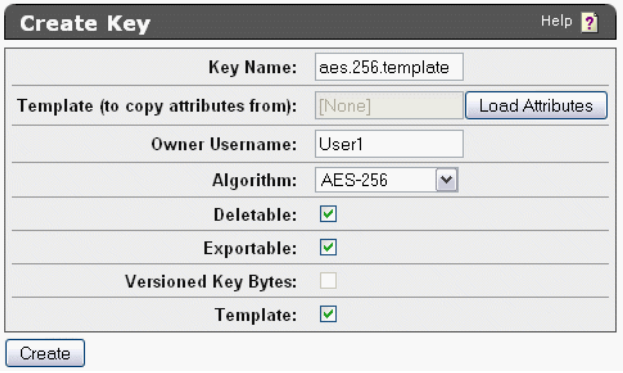
Note: Authorization policies cannot be applied to global keys or to certificates. Key owners are not subject to policy restrictions.

Create a Key

To create a key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Create Key section on the Key and Policy Configuration page (Security >> Keys >> Create Keys).



3 Enter a unique key name in the **Key Name** field. This is the name that the server uses to refer to the key. The key name must begin with a letter, must be between 1 and 64 characters (inclusive), and can consist of only letters, numbers, underscores, periods, and hyphens. This value may be changed after the key is created.

4 (optional) Enter a **Template** and click **Load Attributes**. A template is a collection of attributes that can be assigned only when the key is created. You must first create a template before it can be used to create keys. For more information, see “Create a Key Template” on page 145.

5 Enter a value in the **Owner Username** field to assign a specific owner or leave this value blank to create a global key. If an owner is listed for the key, then that is the only user who can access the key, unless you set group permissions. Global keys can be accessed by all users. This value may be changed after the key is created.

6 Select an **Algorithm**. The follow algorithms are available:

- AES-256
- AES-192
- AES-128
- DES-EDE-168
- DES-EDE-112
- DES
- RC4-128
- RC4-40
- HmacSHA512
- HmacSHA384
- HmacSHA256
- HmacSHA1
- RSA-4096
- RSA-3072
- RSA-2048
- RSA-1024
- RSA-512
- SEED (The SEED algorithm must be feature-activated on the device.)

Note: Some of the algorithms listed above will not be available on FIPS-compliant devices.

7 To make the key deletable by the owner, select **Deletable**. Deletable global keys are deletable by all users. This value may be changed after the key is created.

8 To make the key exportable on from non-FIPS DataSecure, select **Exportable**. An exportable key can be exported by its owner and by members of a group with “Export” permission for the key. An exportable global key is exportable by all users. This value may be changed after the key is created.

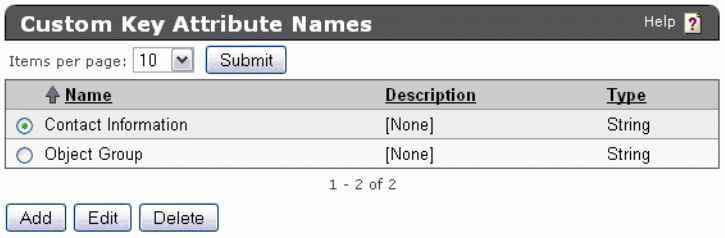
9 Select **Versioned Key Bytes** to create a versioned key. A versioned key can have up to 4000 versions, each with its own unique set of key bytes, but with shared key metadata (key name, algorithms, permissions, etc.). The first key version is created when the key is created. Additional key versions may be created later using the Key Versions section. For more information on key versions, see “Versioned Keys” on page 138

10 Click **Create**.

Note: You may want to assign key attributes and group permissions to the key. These optional instructions are included below.

Note: Once the key is created you can add additional key names by editing the **Other Key Names** field in the key's properties. To access this field, go to the Keys section (Security >> Keys), select the key name and click **Properties**.

11 Navigate to the Custom Key Attribute Names section of the Key and Policy Configuration page (Security >> Keys >> Key Options). The DataSecure includes the *Contact Information* and *Object Group* attributes used by KMIP. These attributes cannot be deleted or modified.



12 Click **Add** to create your own key attribute names.

13 Enter the attribute's **Name**. Attribute names can contain alphanumeric characters, hyphens, underscores, and periods. You cannot include whitespaces in the name. In addition, the first character of the name must be a letter. Maximum length is 255 characters.

14 Enter a **Description**. This field can contain any printable ASCII characters and spaces, tab, \n and \r. Maximum length is 4095 characters.

15 Select the **Type**. Once selected, the type cannot change. Key attributes can be any of the following data type:

- String
- Integer
- Long Integer
- Big Integer
- Enumeration
- Boolean
- Byte String
- Data/Time
- Interval

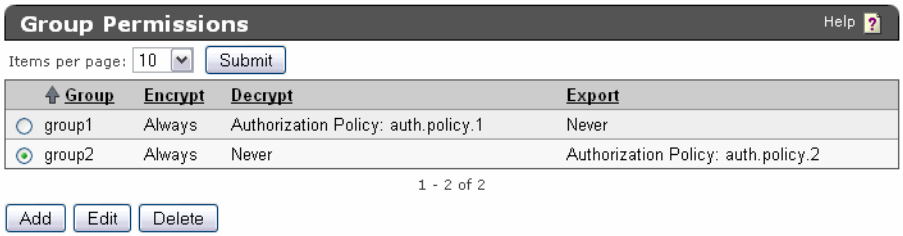
Note: Any attribute created through the XML interface is automatically a String.

Note: Each attribute is assigned an index. The index is only visible when queried by a KMIP client. This index cannot be changed.

16 Click **Save**. The key attribute can now be associated with a key.

17 Navigate to the key's Key Properties section. Go to the Keys section (Security >> Keys), select the key name and click **Properties**.

18 Click the Permissions tab. Key permissions are granted at the group level. To assign permissions, there must be local groups defined on the DataSecure. The owner of a key implicitly has permissions to perform all applicable operations using the key, even if that user belongs to a group for which permissions are restricted. You cannot set group permissions for global keys, because all users can access global keys for any applicable operation.



Note: To include authorization policies when assigning permissions, you must first create the policies you need. For instructions on creating authorization policies, see Chapter 29, "Authorization Policies".

19 Click **Add**.

20 Enter a **Group**. These can be local or LDAP groups, if an LDAP user directory is configured for your DataSecure.

21 Assign permissions for the available operations, which vary by algorithm:

- AES: Encrypt, Decrypt, Export
- DES: Encrypt, Decrypt, Export
- RC4: Encrypt, Decrypt, Export
- HmacSHA: MAC, MAC Verify, Export
- RSA: Encrypt, Decrypt, Sign, Sign Verify, Export
- SEED: Encrypt, Decrypt, Export

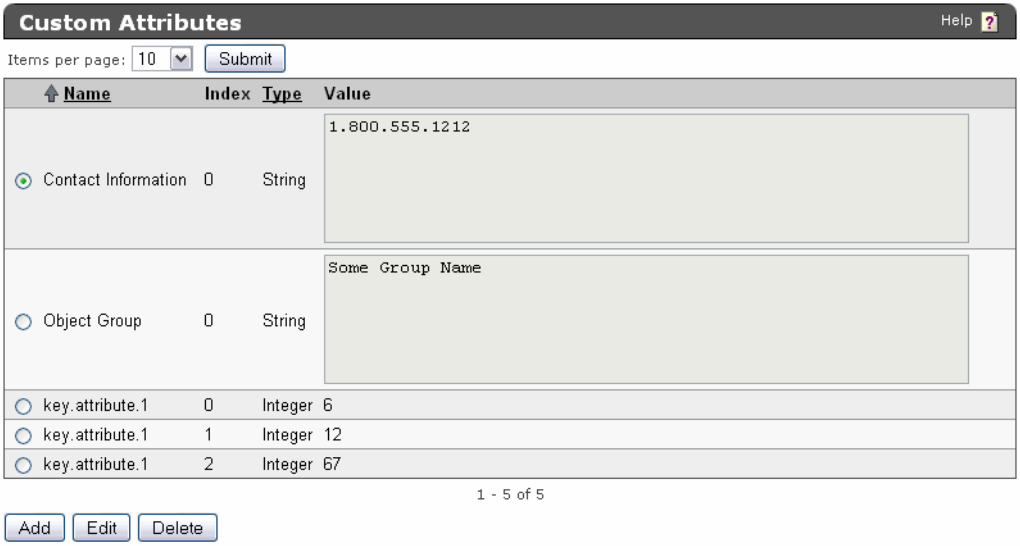
You can assign these operations using the following options:

- *Never* - Members of the group can never perform the operation with the key.
- *Always* - Members of the group can always perform the operation with the key.
- *Authorization Policy* - Members of the group can perform the operation with the key according to the terms of the authorization policy.

Note: Export permissions are only applicable if the key is exportable.

22 Click **Save**.

23 Click the Custom Attributes tab.



24 Click **Add**. You can assign a maximum of 100 custom attributes. Only one instance of *Contact Information* is allowed per key. Each attribute is given an **Index**. The **Index** is per attribute, per key. The first instance of an attribute is given **Index** 0. The second instance is given **Index** 1, and so on. Thus, since there can only be one instance of *Contact Information*, it will always be **Index** 0.

25 Select the **Name**. Only attributes that already exist on the Custom Key Attributes Names section are available here.

26 Enter a **Value**. This can be any printable ASCII characters and spaces, tab, \n and \r. Maximum length is 4096 characters.

27 Click **Save**.

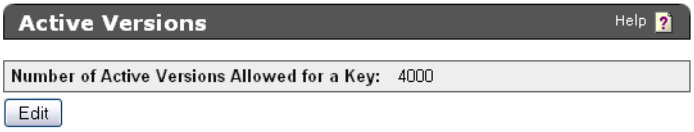
Important! You should create a backup immediately after creating a key. There is no way to recover a key that has not been backed up.

Set the Maximum Number of Key Versions

To set the maximum number of versions allowed for a key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Active Versions section on the Key and Policy Configuration page (Security >> Keys >> Key Options).



3 Click **Edit**.

4 Enter a value for the **Number of Active Versions Allowed for a Key**. Active versions of a key can be used for both encryption and decryption (or Sign/SignVerify, or MAC/MACVerify depending on the algorithm).

5 Click **Save**.

Important! When restoring a key to the DataSecure, the key must conform to the appliance's current **Number of Active Versions Allowed for a Key** setting on the Key and Policy Configuration page. If the key has more active versions than permitted, the key restore will fail.

To restore a key with more active versions than the system allows, you must change the **Number of Active Versions Allowed for a Key** setting before restoring the backup. You can then reduce the key's active versions and return the **Number of Active Versions Allowed for a Key** to its original value.

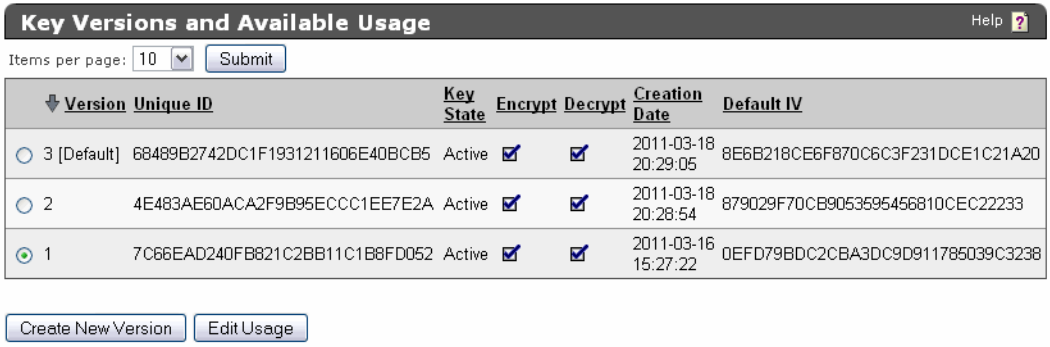
Create and Manage Key Versions

The first version of a versioned key is created when the key is created. To create and manage key versions use the Key Versions tab on the Key Properties page.

To create and manage key versions:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Key Versions and Available Usage section. Go to the Keys section on the Key and Policy Configuration page (Security >> Keys), select the **Key Name**, and click the Key Versions tab.



3 Click **Create New Version** to create a new key version. The new version is now the default version. This will be the version used when cryptographic and information requests do not specify a version number. The maximum amount of versions is set on the Active Versions (Security >> Keys >> Key Options).

All versions of a key have the same metadata (found on the Key Properties, Permissions, and Custom Attributes sections). But, the **Version**, **Unique ID**, **Key State**, **Creation Date**, **Default IV**, and key bytes differ for each version.

4 Click **Edit Usage**.

5 Alter the **Key State** for any or all version. You can edit all but the Default key version. The following options are available:

- Active - All key management options are allowed. The number of active key versions must be less than the **Number of active versions allowed for a key** field on the Active Versions section.
- Restricted - Only decrypt (MAC Verify for HmacSHA1 keys, Sign Verify for RSA keys) and key info operations are allowed.
- Retired - No access is allowed.

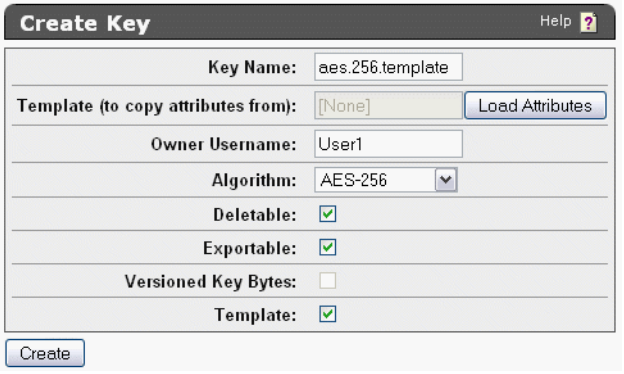
6 Click **Save**.

Create a Key Template

To create a key template:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Create Key section on the Key and Policy Configuration page (Security >> Keys >> Create Keys).



3 Enter a unique key name in the **Key Name** field. This is the name that the server uses to refer to the key. The key name must begin with a letter, must be between 1 and 64 characters (inclusive), and can consist of only letters, numbers, underscores, periods, and hyphens. This value may be changed after the key is created.

4 Enter a value in the **Owner Username** field to assign a specific owner or leave this value blank to create a global key. If an owner is listed for the key, then that is the only user who can access the key, unless you set group permissions. Global keys can be accessed by all users. This value may be changed after the key is created.

5 Select an Algorithm. The follow algorithms are available:

- AES-256
- AES-192

- AES-128
- DES-EDE-168
- DES-EDE-112
- DES
- RC4-128
- RC4-40
- HmacSHA512
- HmacSHA384
- HmacSHA256
- HmacSHA1
- RSA-4096
- RSA-3072
- RSA-2048
- RSA-1024
- RSA-512
- SEED (The SEED algorithm must be feature-activated on the device.)

Note: Some of the algorithms listed above will not be available on FIPS-compliance devices.

6 To make the key deletable by the owner, select **Deletable**. Deletable global keys are deletable by all users. This value may be changed after the key is created.

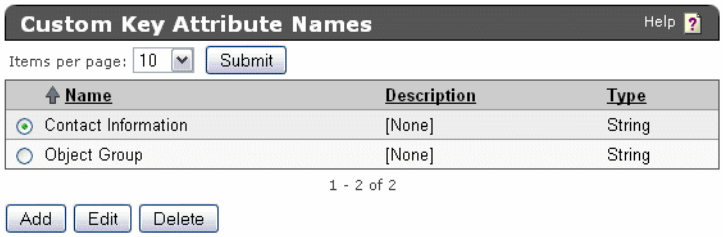
7 To make the key exportable select **Exportable**. An exportable key can be exported by its owner and by members of a group with “Export” permission for the key. An exportable global key is exportable by all users. This value may be changed after the key is created.

Note: You cannot select **Versioned Key Bytes** when creating a template. To create versioned keys from a template, you must select this option for each key individually after loading the key properties.

8 Select **Template** to create a key template based on the values set above.

9 Click **Create**.

10 Navigate to the Custom Key Attribute Names section of the Key and Policy Configuration page (Security >> Keys >> Key Options). The DataSecure includes the *Contact Information* and *Object Group* attributes used by KMIP. These attributes cannot be deleted or modified.



11 Click **Add** to create your own key attribute names.

12 Enter the attribute's **Name**. Attribute names can contain alphanumeric characters, hyphens, underscores, and periods. You cannot include whitespaces in the name. In addition, the first character of the name must be a letter. Maximum length is 255 characters.

13 Enter a **Description**. This field can contain any printable ASCII characters and spaces, tab, \n and \r. Maximum length is 4095 characters.

14 Select the **Type**. Once selected, the type cannot change. Key attributes can be any of the following data type:

- String
- Integer
- Long Integer
- Big Integer
- Enumeration
- Boolean
- Byte String
- Data/Time
- Interval

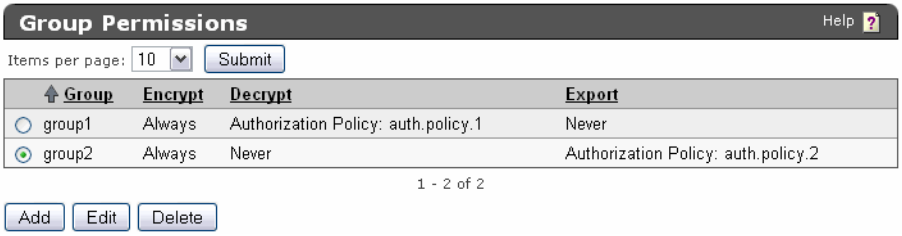
Note: Any attribute created through the XML interface is automatically a String.

Note: Each attribute is assigned an index. The index is only visible when queried by a KMIP client. This index cannot be changed.

15 Click **Save**. The key attribute can now be associated with a key.

16 Navigate to the template's Key Properties section. Go to the Keys section (Security >> Keys), select the template name and click **Properties**.

17 Click the Permissions tab. Key permissions are granted at the group level. To assign permissions, there must be local groups defined on the DataSecure. The owner of a key implicitly has permissions to perform all applicable operations using the key, even if that user belongs to a group for which permissions are restricted. You cannot set group permissions for global keys, because all users can access global keys for any applicable operation.



Note: To include authorization policies when assigning permissions, you must first create the policies you need. For instructions on creating authorization policies, see Chapter 29, "Authorization Policies".

18 Click **Add**.

19 Enter a **Group**. These can be local or LDAP groups, if an LDAP user directory is configured for your DataSecure.

20 Assign permissions for the available operations, which vary by algorithm:

- AES: Encrypt, Decrypt, Export
- DES: Encrypt, Decrypt, Export
- RC4: Encrypt, Decrypt, Export
- HmacSHA: MAC, MAC Verify, Export
- RSA: Encrypt, Decrypt, Sign, Sign Verify, Export
- SEED: Encrypt, Decrypt, Export

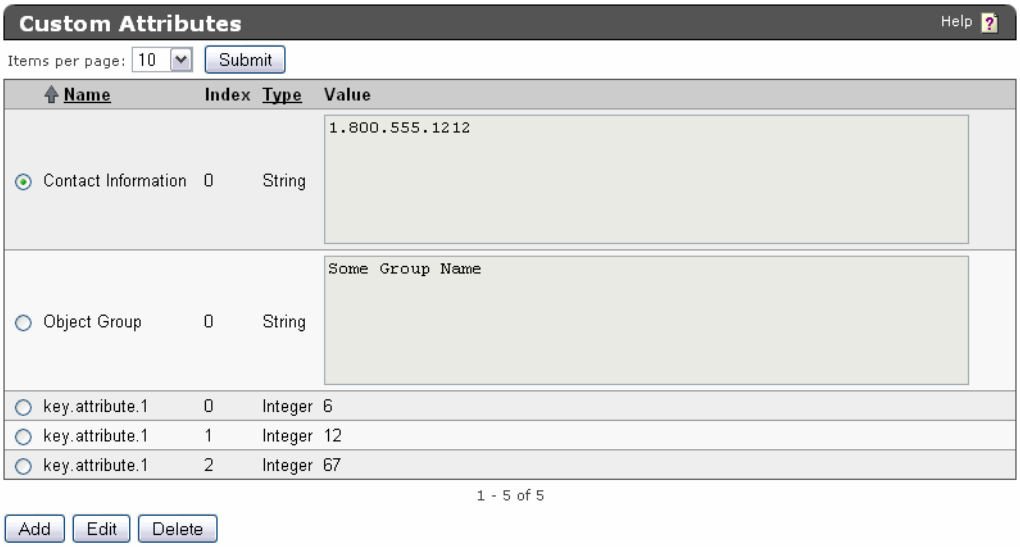
You can assign these operations using the following options:

- *Never* - Members of the group can never perform the operation with the key.
- *Always* - Members of the group can always perform the operation with the key.
- *Authorization Policy* - Members of the group can perform the operation with the key according to the terms of the authorization policy.

Note: Export permissions are only applicable if the key is exportable.

21 Click **Save**.

22 Click the Custom Attributes tab.



23 Click **Add**. You can assign a maximum of 100 custom attributes. Only one instance of *Contact Information* is allowed per key. Each attribute is given an **Index**. The **Index** is per attribute, per key. The first instance of an attribute is given **Index** 0. The second instance is given **Index** 1, and so on. Thus, since there can only be one instance of *Contact Information*, it will always be **Index** 0.

24 Select the **Name**. Only attributes that already exist on the Custom Key Attributes Names section are available here.

25 Enter a **Value**. This can be any printable ASCII characters and spaces, tab, \n and \r. Maximum length is 4096 characters.

26 Click **Save**.

Now all keys created with this template will share these properties.

Importing a Key

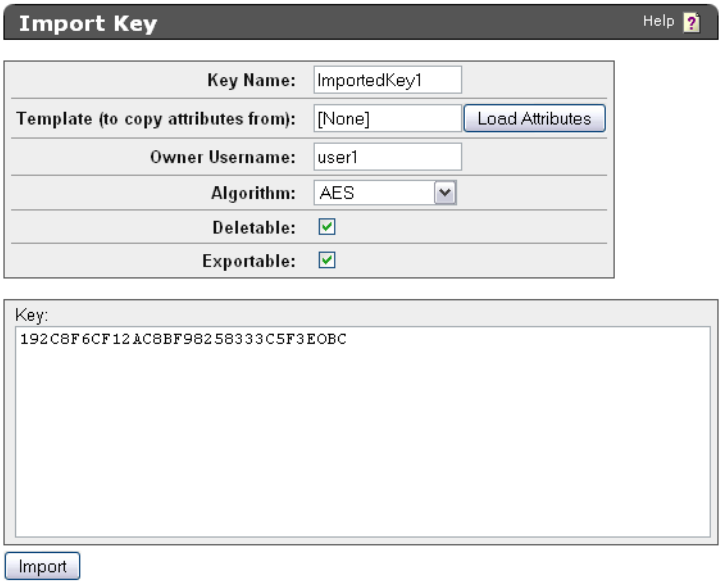
The Import Key section allows you to import clear text keys on DataSecures. Asymmetric keys must be imported in PEM-encoded ASN.1 DER-encoded PKCS #1 format, and both the public and private keys must be imported. Symmetric keys must be in Base 16 format, and in the case of DES keys, parity bits must be properly set.

Important! The server will not import keys that are known to be weak, such as 64 bit DES. In addition, the parity bits must be set properly; otherwise, the server returns an error.

To import a key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Import Key section on the Key and Policy Configuration page (Security >> Keys).



3 Enter a unique key name in the **Key Name** field. The key name must begin with a letter, it must be between 1 and 64 characters (inclusive), and it can consist of letters, numbers, underscores, periods, and hyphens.

4 (optional) Enter a **Template** and click **Load Attributes**. A template is a collection of attributes that can be assigned only when the key is created or imported. You must first create a template before it can be used to create or import keys. For more information, see “Create a Key Template” on page 145.

5 Enter a value in the **Owner Username** field to assign a specific owner or leave this value blank to create a global key. When you import a key through the management console, the existing key ownership data is not maintained, so any previous ownership must be re-established. If an owner is listed for the key, then that is the only user who can access the key, unless you set group permissions. Global keys can be accessed by all users.

6 Select the **Algorithm**. You import keys based on the following algorithms:

- AES
- DES
- DES-EDE
- HmacSHA1
- HmacSHA256
- HmacSHA384
- HmacSHA512
- RC4
- RSA
- SEED (this algorithm must be feature-activated.)

7 To make the key deletable by the owner, select **Deletable**. Deletable global keys are deletable by all users. This value may be changed later.

8 To make the key exportable on from non-FIPS DataSecure, select **Exportable**. An exportable key can be exported by its owner and by members of a group with “Export” permission for the key. An exportable global key is exportable by all users. This value may be changed later.

9 Paste the key bytes in the **Key** field. Asymmetric keys must be imported in PEM-encoded ASN.1 DER-encoded PKCS #1 format, and both the public and private keys must be imported. Symmetric keys must be in Base 16 format, and in the case of DES keys, parity bits must be properly set.

Important! The server will not import keys that are known to be weak, such as 64 bit DES. In addition, the parity bits must be set properly; otherwise, the server returns an error.

10 Click **Import**.

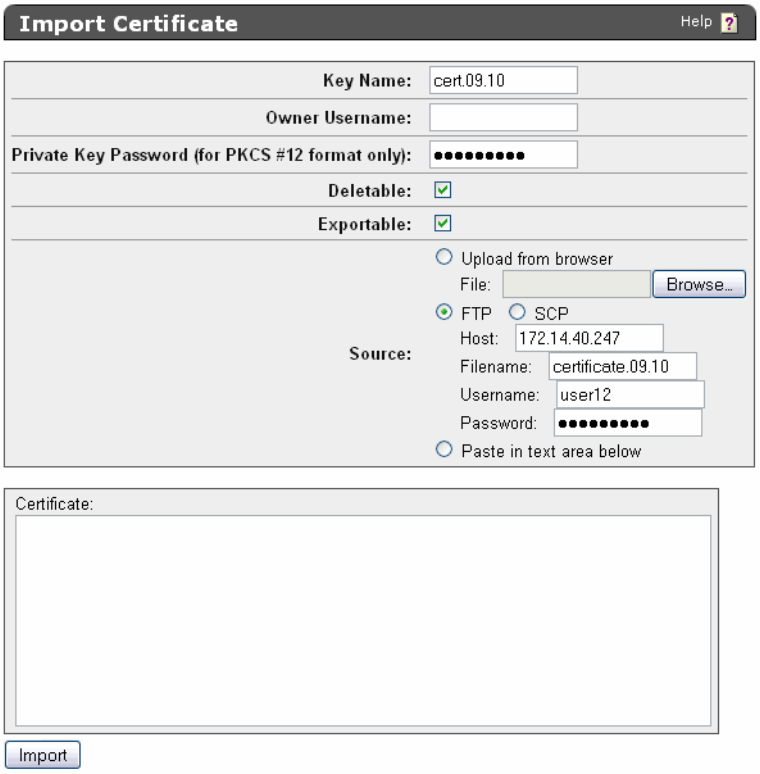
Import a Certificate as a Key

The Import Certificate section allows you to import certificates in PEM-encoded PKCS #7, PEM-encoded PKCS #12, and PEM-encoded X509, as long as the private key is included with the certificate. Certificates imported using this section are managed as keys and can be used for encryption.

To import a certificate as a key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Import Certificate section on the Key and Policy Configuration page (Security >> Keys) >> Import Keys.



3 Enter a unique key name in the **Key Name** field. The key name must begin with a letter, it must be between 1 and 64 characters (inclusive), and it can consist of letters, numbers, underscores, periods, and hyphens.

4 Enter a value in the **Owner Username** field to assign a specific owner or leave this value blank to create a global key. When you import a key through the management console, the existing key ownership data is not maintained, so any previous ownership must be re-established. If an owner is listed for the key, then that is the only user who can access the key, unless you set group permissions. Global keys can be accessed by all users.

5 Enter the **Private Key Password**. This is required only when using PKCS #12 format.

6 To make the key deletable by the owner, select **Deletable**. Deletable global keys are deletable by all users. This value may be changed later.

7 To make the key exportable, select **Exportable**. An exportable key can be exported by its owner and by members of a group with “Export” permission for the key. An exportable global key is exportable by all users. This value may be changed later.

8 Select the **Source** of the key import. You can select one of three options:
   - Choose *Upload from browser* to upload the certificate through the browser and click **Browse** to locate the file on the local drive or network.
   - Choose *SCP* and enter values for the *Host*, *Filename*, *Username*, and *Password* to copy the file via SCP. *Username* refers to the account on the source host that has access to the file.
   - Choose *Paste in text area below* and paste the certificate in the **Certificate** field.

9 Click **Import**.

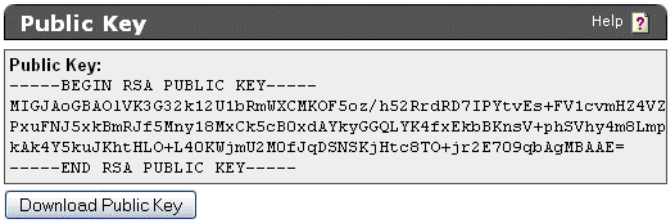
Downloading an RSA Key

To download an RSA key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Keys section of the Key and Policy Configuration page (Security >> Keys). Select the RSA key.

3 Navigate to the Public Key section.



4 Click **Download Public Key** to download the public portion of the RSA key.

Deleting a Key

WARNING! Exercise extreme caution when deleting keys. *If you erroneously delete a key, you cannot recreate that key.* As a result, unless you have a backup of that key, you will not be able to decrypt any ciphertext created by that key.

To delete a key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Keys section of the Key and Policy Configuration page (Security >> Keys).

3 Select the key and click **Delete**.

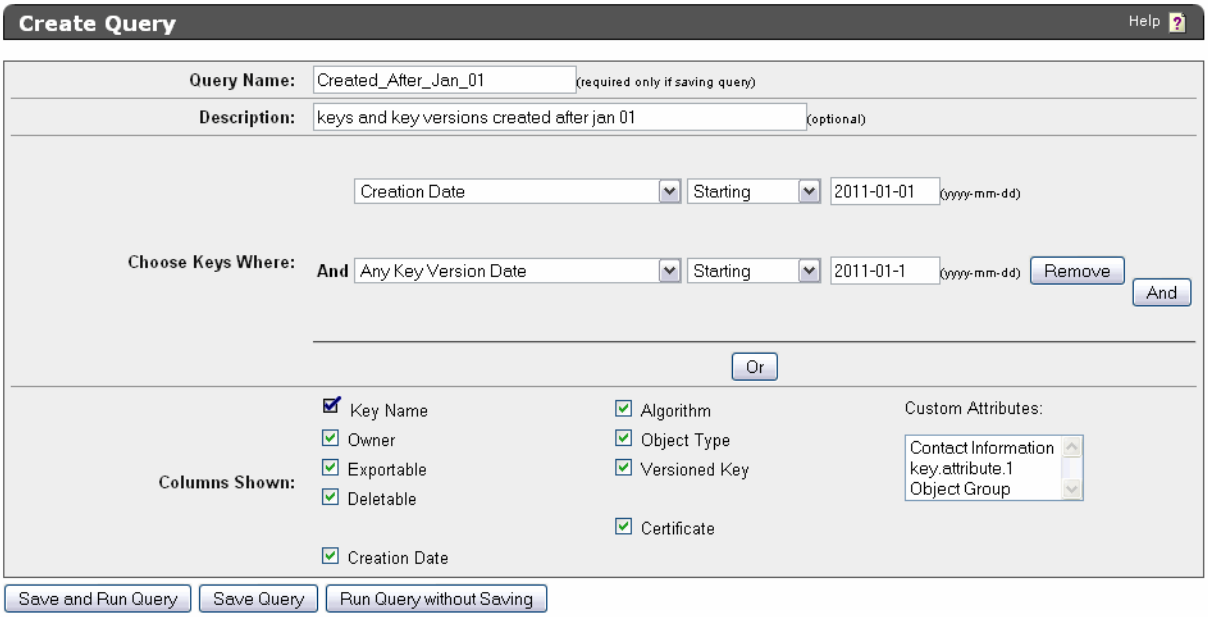
Create a Key Query

A key query enables you to view a subset of the keys that exist on the DataSecure. You can create new queries, run saved queries, and modify queries.

To create a query:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Queries section of the Key and Policy Configuration page (Security >> Keys >> Query Keys). This section enables you to create very specific queries using multiple and/or statements and using the results of other saved queries. You can also tailor your query to show specific columns.



3 Enter the **Query Name**. This field is only required if you will save the query. You can run a query without saving, but *you can only save a query before running it*.

4 Enter a **Description** of the query.

5 Use the **Choose Keys Where** field in combination with the **AND** and **OR** buttons to create your own query. You can query on key metadata, combine query strings, and use the results of previously saved queries.

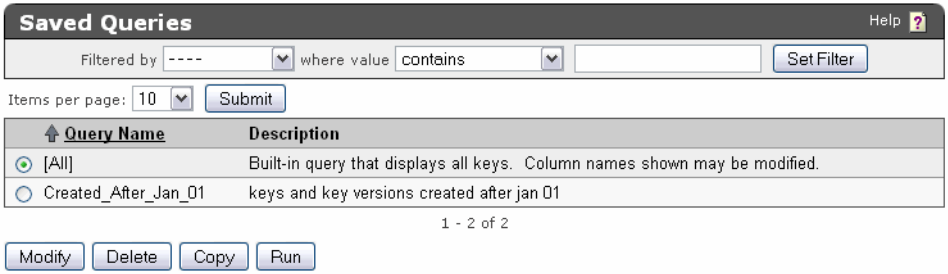
6 Select the **Columns Shown** in the query results.

7 Select one of the following:

- **Save and Run Query** - save and execute the query.
- **Save Query** - save the query without executing.

- **Run Query without Saving** - execute the query without saving. The results will show the **Query Name** as *Unnamed Query*. You can navigate away from the Keys sections and still reapply the *Unnamed Query*, however, the Management Console will only store one *Unnamed Query* at a time. Old unnamed queries are forgotten.

Saved queries appear in the Saved Queries section. They can be run, copied, deleted, and modified. Click the **Modify** button in the Saved Queries section and then alter the Query Name, **Description**, **Selection Criteria**, and the **Columns Shown** fields.



Note: You cannot greatly modify the built-in query [All]. The DataSecure will only permit you to change the **Columns Shown** values.

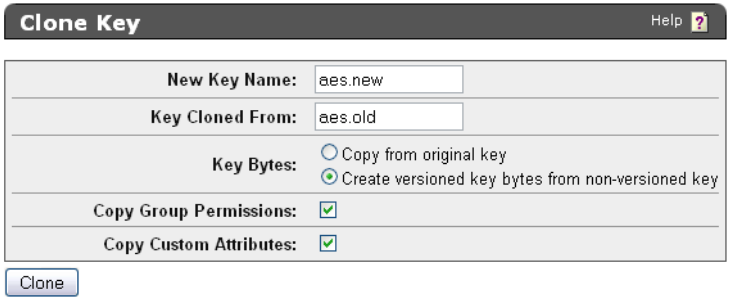
Clone a Key

Cloning a key involves assigning the key bytes and key metadata from an existing key to a new key. You can choose to copy or ignore the existing group permissions and custom attributes. You can use this feature to create a versioned key from a non-versioned key.

To clone a key:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Clone Key section of the Key and Policy Configuration page (Security >> Keys >> Create Keys).



3 Enter the **New Key Name**. The name must begin with a letter, is must be between 1 and 64 characters (inclusive), and it can consist of letters, numbers, underscores, periods, and hyphens.

4 Enter the old key name in the **Key Cloned From** field. This is the key that will be copied.

5 Choose an option for the **Key Bytes** field:

- *Copy from original key* - clones a standard key
- *Create versioned key bytes from non-versioned key* - creates a new versioned key based on a standard key.

In both cases, the new key will have the same metadata and key bytes as the cloned key.

6 Select **Copy Group Permissions** to copy the group permissions from the existing key.

7 Select **Copy Custom Attributes** to copy the custom attributes from the existing key.

8 Click **Clone** to create a new copy of the key.

Chapter 29

Authorization Policies

An authorization policy enables you to limit how a user group may use a key. You implement an authorization policy when establishing a key's group permissions. The policies are applied to a key separately for each group; groups that share a key do not necessarily share the same authorization policy.

Authorization policies define two kinds of limits:

- **Rate Limits:** The number of operations (per hour) that members of the group can perform. The default is unlimited operations. If a user attempts to perform an operation and has exceeded the rate limit, an error is returned and the connection is closed.

  Note: Rate limiting is done on a per-user basis, not on a per-group basis. If the limit is 500 operations, each user in the group can perform 500 operations with the key.

  The Key Server starts keeping track of the number of operations performed by a user as soon as that user makes a request to the server. Once the clock is running, the user has a one hour time period in which to perform no more than the number of operations specified in the Maximum Operations per Hour field. Should you change the limit for a particular policy, those changes are recognized immediately.

  The following example illustrates the point: The rate limit for Key1 is 100 operations per hour.
  - At 11:00 AM, User1 logs in and begins making requests using the Key1.
  - At 11:30 AM, User1 has used 50 operations with Key1.
  - At 11:31 AM, the administrator changes the rate limit for Key1 to 150 operations per hour.
  - User1 can make only 100 more requests between 11:31 AM and 11:59 AM

  Likewise, if the limit was lowered to 75, User1 would only be allowed to make 25 more requests.

- **Time Limits:** The hours or days in which members of the group can perform operations. The default is unlimited access. If a member of a restricted group attempts to use the key outside of the designated time, an error is returned and the connection is closed.

  A usage period is an uninterrupted time span, during which the authorization policy applies. A usage period can span multiple days with a maximum of 7 days (e.g. from Monday 12:00 AM to Sunday 11:59 PM.) A usage period can have only one start day and time and one end day and time. To establish a daily usage period of 9 AM to 5 PM, you must define a usage period for each day of the week.

  If the start day and the end day are the same, and the end time precedes the start time, the authorization policy applies at all times except those between the end time and the start time on that day.

  For example, if the start day and time are Monday 13:00 (1 PM) and the end day and time are Monday 08:00 (8 AM), then operations are allowed from 1 PM Monday until 8 AM the following Monday.

Once an authorization policy is defined it is associated with a key and a group through the Group Permissions section in the Management Console. Individual keys can be associated with multiple groups which may in turn have differing or conflicting authorization policies. In this case, the server chooses the least restrictive authorization policy available (the most operations per hour for the current time of day).

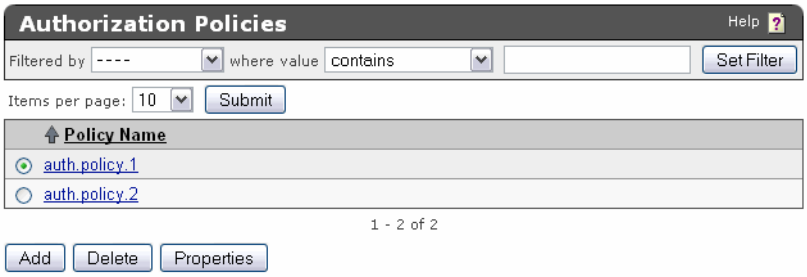
By default, no authorization policies are assigned to any group.

Note: Authorization policies cannot be applied to global keys or to certificates. Key owners are not subject to policy restrictions.

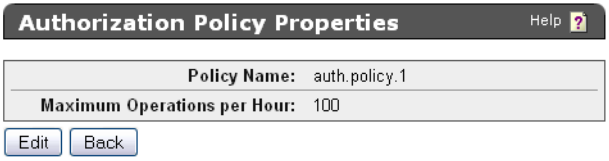
Creating an Authorization Policy

To create an authorization policy:

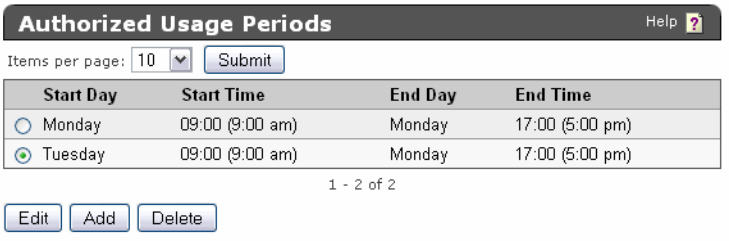
1. Log in to the Management Console as an administrator with Keys and Authorization Policies access control.
2. Navigate to the Authorization Policies section of the Authorization Policy Configuration page (Security >> Authorization Policies).



3. Click **Add**.
4. Enter a **Policy Name**.
5. Click **Save**.
6. Select the Policy to access the Authorization Policy Configuration page.



7. Click **Edit** to establish a rate limit using the **Maximum Operations per Hour** field. By default, policies can perform unlimited operations. The valid range of operations is1 to 500,000,000.
8. Click **Save**.
9. Click **Add** to establish a time limit using the **Start Day**, **Start Time**, **End Day**, and **End Time** fields. A usage period can span up to 7 days of the week or any portion of those days.



10 Click **Save**. Repeat this step to set multiple usage periods.

Deleting an Authorization Policy

To delete an authorization policy:

1 Log in to the Management Console as an administrator with Keys and Authorization Policies access control.

2 Navigate to the Authorization Policies section of the Authorization Policy Configuration page (Security >> Authorization Policies).

3 Select a Policy Name and click **Delete**.

Chapter 30

Local Users & Groups

A user directory contains a list of users that may access the keys on your Key Server, and a list of groups to which those users belong. The Key Server can use one of two user directories:

- A local user directory, where users and groups are defined only on the local device and are not available to any other DataSecure.
- A central server running the Lightweight Directory Access Protocol (LDAP), which enables all devices to access the same set of users and groups. If you have several DataSecures in use, LDAP can greatly simplify user and group administration.

The Key Server can either use local user and group authentication or LDAP authentication; it cannot use both at the same time. You can define which authentication method your Key Server uses on the Network-Attached Encryption Server Configuration page in the section Key Server Authentication Settings. See “Configure the User Directory Settings” on page 18 for more details.

When you configure the Key Server to use an LDAP user directory instead of the local user directory (or vice versa), or if you change the LDAP server settings to point to a different user directory, existing key permissions and database user mappings become invalid if the user and group names no longer exist in the new user directory. However, if a user or group name appears in both the old and new directories, the new user or group inherits the key permissions and database user mappings from the old user or group.

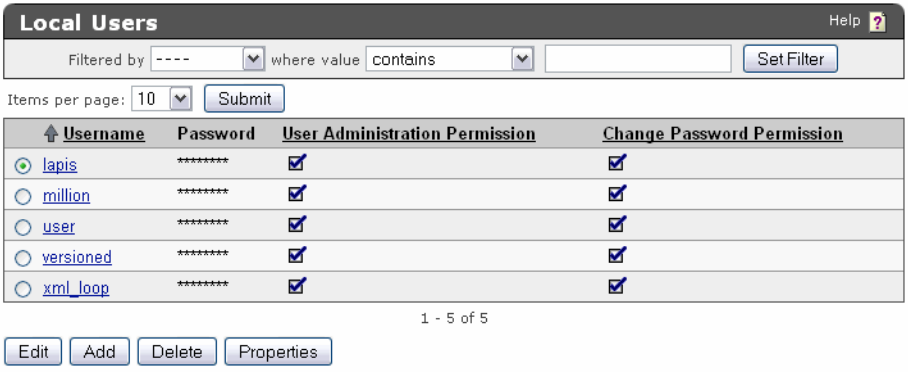
For more information about LDAP users, see Chapter 32, “LDAP User & Groups”.

Create a Local User

To create a local user:

1 Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.

2 Navigate to the Local Users section of the User & Group Configuration page (Security >> Local Users & Groups).



3 Click **Add**.

4 Enter a **Username**. The **Username** must begin with a letter, it must be between 1 and 64 characters (inclusive), and it can consist of letters, numbers, underscores, periods, and hyphens. Once saved, you cannot change the **Username**.

5 Enter a **Password**. The requirements for the local user password depend on your Password Management Settings. For information on password requirements, refer to Chapter 17, “Password Management”. The maximum password length is 256 characters.

The passwords displayed on the Local Users section are masked with eight asterisks (*). When changing the password, clear this field before entering the new password. If you do not clear this field, the asterisks become a part of the new password.

6 Select **User Administration Permission** to give this user the ability to create, modify, and delete users and groups via the XML interface. Users with this feature enabled automatically have the **Change Password Permission**.

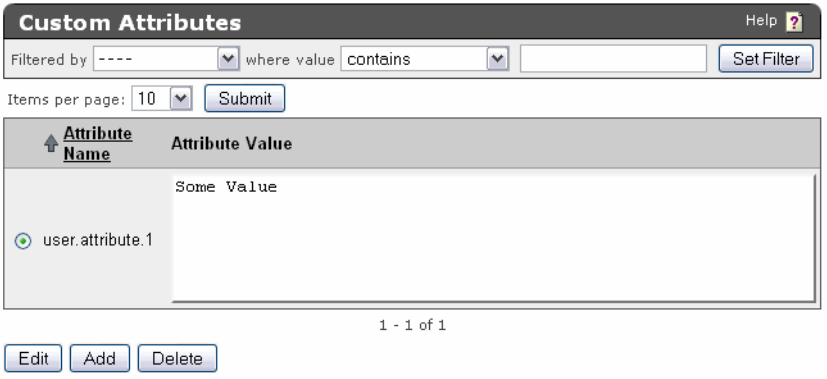
Important! You should be extremely cautious in assigning the User Administration Permission. Its use should be reserved for situations where you want to perform user administration programmatically using the XML interface of the Key Server (as opposed to the Management Console). In such deployments, the User Administration Permission should be given to a very small number of users. Most users should not be given this permission.

7 Select **Change Password Permission** to give this user the ability to change his or her own password via the XML interface.

8 Click **Save**. The remainder of these instructions describe how to create custom attributes, which are not required.

9 Select the **Username** and click **Properties**.

10 Select the Custom Attributes tab.



11 Click **Add**.

12 Enter an **Attribute Name**. The name can contain alphanumeric characters, hyphens, underscores, and periods. You cannot include whitespace in the name. In addition, the first character of the name must be a letter. The maximum length is 64 characters.

13 Enter an **Attribute Value**. Enter the value of the attribute. This can contain any printable ASCII characters and spaces, tabs, \n and \r. The maximum length is 1000 characters.

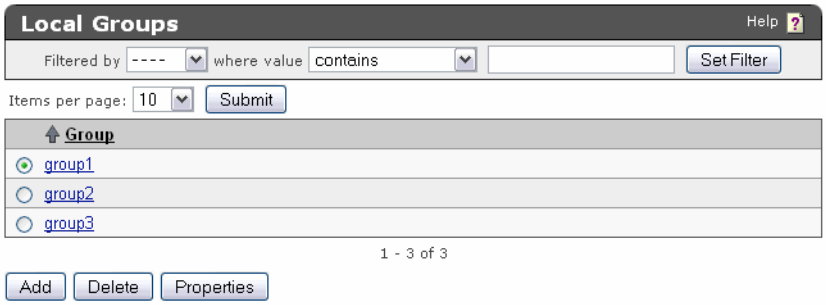
14 Click **Save**.

Creating a Local Group

To create a local group:

1 Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.

2 Navigate to the Local Groups section of the User & Group Configuration page (Security >> Local Users & Groups).

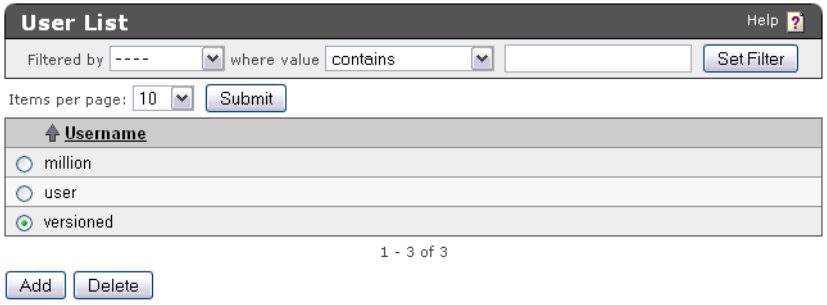


3 Click **Add**.

4 Enter a name in the **Group** field.

5 Click **Save**. You can now add users to the group.

6 Select the **Group** on the Local Groups section to access the User List.



7 Click **Add** and enter a local user in the **Username** field. Click ALT-[down arrow] to see a list of available local users.

8 Click **Save**.

Removing a User from a Group

To remove a user from a group:

1. Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.
2. Navigate to the Local Groups section of the User & Group Configuration page (Security >> Local Users & Groups).
3. Select a Group and click **Properties** or click the group name to access the User List section.
4. Select the **Username** and click **Delete**.

Deleting a User

When deleting users, the system does not check to see if that user has been mapped to a database user. All database users mapped to the user being deleted lose all privileges associated with that user. In such a scenario, the database users lose access to the keys, which means that those users cannot encrypt or decrypt data.

If you discover that you erroneously deleted a user, you can recreate that user. After recreating the user, you must manually add that user to any groups to which it belonged before it was deleted.

To delete a user:

1. Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.
2. Navigate to the Local Users section of the User & Group Configuration page (Security >> Local Users & Groups).
3. Select the **Username** and click **Delete**.

Note: You cannot delete a user if it is a key owner.

Deleting a Group

To delete a group:

1. Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.
2. Navigate to the Local Groups section of the User & Group Configuration page (Security >> Local Users & Groups).
3. Select the **Group** and click **Delete**.

Chapter 31

LDAP Server

Lightweight Directory Access Protocol (LDAP) is a protocol that allows you to enable authentication of your Key Server based on a central directory of users, rather than the local users and groups defined on each device. To use LDAP with the Key Server, you need an LDAP server available such as MS Active Directory, Netscape Directory Server or OpenLDAP. You should also be familiar with the schema defined by that server.

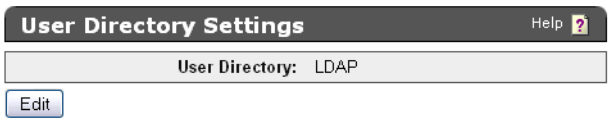
Note: If you set up the Key Server to use LDAP for users and groups, those users and groups are case-*in*sensitive. For example, a user ID of `JohnSmith` can also be used throughout the system as `johnsmith`. This is different from most other parts of the system where upper and lower case are treated differently.

Passwords for both local users and LDAP users must not contain the less than character (<).

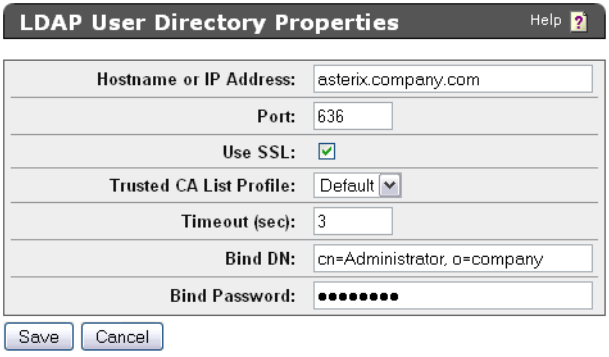
Setting up the LDAP User Server

To set up the LDAP user directory:

1. Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.
2. Navigate to the User Directory Settings section of the Cryptographic Key Server Configuration page (Device >> Key Server).



3. Click **Edit**. Select *LDAP* and click **Save**.
4. Navigate to the LDAP User Directory Properties section of the LDAP Server Configuration page (Security >> LDAP >> LDAP Server).



5 Click **Edit**.

6 Enter the **Hostname or** IP **Address** and **Port** of the primary LDAP server. LDAP servers typically use port 389. For SSL connections, LDAP servers typically use port 636.

7 Select **Use SSL** to enable SSL. By default, the DataSecure connects directly to the LDAP server over TCP.

8 If using SSL, enter the **Trusted Certificate Authority**. The CA will verify that the server certificate presented by LDAP servers are signed by a CA trusted by the DataSecure.

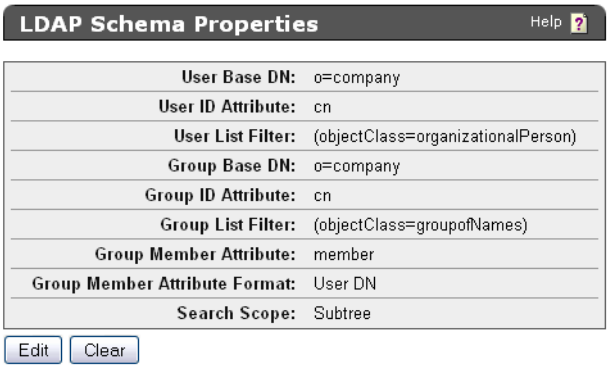
9 Enter a value in the **Timeout** field. This is the number of seconds to wait for the LDAP server during connections and searches. If the connection times out, the authorization fails.

10 Enter the **Bind DN** (distinguished name) used to bind to the server. The device will bind using these credentials to perform searches for users and groups. If your LDAP server supports anonymous searches, you may leave this field and the **Blind Password** field empty.

11 Click **Save**.

12 Click **LDAP Test** to test the connection.

13 Set up the LDAP Schema using the LDAP Schema Properties section (Security >> LDAP >> LDAP Server).



14 Click **Edit**.

15 Enter the values for your LDAP schema.

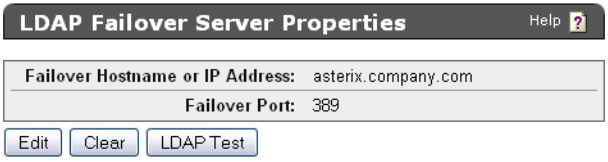
- **User Base DN** - the base distinguished name (DN) from which to begin the search for usernames.
- **User ID Attribute** - the attribute type for the user on which to search. The attribute type you choose must result in globally unique users.
- **User List Filter** - used for narrowing the search within the object class. For example:
  `(& (objectClass=user) (objectCategory=person))`
  To specify all, use: `(objectClass=*)`
- **Group Base DN** - The base DN from which to begin the search for groups.
- **Group ID Attribute** - The attribute type for the group on which to search.
- **Group List Filter** - The search filter for groups. For example: `(objectClass=group)`

- **Group Member Attribute** - The attribute that is used to search for a user within a group, for example, `member`. The format of the Group Member Attribute may be a user ID or a DN and is determined by the next setting.
- **Group Member Attribute Format** - either *Used ID* or *User DN.*
- **Search Scope** - determines how deep within the LDAP user directory the Key Server searches for a user or group.
  - *One Level*: search only the children of the base node
  - *Subtree*: search all the descendents of the base node. Depending on the size of your LDAP directory, this can be very inefficient.

    The LDAP protocol supports four search scopes: base, onelevel, subtree and children. The Key Server allows you to specify only onelevel and subtree at this time. You should note that subtree includes base and children, so by specifying subtree, the search scope includes subtree, base, and children.

16 Click **Save**.

17 Set up the LDAP failover server using the LDAP Failover Server Properties section of the LDAP Server Configuration page (Security >> LDAP >> LDAP Server). When the primary LDAP server is down, the DataSecure shifts to the failover server and periodically retries the main server to see if it have become accessible again.



18 Click **Edit**.

19 Enter the **Failover Server IP or Hostname** and **Failover Server Port**.

20 Click **Save**.

21 Click **LDAP Test** to test the connection.

When the LDAP server is configured, the available users and groups will be visible on the LDAP Users and LDAP Groups sections (Security >> LDAP >> LDAP Users & Groups)

Chapter 32

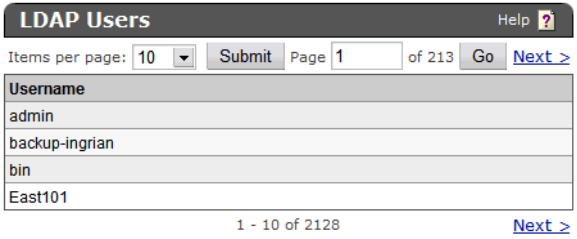
LDAP User & Groups

The LDAP User & Group Configuration page enables you to view the users and groups for the server as defined by the LDAP directory. You can only view the users and groups on this page; users and groups are created, modified, and removed on the LDAP server itself.

View LDAP Users

To view LDAP users:

1. Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.
2. Navigate to the LDAP User & Group Configuration page (Security >> LDAP >> LDAP Users & Groups).

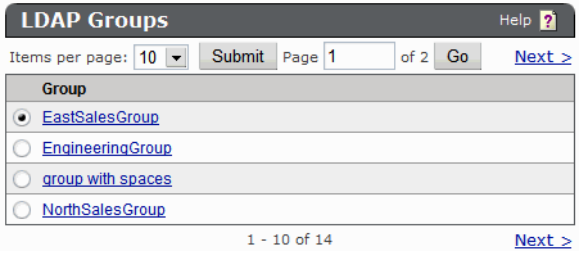


3. View the list of users. These users are created, modified, and removed on your LDAP server.

View LDAP Groups

To view LDAP groups:

1. Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.
2. Navigate to the LDAP User & Group Configuration page (Security >> LDAP >> LDAP Users & Groups).



3. View the list of groups. These groups are created, modified, and removed on your LDAP server.
4. Click the group name to access the User List section and view the group members.

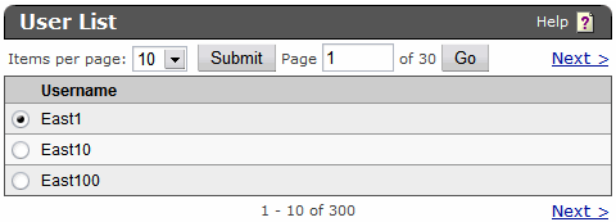
View LDAP Group Members

To view LDAP groups:

1 Log in to the Management Console as an administrator with Users, Groups, and LDAP access control.

2 Navigate to the LDAP User & Group Configuration page (Security >> LDAP >> LDAP Users & Groups).

3 Select a group name.



4 View the group membership list. Groups and users are managed on the LDAP server.

Chapter 33

Certificates

Certificates identify one entity to another. In this case, when making SSL connections between a client application and the Key Server, the server must provide its server certificate to the client application. Likewise, if you require client applications to validate themselves to the Key Server via client certificates, then the client application must provide its client certificate to the server during the SSL handshake.

The Key Server uses the following two kinds of certificates:

- *Server* certificates on the DataSecure allow a DataSecure to authenticate itself to a client application during an SSL handshake.
- *Client* certificates allow client applications to authenticate themselves to the DataSecure during an SSL handshake. Where the certificate resides varies from application to application and database to database.

Creating a Server Certificate for the DataSecure

Before the DataSecure can respond to SSL requests from a client application, the DataSecure must be configured with at least one server certificate.

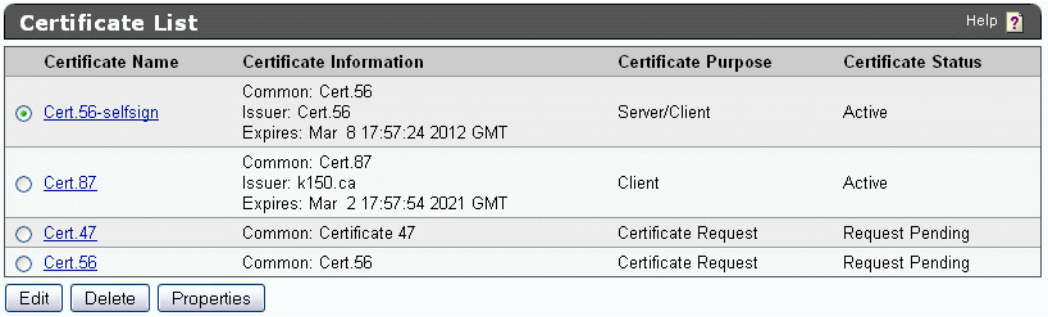
Note: To generate a valid certificate, you must have a certificate authority sign a certificate request. You can create local CAs on the DataSecure, and use those CAs to sign certificate requests. Otherwise, you must use an external CA to sign certificate requests. The following steps assume that you have already created a local CA.

To create a server certificate for the DataSecure:

1. Log in to the Management Console as an administrator with Certificates access control.
2. Navigate to the Create Certificate Request section of the Certificate and CA Configuration page (Security >> SSL Certificates).

3 Enter the **Certificate Name**, **Common Name**, **Organization Name**, **Organizational Unit Name**, **Locality Name**, **State or Province Name**, **Country Name**, **Email Address**, and **Key Size** for the certificate. The DataSecure supports 768-bit, 1024-bit, and 2048-bit key sizes.

4 Click **Create Certificate Request**. The new request appears in the Certificate List with a status of *Request Pending*.



5 Select the certificate request and click **Properties** to access the Certificate Request Information section.

Note: At this point you can select **Create Self Sign Certificate** to create a self-signed certificate. This enables you to avoid getting a certificate request signed by a local CA, or a CA on another DataSecure. Self-signed certificates can be presented to client applications just like any other certificate. We recommend that self-signed certificates be used for testing purposes only. Any attempt to connect to a DataSecure using a self-signed certificate sends a warning to the client browser. The remainder of these instructions explain how to sign a certificate request with a CA.

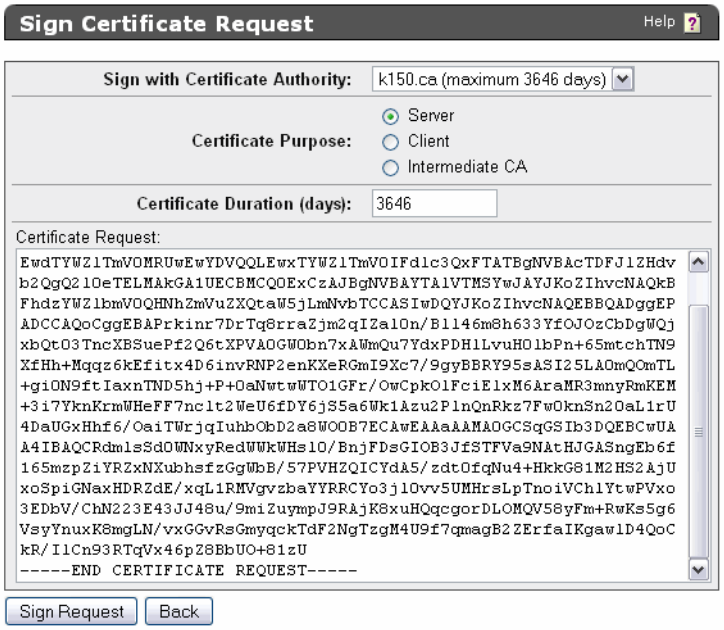
6 Copy the certificate request text. The certificate text looks similar, but not identical, to the following text.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIBmzCCAQQCAQAwWzEPMA0GA1UEAxMGZmxldGNoMQkwBwYDVQQKEwAxCTAHBgNVBAsTADEJM
AcGA1UEBxMAMQkwBwYDVQQIEwAxCzAJBgNVBAYTAlVTMQ8wDQYJKoZIhvcNAQkBFgAwgZ8wDQ
YJKoZIhvcAYBABTUxxgY0AMIGJAoGBAMUqA1t4m&Nm0sCcUqnt5Yug+qTSbgEFnvnYWUApHKD
lx5keC1lguQDU1ol2Xcc3YGrUviGCe4y0JIMK2giQ5b+ABQDemRiD11vInQqkhV6ngWBRD0lp
KCjU6QXDEE9KGCKBRh5uqL70rr2LErqxUuYwOu50Tfn4T3tKb1HGgfdzAgMBAAGgADANBgkqh
kiG9w0BAQQFAAOBgQCuYnv8vBzXEZpgLD71FfeDK2Zqh0FnfTHXAkHrj4JP3MCMF5nKHgOSRV
mImNHHy0cYKTDP+hor68R76XhLVapKMqNuUHUYf7CTB5JNHHy0cYKTNHHy0cYKTuV1Ce8nvvU
G+yp2Eh8aJ7thaua41xDFXPmIEXTqzXi1++DCWAdWaysojPCZugY7jNWXmg==
-----END CERTIFICATE REQUEST-----
```

Important! Be sure to include the first and last lines (-----BEGIN CERT... and -----END CERT...), and copy only the text in the certificate. Do not copy any extra white space.

7 Navigate to the Local Certificate Authority List section (Security >> Local CAs).

8 Select a CA and click **Sign Request**.



9 Paste the certificate request into the **Certificate Request** field. Select Server as the **Certificate Purpose**, specify a **Certificate Duration** and click **Sign Request**. The newly-activated certificate displays on a new page.

10 Copy the certificate text.

11 Navigate back to the Certificate List section.

12 Select the certificate request and click **Properties** to access the Certificate Request Information section.

13 Click **Install Certificate**.

14 Paste the text of the signed certificate into the **Certificate Response** field.

15 Click **Save**. When you return to the main Certificate Configuration page, the certificate request is now an active certificate. It can be used in to establish SSL connections with client applications.

Creating a Client Certificate

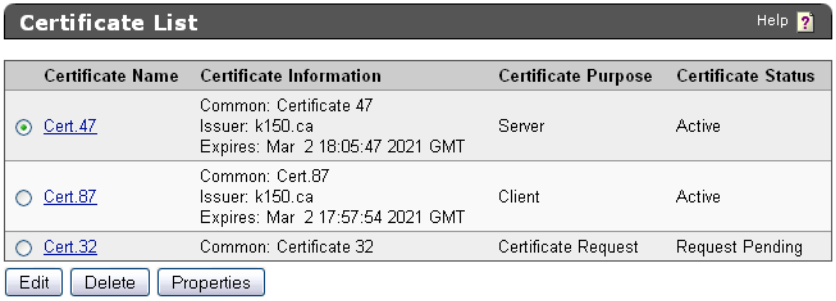
To create a client certificate for the DataSecure:

1 Log in to the Management Console as an administrator with Certificates access control.

2 Navigate to the Create Certificate Request section of the Certificate and CA Configuration page (Security >> SSL Certificates).

3 Enter the **Certificate Name**, **Common Name**, **Organization Name**, **Organizational Unit Name**, **Locality Name**, **State or Province Name**, **Country Name**, **Email Address**, and **Key Size** for the certificate.

4 Click **Create Certificate Request**. The new request appears in the Certificate List with a status of *Request Pending*.



5 Select the certificate request and click **Properties** to access the Certificate Request Information section.

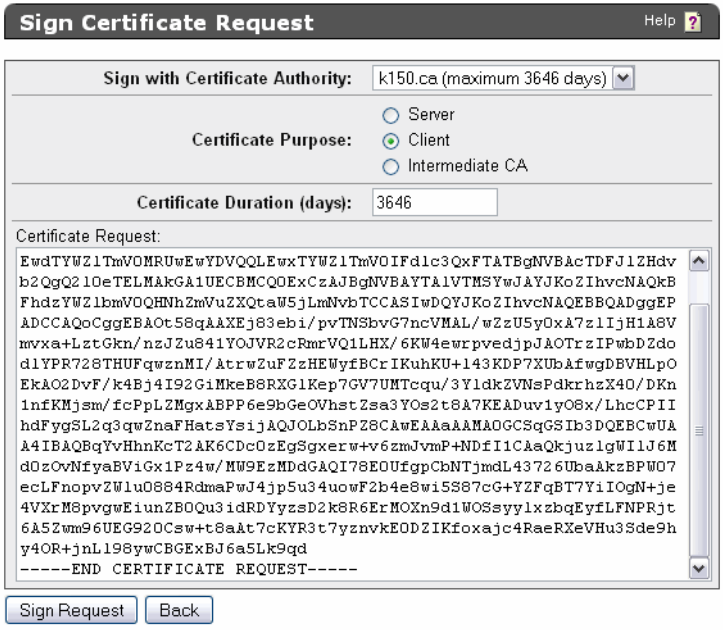
6 Copy the certificate request text. The certificate text looks similar, but not identical, to the following text.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIBmzCCAQQCAQAwWzEPMA0GA1UEAxMGZmxldGNoMQkwBwYDVQQKEwAxCTAHBgNVBAsTADEJM
AcGA1UEBxMAMQkwBwYDVQQIEwAxCzAJBgNVBAYTAlVTMQ8wDQYJKoZIhvcNAQkBFgAwgZ8wDQ
YJKoZIhvcAYBABTUxxgY0AMIGJAoGBAMUqA1t4m&Nm0sCcUqnt5Yug+qTSbgEFnvnYWUApHKD
lx5keC1lguQDU1ol2Xcc3YGrUviGCe4y0JIMK2giQ5b+ABQDemRiD11vInQqkhV6ngWBRD0lp
KCjU6QXDEE9KGCKBRh5uqL70rr2LErqxUuYwOu50Tfn4T3tKb1HGgfdzAgMBAAGgADANBgkqh
kiG9w0BAQQFAAOBgQCuYnv8vBzXEZpgLD71FfeDK2Zqh0FnfTHXAkHrj4JP3MCMF5nKHgOSRV
mImNHHy0cYKTDP+hor68R76XhLVapKMqNuUHUYf7CTB5JNHHy0cYKTNHHy0cYKTuV1Ce8nvvU
G+yp2Eh8aJ7thaua41xDFXPmIEXTqzXi1++DCWAdWaysojPCZugY7jNWXmg==
-----END CERTIFICATE REQUEST-----
```

Important! Be sure to include the first and last lines (-----BEGIN CERT... and -----END CERT...), and copy only the text in the certificate. Do not copy any extra white space.

7 Navigate to the Local Certificate Authority List section.

8 Select a CA and click **Sign Request**.



9 Paste the certificate request into the **Certificate Request** field. Select *Client* as the **Certificate Purpose**, specify a **Certificate Duration** and click **Sign Request**. The newly-activated certificate displays on a new page.

10 Copy the certificate text.

11 Navigate back to the Certificate List section.

12 Select the certificate request and click **Properties** to access the Certificate Request Information section.

13 Click **Install Certificate**.

14 Paste the text of the signed certificate into the **Certificate Response** field.

15 Click **Save**. When you return to the main Certificate Configuration page, the certificate request is now an active certificate. If the certificate is for a client application, please see the appropriate developer guide for instructions on installing the client certificate.

Installing a Certificate Chain

When CAs sign server certificates with an intermediate CA, it might be necessary for a DataSecure to send multiple certificates to a client to enable the client to verify the server certificate. Multiple certificates contained in one certificate are called a certificate chain. A client connecting to a forwarding rule that uses such a chain receives all certificates on the chain.

Certificate chains can be installed on the DataSecure through the Certificate Installation page.

To install a certificate chain:

1 Log in to the Management Console as an administrator with Certificates access control.

2 Navigate to the Certificate List section of the Certificate and CA Configuration page (Security >> SSL Certificates).

3 Select the certificate and click **Properties** to access the Certificate Information section.

4 Click **Install Certificate** to access the Certificate Installation page.

5 Append the intermediate CA certificate to the server certificate received from the CA. The combined certificates should be displayed in the Certificate Response field, as shown here:

6 Click **Save**.

Downloading a Certificate

To download a certificate:

1 Log in to the Management Console as an administrator with Certificates access control.

2 Navigate to the Certificate List section of the Certificate and CA Configuration page (Security >> SSL Certificates).

3 Select the Certificate Name and click **Properties** to access the Certificate Information section.

4 Click **Download**.

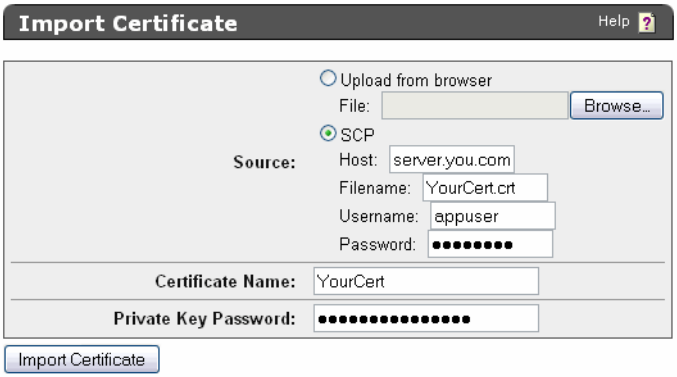
Import a Certificate

The DataSecure can import certificates in PEM-encoded PKCS #12, and PEM-encoded X.509, as long as the private key is included with the certificate.

To import a certificate:

1 Log in to the Management Console as an administrator with Certificates access control.

2 Navigate to the Import Certificate section of the Certificate and CA Configuration page (Security >> SSL Certificates).



3 Select the **Source** of the import. You can select one of three options:

- Choose *Upload from browser* to upload the certificate through the browser and click **Browse** to locate the file on the local drive or network.
- Choose *SCP* and enter values for the *Host*, *Filename*, *Username*, and *Password* to copy the file via SCP. *Username* refers to the account on the source host that has access to the file.
- Choose *FTP* and enter values for the *Host*, *Filename*, *Username*, and *Password* to copy the file via SCP. *Username* refers to the account on the source host that has access to the file.

4 Enter the **Certificate Name**.

5 Enter the **Private Key Password**.

6 Select **Import Certificate** to import the certificate to your DataSecure.

Note: You can import certificates with a key size of 2048-bit or smaller.

Chapter 34

Certificate Authorities

The DataSecure is capable of functioning as a certificate authority (CA). Local CAs are managed on the Certificate Authority Configuration page and are used to issue certificates to clients that might be making requests to the Key Server. These might include applications and databases. You can also use the Certificate and CA Configuration page to configure the list of Certificate Authorities recognized by the DataSecure.

When the Client Certificate Authentication option is enabled on the Key Server, the DataSecure verifies that the CA that signed the client certificate is in the list of Trusted CAs for the Trusted CA profile specified on the Key Server page.

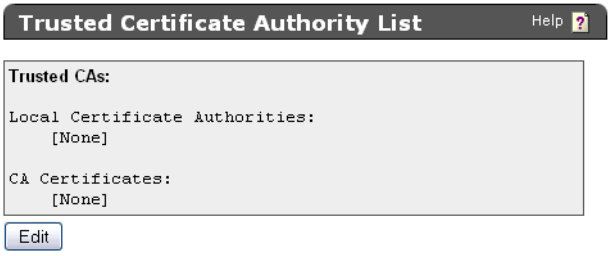
The Default Trusted List CA List profile is empty by default. When you import a CA Certificate onto the DataSecure, it appears in the master list of CA Certificates, but it is not “trusted” until it is added to a Trusted CA list. The same is true for local CAs you generate on the DataSecure. You cannot change the name of the Default profile; however, you can change the list of Trusted CAs for the Default profile.

Manage the Trusted CA List

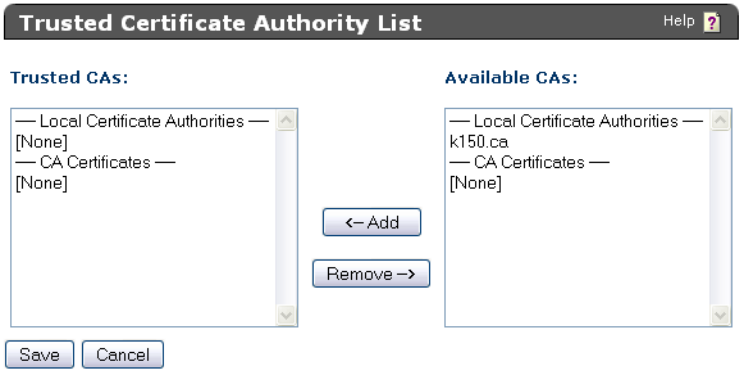
To add or remove a CA certificate to the trusted CA list:

1. Log in to the Management Console as an administrator with Certificate Authorities access control.
2. Navigate to the Trusted Certificate Authority List Profiles section of the Certificate and CA Configuration page (Security >> Trusted CA Lists).

3. Select a profile and click **Properties** to access the Trusted Certificate Authority List section. To create a new CA List profile, click **Add**. Use the **Delete** button to remove unwanted/unused CA List profiles - but note that the Default list cannot be deleted.



4 Click **Edit**. The management console displays the **Trusted CAs** and the **Available CAs** and enables you to add **Available CAs** to the trusted list. The list of **Available CAs** includes both local and external CAs.



5 Use the **Add** and **Remove** buttons as needed.

6 Click **Save**.

View and Download a Local CA

To view all of the certificates signed by a local CA:

1 Log in to the Management Console as an administrator with Certificate Authorities access control.

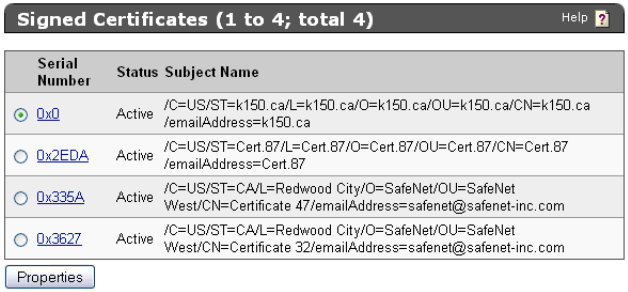
2 Navigate to the Local Certificate Authority List section of the Certificate and CA Configuration page (Security >> Local CAs).

3 Select a certificate authority and click **Properties** to view information associated with a specific CA Certificate. The top portion of the CA Certificate Information page displays several of the X509 fields in the CA certificate. The lower portion of this page displays the X509 certificate encoded in PEM format. Since this is a CA certificate, the issuer and subject are identical.

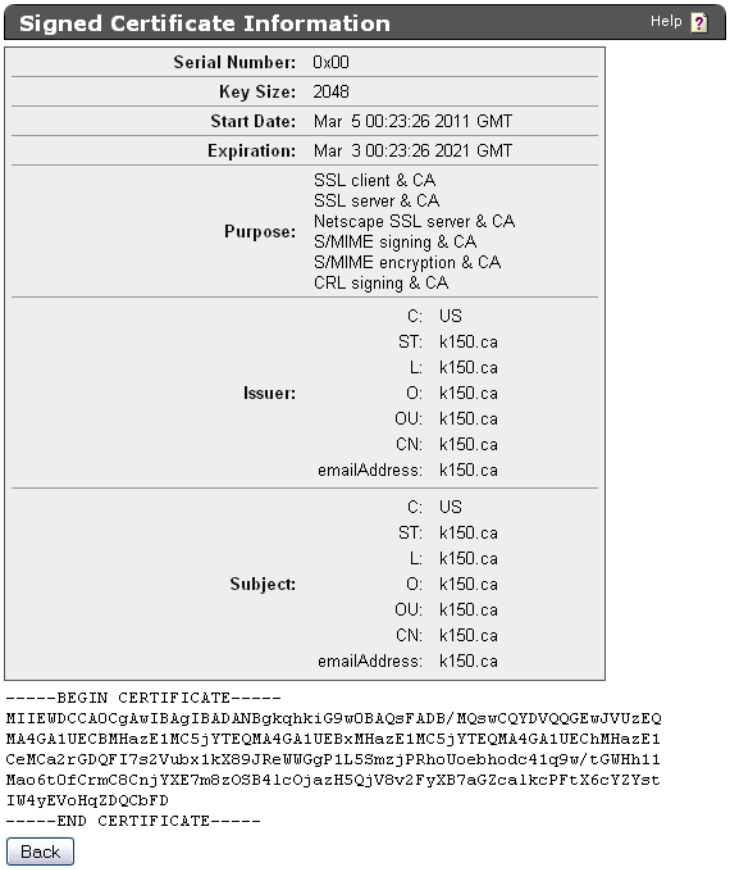
4 Select **Download** to download a CA certificate so that you can add it to the trusted CA on a client device. Downloading a CA certificate could be very important when you are attempting to establish SSL connections between the Key Server and client applications. To establish trust between the Key Server and the client application, it might be necessary to install a CA certificate on the client application.

5 Select **Show Signed Certs** to access the Signed Certificates section. The page displays the following information:

- Serial Number - The Serial Number, expressed in Base 16 notation, is assigned by the DataSecure and used internally to refer to a certificate signed by a local CA. There is only one counter on the DataSecure, which means that all serial numbers for certificates signed by local CAs will be in numerical order regardless of which local CA signed the certificate. For example, a certificate signed by one local CA might get the serial number 0x7. The next certificate signed by a local CA on the DataSecure would get the serial number 0x8, regardless of which local CA signed it. The first certificate in the list of signed certificates is always the local CA itself, which always has a serial number of 0x0.
- Status - status of the certificate.
- Subject Name - the concatenated subject information for the signed certificate.



6 Select a certificate and click **Properties** to view the signed certificate. The page displays the serial number, key size, expiration date, issuer, and subject. In addition, the PEM encoded x.509 certificate can be used to install the certificate if necessary. This page is view-only.



Create a Local Certificate Authority

To create a local certificate authority:

1 Log in to the Management Console as an administrator with Certificate Authorities access control.

2 Navigate to the Create Local Certificate Authority section of the Certificate and CA Configuration page (Security >> Local CAs).

3 Enter the **Certificate Authority Name**, **Common Name**, **Organization Name**, **Organizational Unit Name**, **Locality Name**, **State or Province Name**, **Country Name**, **Email Address**, and **Key Size**.

4 Select either Self-signed Root CA or Intermediate CA Request as the **Certificate Authority Type**.

When you create a self-signed root CA, you must also specify a CA Certificate Duration and a Maximum User Certificate Duration, which become valid once you click **Create**. Once you create a self-signed root CA, you must add it to the trusted CA list for it to be recognized by the Key Server.

When you create an intermediate CA request, you must sign it with either an existing intermediate CA or your organization's root CA. Certificates signed by the intermediate CA can be verified by that same intermediate CA, by the root itself, or by any intermediate CAs that link the signing CA with the root. This enables you to de-centralize certificate signing and verification.

When creating an intermediate CA request, you must also specify a Maximum User Certificate Duration *when installing the certificate response*. This duration cannot be longer than the signing CA's duration.

5 Click **Create**.

Create an Intermediate CA Request

To create an intermediate CA request:

1. Log in to the Management Console as an administrator with Certificate Authorities access control.
2. Navigate to the Create Local Certificate Authority section of the Certificate and CA Configuration page (Security >> Local CAs).
3. Enter the **Certificate Authority Name**, **Common Name**, **Organization Name**, **Organizational Unit Name**, **Locality Name**, **State or Province Name**, **Country Name**, **Email Address**, and **Key Size**.
4. Select Intermediate CA Request as the **Certificate Authority Type**.
5. Click **Create**.

   The new request appears in the Local Certificate Authority List section with a status of *CA Certificate Request Pending.*
6. Navigate to the Local Certificate Authority List section of the Certificate and CA Configuration page (Security >> Local CAs).
7. Select the CA Certificate Request and click **Properties** to access the CA Certificate Information section.
8. Copy the CA certificate request text. The certificate text looks similar, but not identical, to the following text.

   ```
   -----BEGIN CERTIFICATE REQUEST-----
   MIIBmzCCAQQCAQAwWzEPMA0GA1UEAxMGZmxldGNoMQkwBwYDVQQKEwAxCTAHBgNVBAsTADEJM
   AcGA1UEBxMAMQkwBwYDVQQIEwAxCzAJBgNVBAYTAlVTMQ8wDQYJKoZIhvcNAQkBFgAwgZ8wDQ
   YJKoZIhvcAYBABTUxxgY0AMIGJAoGBAMUqA1t4m&Nm0sCcUqnt5Yug+qTSbgEFnvnYWUApHKD
   lx5keC1lguQDU1ol2Xcc3YGrUviGCe4y0JIMK2giQ5b+ABQDemRiD11vInQqkhV6ngWBRD0lp
   KCjU6QXDEE9KGCKBRh5uqL70rr2LErqxUuYwOu50Tfn4T3tKb1HGgfdzAgMBAAGgADANBgkqh
   kiG9w0BAQQFAAOBgQCuYnv8vBzXEZpgLD71FfeDK2Zqh0FnfTHYKTuV1Ce8nvvUG+yp2Eh8aJ
   7thaua41xDFXPmIEXTqzXi1++DCWAdWaysojPCZugY7jNWXmg==
   -----END CERTIFICATE REQUEST-----
   ```

   Important! Be sure to include the first and last lines (-----BEGIN CERT... and -----END CERT...), and copy only the text in the certificate. Do not copy any extra white space.
9. Sign this request with another CA. Copy the signed certificate text.
10. Navigate back to the Local Certificate Authority List section.
11. Select the CA Certificate Request and click **Properties** to access the CA Certificate Information section.
12. Click **Install Certificate**.
13. Paste the text of the signed CA certificate into the **Certificate Response** field.
14. Click **Save**. When you return to the Local Certificate Authority List section, the CA certificate is now active.

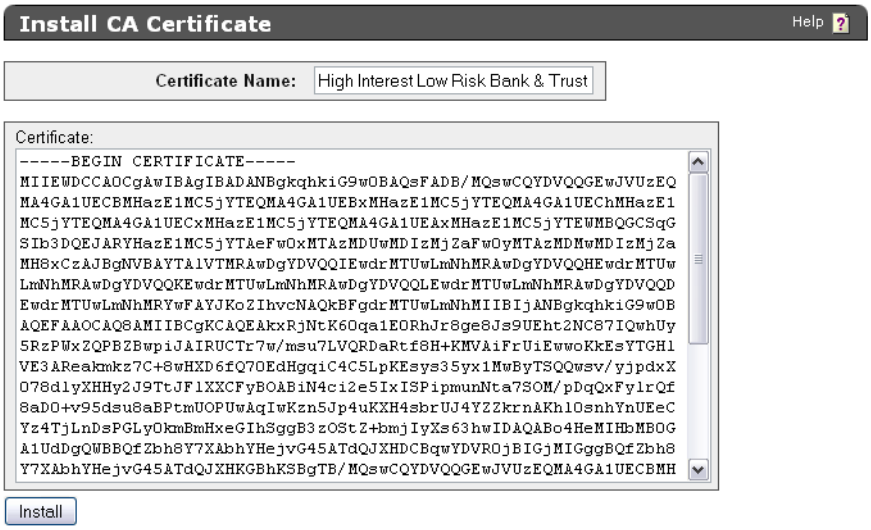
Install a CA Certificate

Prior to installing a CA certificate, you must have a copy of the CA certificate on your local drive.

To install a CA certificate:

1 Log in to the Management Console as an administrator with Certificate Authorities access control.

2 Navigate to the Install CA Certificate section of the Certificate and CA Configuration page (Security >> Known CAs).



3 Enter a value for the **Certificate Name** and paste the CA certificate text in the **Certificate** field.

4 Click **Install**. The CA will be added to the CA Certificate list.

Chapter 35

Certificate Revocation Lists

Certificate Authorities regularly publish a list of certificates that have been revoked by that CA. Such a list is called a certificate revocation list (CRL). The list of revoked certificates is distributed in X.509 CRL v2 format. Support for CRLs on the DataSecure allows you to obtain, query, and maintain CRLs published by CAs supported on the DataSecure. The DataSecure uses CRLs to verify certificates in two ways.

- Require Client Authentication – when enabled, the DataSecure only accepts connections from clients that present a valid client certificate. As certificates are presented to the DataSecure, they are checked against the CRL published by the CA who issued the certificate.
- Web Administration User Authentication – this option specifies that you must present a valid client certificate to log in to the Management Console. As certificates are presented to the DataSecure, they are checked against the CRL published by the CA who issued the certificate.

You can configure the DataSecure to fetch the CRL at a regular interval. The CRL is transported to the DataSecure via FTP, SCP or HTTP. The DataSecure can only be configured to retrieve complete CRLs, as opposed to partial, delta, or indirect CRLs. You can also manually download updated CRLs to the DataSecure.

The DataSecure validates all CRLs that it downloads. To validate a CRL, the CA that signed the CRL must be in the list of Trusted CAs on the DataSecure. CRLs published by untrusted CAs are rejected by the DataSecure. Once a CRL is installed on the DataSecure, it remains in effect on the device until the CRL is successfully updated by a CRL from the same issuing CA. If a CRL has been signed with a key that does not match the key in the CA certificate on the DataSecure, the validation of the CRL fails.

When a certificate on the DataSecure appears on a CRL, the event is logged in System Log. Traps for revoked certificates are sent daily around 5:10 AM local time.

Local CAs

The CRL functionality allows you to revoke and renew certificates that are signed with local CAs. Additionally, you can export a CRL issued by local CAs. CRLs exported from the DataSecure contain a list of certificates revoked by local CAs. The format of CRLs exported by the DataSecure is in PEM-encoded X.509 format.

Auto-Update

Each CA promises to update its CRL at the day and time specified in the Next Update field for that CA. When you enable the Auto–Update feature, at 5:00 AM every day the DataSecure inspects the Next Update value for the CRL associated with each CA on the DataSecure. For CRLs whose Next Update time is in the past, the DataSecure attempts to connect to the CRL distribution point (CDP) for the CA to download the updated CRL. If the download was successful, the Next Update field for that CA is changed

to the new update time contained in the newly-downloaded CRL. If the Next Update value for that CRL is in the future, the DataSecure waits until that specified time to attempt to connect to the CDP and download the updated CRL. For example:

> There is a CA named XYZ that has a CRL Next Update time of Oct 20 01:00:00 2002 (1:00 AM). The administrator has enabled CRL auto-updates on the DataSecure. At 5:00 AM on Oct 20, the DataSecure checks the Next Update times for all of the CAs. When it gets to CA XYZ, it will notice that the Next Update time was in the past (4 hours ago), and it will attempt to download an updated CRL from the appropriate CDP.
>
> If the CRL download was successful, the Next Update field for that CA is changed to the new update time contained in the downloaded CRL.
>
> Should the CRL download fail, the DataSecure continues using the old CRL, and it tries again each day to download the updated CRL at the normal 5:00 AM auto-update time.

The Auto-Update feature is a global setting. If you want to disable Auto-Update for a particular CA, you can use the `crl settings` command in the CLI to set the Next Update value to a time in the distant future.

Note: The Auto-Update feature does not apply to local CAs.

Force Periodic Update

The DataSecure performs a daily check of the Next Update field to determine whether it should attempt to update the CRL for a particular CA. If you are not satisfied with a daily check of the Next Update field or if it is possible that the CA incorrectly set the Next Update field in the CRL, you can use the optional Force Periodic Update parameter to instruct the DataSecure to download updated CRLs at an interval you specify.

It is important to note that when you specify a value for the Force Periodic Update parameter, the DataSecure does not stop making daily checks of the Next Update field. For example, if you set the Force Periodic Update parameter to 10800 minutes (one week), the DataSecure continues to check the Next Update field on a daily basis to see if it is necessary to download an updated CRL. In addition, the DataSecure downloads the CRL from the CDP according to the value you specify in the Force Periodic Update parameter.

The Force Periodic Update parameter supports values between 5 and 525600 minutes (one year). Values must be a multiple of 5; if it is not, the value is rounded down to the closest multiple of 5. For example, if you enter a value of 12, the value will be rounded down to 10.

Note: The Force Periodic Update parameter is not available for local CAs.

Chapter 36

High Security Features

Use the High Security settings on the DataSecure to set the highest level of security for administrative and cryptographic operations on the device. Depending on the DataSecure in use, the advanced security settings can be configured to comply with the Federal Information Processing Standard (FIPS) 140-2, Level 2 cryptography requirements and/or international Common Criteria (CC) standards. If you use a non-FIPS compliant DataSecure, you can still use high security settings.

Only the following models are capable of operating in accordance with FIPS and Common Criteria standards:

- i116
- i416
- i426
- i430

All other DataSecures can be configured for high security but cannot be FIPS or Common Criteria compliant

For a physical description of the i116, i416, i426, and i430, see Appendix B, “Hardware Specifications.”

Advanced Security Access Control

Altering the security settings on the High Security Configuration page can have a profound effect on the security of your SafeNet platform *and* alter your compliance with FIPS and Common Criteria standards. For this reason, administrators must have the Advanced Security Access Control to modify these settings.

FIPS Compliance

The FIPS standards describe hardware and software parameters that must be met for full compliance. SafeNet provides both FIPS compliant hardware and software security settings to enable all DataSecures to operate with the highest software security settings described in the FIPS standards. However, since FIPS compliance includes both hardware and software, FIPS compliance can only be fully achieved by using a FIPS-capable DataSecure.

DataSecure Settings Required for FIPS Compliance

In order to comply with FIPS 140-2, Level 2, the following functionality must be *disabled* on the DataSecure:

- Global Keys
- Administrative options on XML interface

- FTP transport for importing certificates and downloading and restoring backup files
- LDAP authentication
- LDAP administrator server
- Use of the following algorithms: SEED/ARIA, RC4, DES, RSA-512, RSA-768. These algorithms are not available when FIPS compliance is enabled.
- SSL 2.0 and SSL 3.0*
- Hot-swappable drive capability
- RSA encrypt/decrypt operations**

* We recommend running TLS over the XML interface. This requires that you generate a certificate and enable it.

**RSA encrypt/decrypt associated with TLS handshakes and Sign and Sign Verify are permitted.

These settings are adjusted automatically when you use the Management Console's High Security Configuration page to enable FIPS compliance on FIPS capable DataSecures.

WARNING! Logging in and changing passwords through the serial console while not physically present will take the device out of FIPS compliance.

Clustering

Clustering FIPS-compliant devices with non-FIPS compliant devices will disable FIPS for all devices in the cluster. For example, clustering a FIPS-compliant i416 with a non-FIPS capable i321 will take the i416 out of FIPS compliance. It also means that clustering one or more FIPS-compliant i416s with even one non-FIPS i416 will disable FIPS for the entire cluster.

FIPS-capable and non-FIPS-capable DataSecures cannot be clustered together.

WARNING! In a FIPS-compliant cluster, taking one device out of FIPS compliance will disable FIPS for the entire cluster.

Backups

FIPS and non-FIPS devices cannot share backups.

FIPS Self-Test

To run a FIPS self-test on the DataSecure, powercycle the device.

Software Patches and Upgrades

SafeNet, Inc. will indicate which software patches and upgrades are FIPS certified. Apply only FIPS certified software to a FIPS compliant device. Doing otherwise takes the device out of FIPS compliance.

Enabling and Disabling FIPS Compliance

According to FIPS requirements, you cannot enable or disable FIPS when there are keys on the DataSecure. You must *manually* delete all keys before enabling and disabling FIPS compliance. Keys are zeroized upon deletion. *We strongly recommend that you back up your keys before deleting.*

Common Criteria Compliance

The FIPS configuration settings are a subset of the Common Criteria evaluated configuration settings. Following the FIPS guidelines also makes the DataSecure compliant with Common Criteria standards. As with FIPS, Common Criteria standards also depend on specific hardware requirements met only with the FIPS compliant DataSecures mentioned above.

To meet the requirements for Common Criteria operations, follow the preceding guidelines outlined in this chapter for FIPS 140-2 Level 2. You may run SEED and RC-4 in a Common Criteria configuration by clearing the **Disable Non-FIPS Algorithms and Key Sizes checkbox**.

Note: Support for the SEED algorithm is available only on non–FIPS-compliant DataSecures, and must be feature-activated.

Important! When the **Disable Non-FIPS Algorithms and Key Sizes** checkbox is cleared, the DES, RSA-512, and RSA-768 algorithms can be used on the DataSecure. These algorithms are not allowed under the International Common Criteria standards; *using them will take the device out of Common Criteria compliance.*

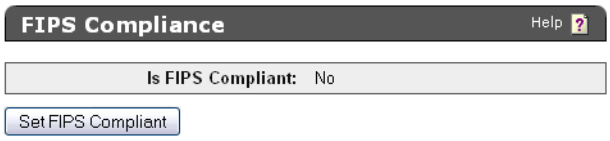
In addition, you must run TLS over the XML interface. You must generate a certificate and then activate TLS.

Configuring the DataSecure for FIPS Compliance

Note: Only the i116, i416, i426, and i430 devices can be configured to comply with FIPS 140-2, Level 2 standards. You cannot enable FIPS compliance on other devices. You can enact some of the same policies required by the FIPS standards, but the device will not be officially compliant.

To configure the DataSecure for FIPS compliance:

1. View the Security Protocols enabled on your Internet Browser. You must enable TLS 1.0 to access the Management Console while FIPS compliant.
2. Log in to the Management Console as an administrator with SSL, Advanced Security, and Key Server access controls.
3. Navigate to the High Security Configuration page (Security >> High Security).



4 Confirm that the **Is FIPS Compliant** value is “No” in the FIPS Compliance section. This field indicates if the DataSecure’s security configuration is consistent with FIPS Level 2 requirements.

Note: If the **Is FIPS Compliant** value is “Yes,” the device is currently FIPS compliant, settings should not be modified, and the **Set FIPS Compliant** button is not available.

5 Click **Set FIPS Compliant** in the FIPS Compliance section. This will alter the settings shown in the High Security Settings and Security Settings Configured Elsewhere sections and enable FIPS compliance. The management console automatically adjusts the settings to comply with FIPS standards.

WARNING: Modifying any of the settings in the High Security Settings and Security Settings Configured Elsewhere sections will take this device out of FIPS compliance.

WARNING: According to FIPS requirements, you cannot enable or disable FIPS when there are keys on the DataSecure. You must *manually* delete all keys before enabling and disabling FIPS compliance. Keys are zeroized upon deletion. *We strongly recommend that you back up your keys before deleting.*

6 Review the settings in the High Security Settings and Security Settings Configured Elsewhere sections to confirm all settings have been adjusted for FIPS compliance.

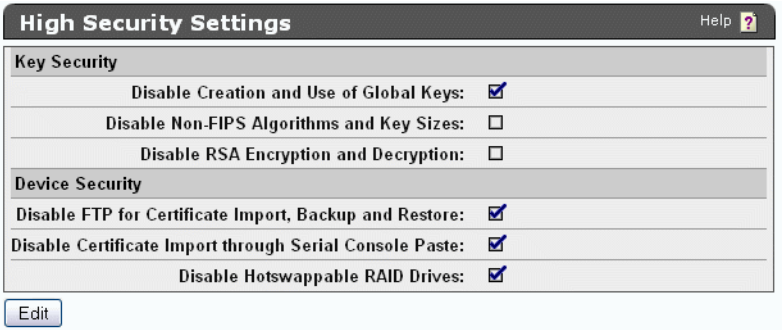
Configuring the High Security Settings on a DataSecure

WARNING! When you enable FIPS compliance on the DataSecure, the functionality displayed here is disabled. Modifying *any* of the items in the High Security Settings section immediately takes the device out of FIPS compliance. This section should be used to *review* the key and device security functionality that has been disabled for full FIPS compliance. When the device is FIPS compliant, you should not alter these settings.

To configure the High Security settings on a non-FIPS compliant DataSecure:

1 Log in to the Management Console as an administrator with SSL, Advanced Security, and Key Server access controls.

2 Navigate to the High Security Configuration page (Security >> High Security). This section lists the functionality that must be disabled for FIPS compliance. These sections are automatically configured when you select **Set FIPS Compliance** in the FIPS Compliance section.



3 Alter the fields in the High Security Settings section as needed.

WARNING: When you enable FIPS compliance on the DataSecure, the functionality displayed here is disabled. **Modifying *any* of the items in the High Security Settings section immediately takes the device out of FIPS compliance.** This section should be used to *review* the key and device security functionality that has been disabled for full FIPS compliance. When the device is FIPS compliant, you should not alter these settings.

Important! According to FIPS requirements, you cannot enable or disable FIPS when there are keys on the DataSecure. You must *manually* delete all keys before enabling and disabling FIPS compliance. Keys are zeroized upon deletion. *We strongly recommend that you back up your keys before deleting.*

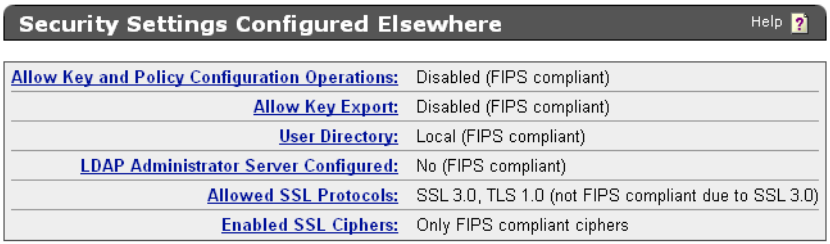
- **Disable Creation and Use of Global Keys** - Disables the ability to create and use global keys. Once this option is selected, global keys cannot be created on the DataSecure. Any existing global keys will not be usable by the DataSecure for any purpose. While the device is FIPS compliance, you may assign an owner to an existing global key.
- **Disable Non-FIPS Algorithms and Key Sizes** - Prevents the creation or use of algorithms and key sizes that are not FIPS compliant. The following algorithm and key size combinations will be disallowed. Any existing keys and certificates based on these algorithms and key sizes will not be usable by the DataSecure for any purpose.
  - SEED (this is feature-activated and may not appear on most devices)
  - RC4
  - DES
  - RSA-512, RSA-768 (If your server currently uses a 768-bit certificate, this option cannot be selected. You must select, and possibly create, a different server certificate. Clients with 512 or 768 bit certificates will be rejected when they try to connect to a FIPS compliant device.)

  The following algorithms and keys sizes *will* continue to be available on the DataSecure:
  - AES-128, AES-192, AES-256
  - DES-EDE-112, DES-EDE-168
  - HmacSHA1, HmacSHA256, HmacSHA384, HmacSHA512
  - RSA-1024, RSA-2048, RSA-3072, RSA-4096
- **Disable RSA Encryption and Decryption** - Prohibits the use of RSA keys for encryption and decryption and limits their usage to sign and sign verify operations. Administrators can still modify the encryption and decryption permissions for an RSA key, but those operations will not be supported
- **Disable FTP for Certificate Import, Backup and Restore** - Disables the use of FTP for importing certificates, downloading backup files, and restoring backup files. Administrators can still download and upload through the browser and via SCP.
- **Disable Certificate Import through Serial Console Paste** - Prevents administrators from importing certificates through the serial console using cut and paste.
- **Disabled Hotswappable RAID Drives** - Prevents administrators from changing RAID drives through the management console. This option will appear on RAID capable devices only.

WARNING: You cannot replace RAID drives and remain FIPS compliant. To change RAID drives you must either disable FIPS or return the device for drive replacement.

4 Click Exit.

5 Navigate to the Security Settings Configured Elsewhere section (located below High Security Settings).



6 Review the settings. To alter these settings, click the fields to access the appropriate sections.

WARNING: Modifying *any* of the items in the Security Settings Configured Elsewhere section immediately takes the DataSecure out of FIPS compliance.

- Allow Key and Policy Configuration Operations - Displays the value of the **Allow Key and Policy Configuration Operations** field in the Key Server Settings section. When enabled, users can configure keys and authorization policies through the XML Interface. Click the link to access the Key Server Settings section. For FIPS compliance, this functionality must be disabled.
- Allow Key Export - Displays the value of the **Allow Key Export** field in the Key Server Settings section. When enabled, users can export keys from the DataSecure through the XML Interface. Click the link to access the Key Server Settings section. For FIPS compliance, this functionality must be disabled, or SSL must be enabled.
- User Directory - Displays the value of the **User Directory** field in the Key Server Authentication Settings section, which determines whether the Key Server uses a local directory or an LDAP server. Click the link to access the Key Server Authentication Settings section. For FIPS compliance, a local user directory must be used.
- Allowed SSL Protocols - Displays the SSL Protocols enabled in the SSL Options section. Click the link to access the SSL Options section. FIPS compliance requires that SSL 2.0 and SSL 3.0 be disabled.
- Enabled SSL Ciphers - Indicates the security strength of the SSL ciphers enabled in the SSL Cipher Order section. Click the link to access the SSL Cipher Order section. On FIPS capable devices, this field indicates if the enabled SSL ciphers permit FIPS compliance and, if not, what is preventing compliance. For FIPS compliance, you must disable ciphers with key sizes smaller than 128-bits and all RC4 ciphers.

Configuring the DataSecure for Common Criteria Compliance

Note: Only the i116, i416, i426, and i430 devices can be configured to comply with Common Criteria standards. You cannot enable Common Criteria compliance on other devices. You can enact some of the same policies required by the Common Criteria standards, but the device will not be officially compliant.

To configure the DataSecure for Common Criteria standards:

1 View the Security Protocols enabled on your Internet Browser. You must enable TLS 1.0 to access the Management Console while FIPS compliant.

2 Log in to the Management Console as an administrator with SSL, Advanced Security, and Key Server access controls.

3 Navigate to the High Security Configuration page (Security >> High Security).

4 Confirm that the **Is FIPS Compliant** value is “No” in the FIPS Compliance section.

Note: If the **Is FIPS Compliant** value is “Yes,” the device is currently FIPS compliant and settings should not be modified.

5 Click **Set FIPS Compliant** in the FIPS Compliance section.

6 Review the settings in the High Security Settings and Security Settings Configured Elsewhere sections to confirm all settings have been adjusted for FIPS compliance.

This puts the DataSecure in compliance with Common Criteria standards. However, you can also enable the SEED and RC-4 algorithms and still be compliant with Common Criteria standards.

To enable the SEED and RC-4 algorithms and still be compliant with Common Criteria standards:

1 Follow the steps outlined in “Configuring the DataSecure for FIPS Compliance” on page 190.

2 On the High Security Configuration page, High Security Settings section, click **Edit**.

3 Clear the **Disable Non-FIPS Algorithms and Key Sizes** checkbox.

You can now enable SEED and RC-4 algorithms on the device. When the **Disable Non-FIPS Algorithms and Key Sizes** checkbox is cleared, RC-4 is automatically enabled. The SEED algorithm is feature enabled and requires a license to activate.

Important! When the **Disable Non-FIPS Algorithms and Key Sizes** checkbox is cleared, the DES, RSA-512, and RSA-768 algorithms can be used on the DataSecure. These algorithms are not allowed under the International Common Criteria standards; *using them will take the device out of Common Criteria compliance.*

Chapter 37

FIPS Status Server

The FIPS Status Server is an http server that provides system status, in the form of the FIPS Status report, whenever the device is running. The FIPS status server monitors for FIPS-related status and error messages. If the device self-test fails upon start-up, all other services on the device shutdown, including the Management Console. Only the FIPS status server continues to run in this state.

The report indicates:

- the latest results of all system self-tests
- the device state (either *error* or *normal*)
- the status of FIPS compliance (either *yes* or *no*)

The device performs the following tests:

Test	Power-Up	Conditional	Description
AES Encryption	X		Known Algorithm Test for the AES algorithm. This test is performed at power-up.
DES Encryption	X		Known Algorithm Test for the DES algorithm. This test is performed at power-up.
DSA Encryption	X		Known Algorithm Test for the DSA algorithm. This test is performed at power-up.
SHA-1 Algorithm	X		Known Algorithm Test for the SHA-1 algorithm. This test is performed at power-up.
SHA2-256 Algorithm	X		Known Algorithm Test for the SHA2-256 algorithm. This test is performed at power-up
SHA2-384 Algorithm	X		Known Algorithm Test for the SHA2-384 algorithm. This test is performed at power-up
SHA2-512 Algorithm	X		Known Algorithm Test for the SHA2-512 algorithm. This test is performed at power-up
HMAC Algorithm (SHA1, SHA2-256)	X		Known Algorithm Test for the HMAC algorithm, which tests both SHA1 and SHA2-256. This test is performed at power-up.
RSA Encryption	X		Known Algorithm Test for the RSA algorithm. This test is performed at power-up.
X9.31 PRNG	X		Known Algorithm Test for the X9.31 PRNG. This test is performed at power-up.
Continuous Random Number Generation		X	Test of the random number generation. This test is run whenever the system generates a random number.
RSA Pairwise Consistency		X	Pairwise consistency test of RSA key generation. This test is run whenever the system generates a key.

Test	Power -Up	Conditional	Description *(continued)*
DSA Pairwise Consistency		X	Pairwise consistency test of DSA key generation. This test is run whenever the system generates a key.
Software Integrity	X		Checksum test of all software. This test is performed at power-up.

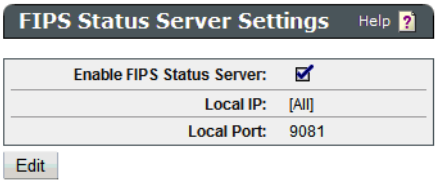
If any of these tests fail, the FIPS Status Report will indicate which test failed and when the failure occurred. The device will enter error state: access to the Management Console, the Command Line Interface, and the XML Interface will be denied. Limited access to the device via the serial console will be supported. To restore functionality, reboot the device. If the problem persists, contact customer support.

Enabling the FIPS Status Server

To enable the FIPS Status Server:

1 Log in to the Management Console as an administrator with SSL, Security, and Key Server access controls.

2 Navigate to the FIPS Status Server page (Security >> FIPS Status Server).



3 Click **Edit**.

4 Select **Enable FIPS Status Server**.

5 Select the **Local IP** address from the list or select [All].

6 Enter the **Local Port** the FIPS Status Server listens on or, accept the default port value of 9081.

7 Click **Save**.

Viewing the FIPS Status Report

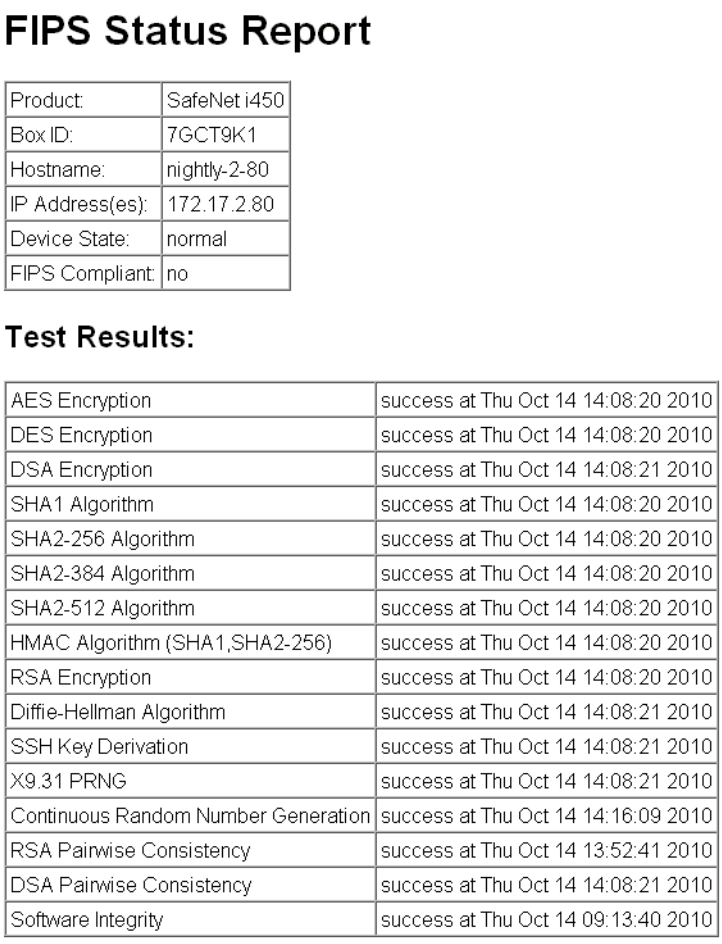
To view the FIPS Status Report:

1 Use either the Management Console or the CLI to locate the IP and port of the status report. By default, the location is *<Management Console IP>:9081/status.html*.

a To locate the IP and port using the Management Console: log in to the Management Console and navigate to the FIPS Status Server page (Security >> Advanced Security >> FIPS Status Server).

b To locate the IP and port using the CLI: log in to the CLI and use the `show fips server` command.

2 Open a web browser and navigate to the IP and port using http. For example, *http:192.168.12.20:9081/status.html*.



FIPS Status Report

Product:	SafeNet i450
Box ID:	7GCT9K1
Hostname:	nightly-2-80
IP Address(es):	172.17.2.80
Device State:	normal
FIPS Compliant:	no

Test Results:

AES Encryption	success at Thu Oct 14 14:08:20 2010
DES Encryption	success at Thu Oct 14 14:08:20 2010
DSA Encryption	success at Thu Oct 14 14:08:21 2010
SHA1 Algorithm	success at Thu Oct 14 14:08:20 2010
SHA2-256 Algorithm	success at Thu Oct 14 14:08:20 2010
SHA2-384 Algorithm	success at Thu Oct 14 14:08:20 2010
SHA2-512 Algorithm	success at Thu Oct 14 14:08:20 2010
HMAC Algorithm (SHA1,SHA2-256)	success at Thu Oct 14 14:08:20 2010
RSA Encryption	success at Thu Oct 14 14:08:20 2010
Diffie-Hellman Algorithm	success at Thu Oct 14 14:08:21 2010
SSH Key Derivation	success at Thu Oct 14 14:08:21 2010
X9.31 PRNG	success at Thu Oct 14 14:08:21 2010
Continuous Random Number Generation	success at Thu Oct 14 14:16:09 2010
RSA Pairwise Consistency	success at Thu Oct 14 13:52:41 2010
DSA Pairwise Consistency	success at Thu Oct 14 14:08:21 2010
Software Integrity	success at Thu Oct 14 09:13:40 2010

3 View the following fields:

- Product - the model of the DataSecure.
- Box ID - the unique box ID, composed of alphanumeric characters.
- Hostname - the hostname used to identify the DataSecure on the network.
- IP Address(es) - the IP address(es) on which the key server is enabled on the DataSecure.
- Device State - indicates the current state of the device, either *normal* or *error*. When the device is in error state, functionality is dramatically limited: you will not be able to communicate with the device using the CLI, the Management Console, or the XML or KMIP Interfaces. Limited access to the device via the serial console will be supported. Reboot the device to restore functionality. If the problem persists, contact customer support.
- FIPS Mode Enabled - Indicates if the device is FIPS compliant.

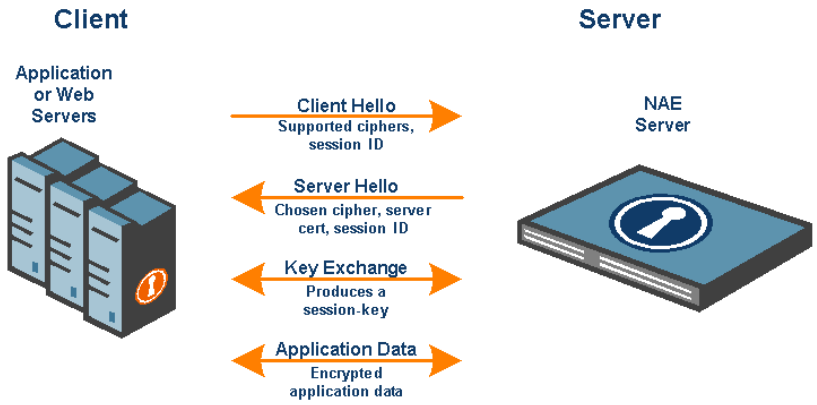
- Test Results - Displays the result and timestamp for each of the following self-tests:
  - AES Encryption
  - DES Encryption
  - DSA Encryption
  - SHA1 Algorithm
  - SHA2-256 Algorithm
  - SHA2-384 Algorithm
  - SHA2-512 Algorithm
  - HMAC Algorithm (SHA1 and SHA2-256)
  - RSA Encryption
  - Diffie-Hellman Algorithm
  - SSH Key Derivation
  - X9.31 PRNG
  - Continuous Random Number Generation
  - RSA Pairwise Consistency
  - DSA Pairwise Consistency
  - Software Integrity

Chapter 38

SSL

The DataSecure is designed to be able to establish Secure Sockets Layer (SSL) and Transport Layer Security (TLS) connections with all applications and databases that make requests to the NAE Server. SSL and TLS are the most widely deployed security protocols in network security. The following section provides a brief overview of the SSL protocol so that you might better understand how to configure the DataSecure.

SSL is used to establish secure connections between two entities, such as a client application and an NAE Server. In addition to securing connections, SSL is commonly used to authenticate a server to a client and vice versa. The SSL protocol is composed of two phases: (1) establishing a secure connection using the SSL handshake protocol, and (2) exchanging data over the secure connection. The SSL protocol steps are summarized below.



SSL Handshake

The following steps describe a typical SSL handshake:

1. The protocol is initiated by the requesting application using a client hello message. This message includes a list of all the ciphers supported by the client application. The application also sends a session ID that might refer to previously established sessions.
2. The DataSecure responds with a server hello message, which includes the DataSecure's certificate and the cipher chosen by the DataSecure. Once the session is established, it is secured using the chosen cipher. The message also contains a session ID.
3. The application and the DataSecure then engage in a key exchange protocol. The result is a session key that is then used for encrypting the entire session.

Once the SSL handshake is completed, the two sides begin exchanging application data, such as cryptographic operations, data migration operations, and so on. All data is encrypted using the negotiated session key.

SSL Session Resume

Because the SSL key exchange protocol is based on public key cryptography, it consumes significant computing resources. To minimize the number of SSL handshakes, SSL provides a shortcut to a full key exchange. Consider an application that has previously established a secure session with the DataSecure. Both the application and the DataSecure already share a session–key. When the application reconnects to the NAE Server, there is no need to renegotiate a session key. During the reconnection process the two sides execute the SSL resume protocol, which bypasses the key exchange part of the SSL handshake. The resumed session is encrypted using the previously negotiated session–key. Establishing a secure connection using SSL resume is much faster than a full SSL handshake.

In this scenario, the client application indicates that it is willing to perform an SSL resume (rather than a full handshake) by sending a previously negotiated session–id in the CLIENT–HELLO message. The DataSecure checks that it has the session key for the given session–id. If so, it acknowledges that it is willing to resume the session by using the same session–id in the SERVER–HELLO message. Otherwise, the DataSecure responds with a new session–id.

SSL Session Timeout

All SSL sessions stored in the DataSecure's session cache have an expiration time. A typical session expiration period is two hours. This means the DataSecure accepts a session resume request for at most two hours after the session is first established. Consequently, every client application must renegotiate a session–key at least once every two hours. This limits the amount of information encrypted with a particular session–key. Hence, an attacker who is able to deduce a session key would only obtain the information exchanged during a two hour window. The SSL session timeout on the DataSecure is configured on the SSL Configuration page, as described later in this chapter.

SSL Certificate Management on the DataSecure

Certificates are used to authenticate one entity to another. This authentication takes place during the SSL handshake protocol. Certificates are issued by Certification Authorities (CA's) such as VeriSign, Entrust, Thawte, and others. The DataSecure is equipped with CA capabilities, and can issue certificates for all your applications.

When establishing an SSL connection with a client application, you have the option to require the application authenticate itself to the DataSecure by presenting a certificate. Because the DataSecure can issue certificates to applications and databases, there is no need for you to use a public CA such as VeriSign to issue these certificates. You can generate these certificates on the DataSecure.

The DataSecure CA is managed on the CA Certificates page. To issue certificates for your applications, you must first create a local CA on the DataSecure. This local CA is then used to issue certificates for all your applications. Local certificates issued by the DataSecure CA are only valid for authenticating to the DataSecure.

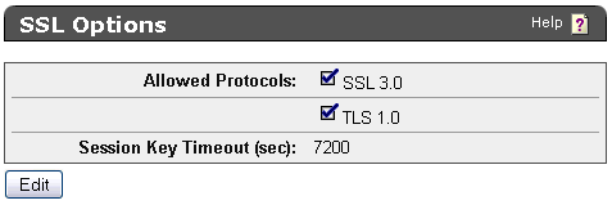
Enabling SSL Protocols and Session Key Timeout

Use this section to view and modify SSL settings. These settings affect the Key Server's communication with client applications and databases when SSL is enabled. These settings also affect all connections to the web-based Management Console.

To enable SSL protocols and set the session key timeout:

1 Log in to the DataSecure.

2 Navigate to the SSL Configuration page (Security >> SSL).



3 Select **Edit**.

4 Enable or disable SSL 3.0 and TLS 1.0 as appropriate for your installation.

Important! If your internet browser is not configured to use the protocol selected here you will be denied access to the Management Console. Consult and alter your browser settings before changing these values.

Important! Enabling SSL 3.0 on a FIPS compliant device will take the device out of FIPS compliance - possibly in a manner that does not comply with FIPS standards. For information on disabling FIPS compliance, see Chapter 36, "High Security Features".

5 Enter a value for the **Session Key Timeout**. This field specifies the number of seconds that a previously negotiated session key is reused for incoming SSL client connections to the DataSecure. This option determines how frequently key renegotiation takes place on the client application. The default value is 7200 seconds (2 hours). Setting this value to 0 disables the time-out.

6 Click **Save**.

Note: FIPS compliant devices *cannot* use the default SSL configuration. On those devices, you must enable TLS 1.0 and disable SSL 3.0.

Important! Some web browsers, including Internet Explorer 6.0, do not have TLS 1.0 enabled by default. If you disable SSL 3.0, please check first that your browser has TLS 1.0 enabled. (In Internet Explorer, select Internet Options from the Tools menu, click the Advanced tab, scroll down to the Security section, and make sure the "Use TLS 1.0" checkbox is checked.)

Note: Changes to the SSL Options cause the Key Server to restart, which takes the Key Server offline for a few seconds.

Managing the SSL Cipher Order

Different applications and databases support different encryption algorithms for securing SSL sessions. The DataSecure supports many SSL ciphers and consequently can communicate securely using all common ciphers.

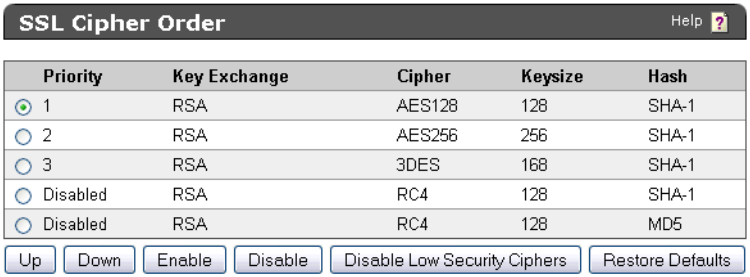
Please note that the SSL Cipher Order pertains to the communication channel between the client (application, database, etc.) and the DataSecure. It does not affect the keys that might be used to encrypt data by the Key Server. When an application or database presents the DataSecure with a list of supported ciphers, the DataSecure chooses the supported cipher that is highest on its priority list.

WARNING! Exercise caution when modifying the SSL Cipher Order. Unless you are familiar with SSL Ciphers, you should not rearrange the Cipher Order list. Changes to the list may affect both performance and security. Click **Restore Defaults** to reset the list to the original settings.

To manage the SSL cipher order:

1 Log in to the DataSecure.

2 Navigate to the SSL Configuration page (Security >> SSL).



3 The SSL Cipher Order section shows the following fields.

- **Priority** - 1 is the highest priority.
- **Key Exchange** - the algorithm to use for encryption and authentication. RSA is the only supported algorithm for key exchange.
- **Cipher** - the symmetric cipher to use to encrypt SSL sessions. Supported ciphers are: AES128, AES256, 3DES, and RC4.
- **Keysize** - the number of bits of the session key size. Supported key sizes vary for each cipher. 128 for RC4, 168 for 3DES, and 128 and 256 for AES.
- **Hash** -the hash function to use for SSL session integrity. The supported hash functions are:
  - SHA-1: operates on 64-byte blocks of data and produces a 160-bit authentication value.
  - MD5: operates on 64-byte blocks of data and produces a 128-bit authentication value.

4 Use the **Up**, **Down**, **Enable**, **Disable**, and **Restore Defaults** buttons to organize the list, as appropriate.

5 Use the **Disable Low Security Ciphers** button to mandate that only high security ciphers (those 128-bit and above) be used. This disables 128-bit RC4, both SHA-1 and MD5.

Appendix A

Default Ports for DataSecure Features

This appendix provides information to assist with making firewall configuration decisions for DataSecure deployments.

Inbound and Inbound/Outbound Ports

The **Port** number in the following table is the port on the DataSecure that is open and receives incoming connections.

If the **Config** column contains "yes," the port value is configurable. For Management Console navigation to the page where ports in the following table can be configured see "Management Console" below.

Port	Feature	Protocol	Config	Required	Session Initiation
	Ping / Traceroute	ICMP	no	Optional	inbound / outbound
22	SSH Administration	TCP	yes	Optional[a]	inbound
161	SNMP Agent	UDP	yes	Optional	inbound
9000	NAE Server[b]	TCP	yes	Required	inbound
9001[c]	Cluster[d]	TCP	yes	Optional	inbound / outbound
9003	ProtectFile Manager Service	TCP	yes	Optional[e]	inbound
9080	Health Check	TCP	yes	Optional	inbound
9081	FIPS Status Server	TCP	yes	Optional	inbound
9191	Enterprise Manager Failover Server	TCP	yes	Optional[f]	inbound
9443	Web Administration	TCP	yes	Optional[a]	inbound
9010[c]	Enterprise Manager Service	TCP	yes	Optional[d]	inbound / outbound

a. SafeNet recommends opening ports for remote Web Administration (9443) and/or SSH Administration (22).
b. Minimum Requirement: The NAE Server must have an open port to process cryptographic and key management operations with TCP or SSL transport. Corresponds to NAE_Port client configuration in IngrianNAE.properties file.
c. This Port is also the destination port used for connections from one DataSecure to another. The source port for appliance-to-appliance connections may be ephemeral.
d. The Cluster feature is used for server-side replication of configuration data.
e. Required when using the ProtectFile.
f. Required when the Enterprise Manager feature is enabled.

Outbound Ports

The **Port** number in the following table is the port on an *external device* used for connections from the DataSecure to that external device. The source port used for these connections may be ephemeral.

If the **Config** column contains "yes," the port value is configurable. For Management Console navigation to the page where ports in the following table can be configured see "Management Console" below.

Port	Feature	Protocol	Config	Required	Session Initiation
20	FTP data[a]	TCP	no	Optional	outbound
21	FTP control[a]	TCP	no	Optional	outbound
22	SCP[a]	TCP	no	Optional	outbound
53	DNS	UDP	no	Optional	outbound
123	NTP	UDP	no	Optional	outbound
162	SNMP Traps	UDP	yes	Optional	outbound
514	Syslog	UDP	yes	Optional	outbound
1025	ProtectDB-Teradata	TCP	yes	Optional[b]	outbound
1433	ProtectDB-SQL Server	TCP	yes	Optional[b]	outbound
1521	ProtectDB-Oracle	TCP	yes	Optional[b]	outbound
8003	ProtectFile	TCP	yes	Optional[b]	outbound
50000	ProtectDB-DB2	TCP	yes	Optional[b]	outbound
389 636	LDAP Administrator Server[c]	TCP SSL	yes	Optional	outbound
389 636	LDAP User Directory[c]	TCP SSL	yes	Optional	outbound

a. Log Rotation, Software & License Upgrade/Install, and Backup & Restore operations.
b. Required when using the corresponding ProtectDB or ProtectFile.
c. LDAP servers typically use port 389 for TCP and 636 for SSL. Required when using an external LDAP server for login authentication.

Management Console Navigation

The following table provides the Management Console navigation to the page where ports in the preceding tables can be configured.

Feature	Management Console Navigation
NAE Server	Device >> NAE Server >> NAE Server Settings
Web Administration	Device >> Administrators >> Remote Administration
SSH Administration	Device >> Administrators >> Remote Administration
SNMP Agent	Device >> SNMP >> SNMP Agent Settings
ProtectFile Manager Service	Security >> ProtectFile Manager >> Service Settings
	Security >> ProtectFile Manager >> Connector Profiles
Enterprise Manager Failover Server	Enterprise >> Enterprise Services >> Failover Server Settings
Health Check	Device >> NAE Server >> Health Check
FIPS Status Server	Security >> Advanced Security >> FIPS Status Server
SQL Parse Server	Device >> NAE Server >> SQL Parse Server
Cluster	Device >> Cluster >> Cluster Settings

Feature	Management Console Navigation
Enterprise Manager Service	Enterprise >> Enterprise Services >> Enterprise Manager Service Settings
LDAP Administrator Server	Device >> Administrators >> LDAP Administrator Server
LDAP User Directory	Security >> LDAP >> LDAP Server
SNMP Traps	Device >> SNMP >> SNMP Management Station List
Syslog	Device >> Log Configuration >> Rotation & Syslog
Oracle Connector	Security >> Database Tools
SQL Server Connector	Security >> Database Tools
DB2 Connector	Security >> Database Tools
Teradata Connector	Security >> Database Tools
ProtectFile	Security >> ProtectFile Manager >> File Servers

Appendix B

Hardware Specifications

This appendix contains the hardware descriptions of the DataSecures. The attributes of individual models are listed in the following sections:

The i10

This section describes the hardware specifications of the i10.

Processor Details	
Processor	One VIA C3 800MHz processor
Cryptographic Operations per second	2,500 Less than 250 microseconds latency.

Interfaces	
Network	1 10/100 Mbps ethernet port

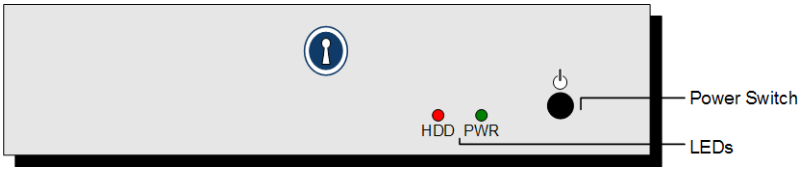
Power Supply Details	
Power Supply	100 - 240 V ~ 1.8A, 50 - 60 HZ
Power Consumption	Less than 0.3A @ 120V

Environmental Requirements	
Operating Temperature	Ambient temperature: 32° to 122°F (0° to 50°C)
Operating Humidity	5% to 93% (non-condensing)

Dimensions and Weight	
Height	2.5 in (6.35 cm)
Width	11.625 in (29.53 cm)
Depth	10.25 in (26.04 cm)
Weight	7.9 lbs (3.6 kg)

Front Panel

The front panel of the i10 contains two LEDs, and a power switch.

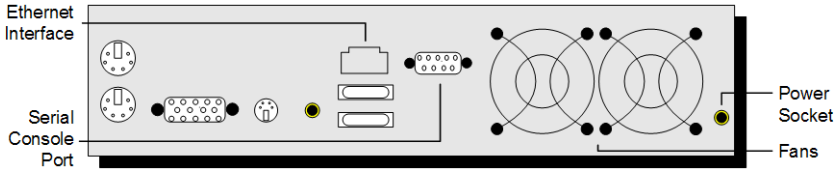


The following table describes the components on the front panel.

Component	Description
Power Switch	The power switch can be used to turn the power on or off. To use the power switch on the front panel, the master power switch on the back panel must be in the on position.
Reset Button	Press this button to reboot the appliance.
LEDs	• PWR – shows green when the unit is on. • HDD – shows red when the system is accessing the hard disk.

Back Panel

The back panel of the i10, shown here, contains one ethernet interface, a serial console port, a power supply, and two fans.



The following table describes the components on the back panel.

Component	Description
Ethernet Interface	One 10/100 Mbps Ethernet port for an RJ45 connector.
Serial Console Port	DB9 port used to obtain console access to the device.
Power Supply	AC power socket.
Fans	Fans used to cool the power supply.

The audio, video, keyboard, mouse, printer, and USB ports are not supported on this appliance.

The i50

This section describes the hardware specifications of the i50.

Processor Details	
Processor	One VIA C3 800MHz processor
Cryptographic Operations per second	2,500 Less than 250 microseconds latency.

Interfaces	
Network	1 10/100 Mbps ethernet port

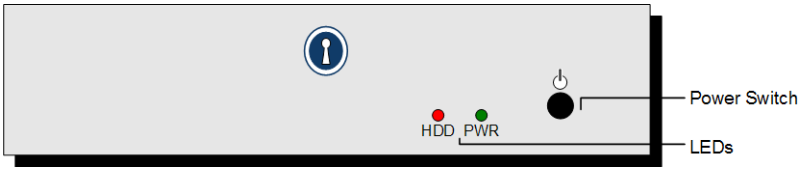
Power Supply Details	
Power Supply	100 - 240 V ~ 1.8A, 50 - 60 HZ
Power Consumption	Less than 0.3A @ 120V

Environmental Requirements	
Operating Temperature	Ambient temperature: 32° to 122°F (0° to 50°C)
Operating Humidity	5% to 93% (non-condensing)

Dimensions and Weight	
Height	2.5 in (6.35 cm)
Width	11.625 in (29.53 cm)
Depth	10.25 in (26.04 cm)
Weight	7.9 lbs (3.6 kg)

Front Panel

The front panel of the i50 contains two LEDs, and a power switch.

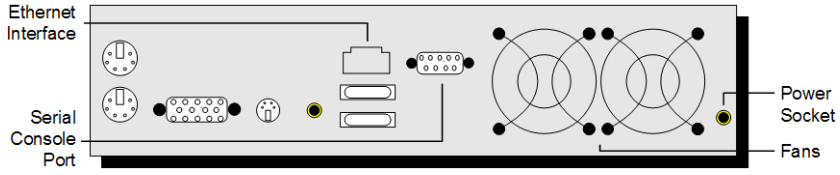


The following table describes the components on the front panel.

Component	Description
Power Switch	The power switch can be used to turn the power on or off. To use the power switch on the front panel, the master power switch on the back panel must be in the on position.
Reset Button	Press this button to reboot the appliance.
LEDs	• PWR – shows green when the unit is on. • HDD – shows red when the system is accessing the hard disk.

Back Panel

The back panel of the i50, shown here, contains one ethernet interface, a serial console port, a power supply, and two fans.



The following table describes the components on the back panel.

Component	Description
Ethernet Interface	One 10/100 Mbps Ethernet port for an RJ45 connector.
Serial Console Port	DB9 port used to obtain console access to the device.
Power Supply	AC power socket.
Fans	Fans used to cool the power supply.

The audio, video, keyboard, mouse, printer, and USB ports are not supported on this appliance.

The i110

This section describes the hardware specifications of the i110.

Processor Details	
Processor	One VIA C3 800MHz processor
Cryptographic Operations per second	11,000 Scalable to tens of thousands of transactions per second with the addition of more DataSecure platforms Less than 250 microseconds latency.

Interfaces	
Network	1 10/100 Mbps ethernet port

Power Supply Details	
Power Supply	250W; 100 - 240 VAC, auto-ranging, 50-60 Hz, 5 - 3A

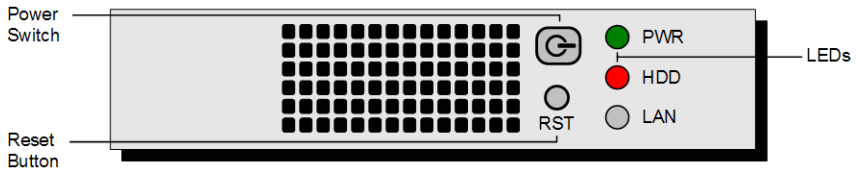
Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 30°C)
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C)
Operating Humidity	8% to 85% (non-condensing) with a maximum gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing)

Acoustic Noise Emissions	
Acoustic Noise	66 decibels

Dimensions	
Height	1.75 in (4.45 cm)
Width	19 in (48.26 cm)
Depth	13 in (33.02 cm)

Front Panel

The front of the i110 contains a metal bezel, below which are a power switch, a reset button, and three LEDs. On the i110, you must remove the front plate with a screwdriver to access the components shown below.

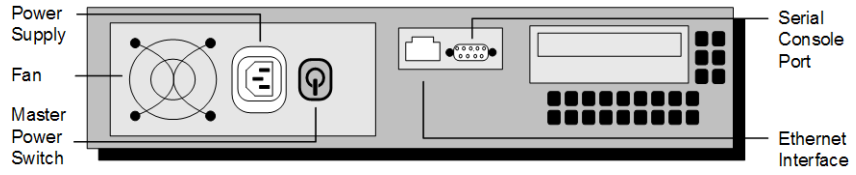


The following table describes the components on the front panel.

Component	Description
Power Switch	Turns the appliance on for the boot process. Used in combination with the Master Power Switch on the back panel. When booting the appliance for the first time: • Turn on the Master Power Switch on the back panel. • Remove the front bezel. • Press the power switch on the front panel. Once you have run the initial boot process, you will not need to use this switch when powering the appliance.
Reset Button	Press this button to reboot the appliance.
LEDs	• PWR – shows green when the unit is on. • HDD – shows red when the system is accessing the hard disk. • LAN – disabled.

Back Panel

The back panel of the i110 contains an ethernet interface, a serial console port, a master power switch, a power supply, and a fan.



The following table describes the components on the back panel.

Component	Description
Ethernet Interface	One 10/100 Mbps Ethernet port for an RJ45 connector.
Serial Console Port	DB9 port used to obtain console access to the device.
Master Power Switch	Use this power switch to turn the DataSecure on or off. *When booting the device for the first time*, you must turn this switch on and then press the power switch on the front panel.

Component	Description *(continued)*
Power Supply	AC power socket.
Fan	Fans used to cool the power supply.

The i150

This section describes the hardware specifications of the i150.

Processor Details	
Processor	One VIA C3 800MHz processor
Cryptographic Operations per second	11,000 Scalable to tens of thousands of transactions per second with the addition of more DataSecure platforms Less than 250 microseconds latency.

Interfaces	
Network	1 10/100 Mbps ethernet port

Power Supply Details	
Power Supply	250W; 100 - 240 VAC, auto-ranging, 50-60 Hz, 5 - 3A

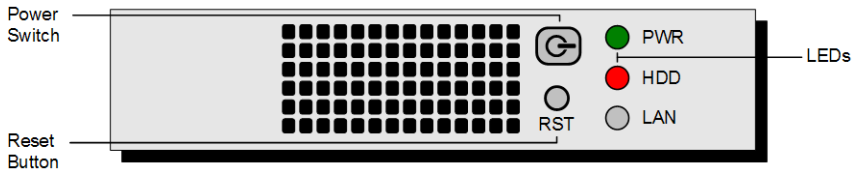
Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 30°C)
Nonoperating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C)
Operating Humidity	8% to 85% (non-condensing) with a maximum gradation of 10% per hour.
Operating Humidity	5% to 95% (non-condensing)

Acoustic Noise Emissions	
Acoustic Noise	66 decibels

Dimensions	
Height	1.75 in (4.45 cm)
Width	19 in (48.26 cm)
Depth	13 in (33.02 cm)

Front Panel

The front of the i150 contains a metal bezel, below which are a power switch, a reset button, and three LEDs. On the i150, you must remove the front plate with a screwdriver to access the components shown below.

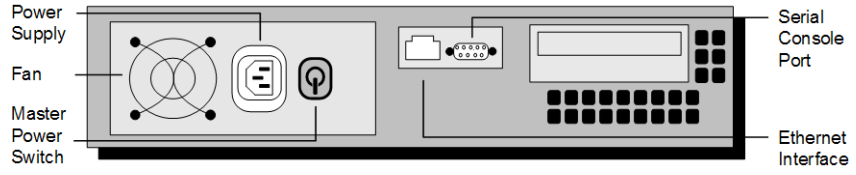


The following table describes the components on the front panel.

Component	Description
Power Switch	Turns the appliance on for the boot process. Used in combination with the Master Power Switch on the back panel. When booting the appliance for the first time: • Turn on the Master Power Switch on the back panel. • Remove the front bezel. • Press the power switch on the front panel. Once you have run the initial boot process, you will not need to use this switch when powering the appliance.
Reset Button	Press this button to reboot the appliance.
LEDs	• PWR – shows green when the unit is on. • HDD – shows red when the system is accessing the hard disk. • LAN – disabled.

Back Panel

The back panel of the i150 contains an ethernet interface, a serial console port, a master power switch, a power supply, and a fan.



The following table describes the components on the back panel.

Component	Description
Ethernet Interface	One 10/100 Mbps Ethernet port for an RJ45 connector.
Serial Console Port	DB9 port used to obtain console access to the device.
Master Power Switch	Use this power switch to turn the DataSecure on or off. *When booting the device for the first time*, you must turn this switch on and then press the power switch on the front panel.
Power Supply	AC power socket.
Fan	Fans used to cool the power supply.

The i311

This section describes the hardware specifications of the i311.

Processor Details	
Processor	One 2.8. GHz Xeon Processor
Cryptographic Operations per second	35,000 Scalable to tens of thousands or transactions per second with the addition or more DataSecure platforms. Less than 150 microseconds latency.

Interfaces	
Network	2 One-Gigabit 10/100/1000 Mbps

Power Supply Details	
Power Supply	550 W; 84 - 264 VAC, auto-ranging, 47 - 63 Hz, 7.6 A

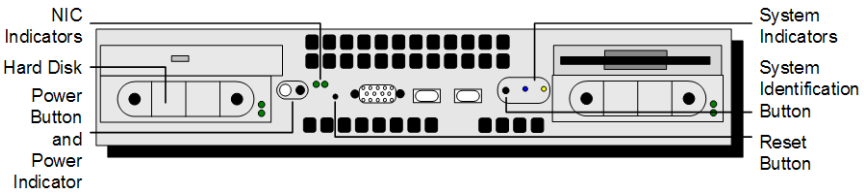
Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 35°C)
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C)
Operating Humidity	8% to 85% (non-condensing) with a maximum gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing)

Acoustic Noise Emissions	
Acoustic Noise	68 decibels

Dimensions	
Height	1.7 in (4.32 cm)
Width	19 in (48.26 cm)
Depth	30 in (76.2 cm)

Front Panel

The front panel of the i311 contains one hard disk, LEDs, and a flip-down bezel that covers the system buttons.



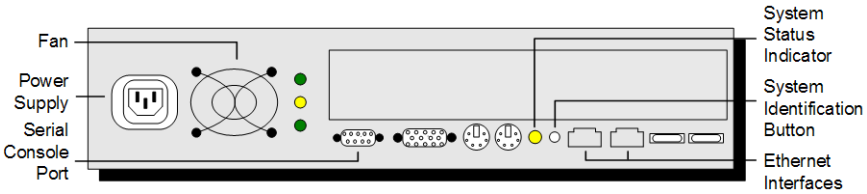
The following table describes the components on the front panel.

Component	Description
Hard Disks	The appliance supports one SCSI hard disk.
Power Button and Power Indicator	This button is used to power up or turn off the DataSecure. The power-on indicator lights when the system power is on. The power indicator blinks when power is available to the system but the system is not powered on.
Reset Button	This button can be used to reboot the DataSecure. In order to reach the reset button, you must use an object that is long, slim, and rigid, such as a pin.
System Identification Button	Pushing this button causes the blue system indicator LED to blink.
System Indicators	The front panel has a blue and an amber system status indicator. The blue indicator lights up when the system is operating correctly, and it blinks when the system identification button has been pushed. The amber indicator lights up when the system needs attention due to a problem with a power supply, fan, system temperature, or hard drives.
NIC Indicators	The NIC indicators are solid green when they are connected to the network; they blink intermittently when the NICs are in use.

The video and USB ports and the CD-ROM and floppy disk drives are not supported on this appliance.

Back Panel

The back panel of the i311 contains two ethernet interfaces, and a power supply.



The following table describes the components on the back panel.

Component	Description
DB9 Serial Console Port	The DB9 port is used to perform first–time initialization, and gain console access to the DataSecure.
Fan	The fan cools the power supply.
Ethernet Interfaces	The i311 has two gigabit ethernet interfaces. As you are facing the back panel, port 1 is on the right, and port 2 is on the left.
Power Supply	The DataSecure i311 platform has one 550W power supply.

The video, keyboard, mouse, and USB ports are not supported on this appliance.

The i321

This section describes the hardware specifications of the i321.

Processor Details	
Processor	Two 2.8 GHz Intel Xeon Processors
Cryptographic Operations per second	45,000 Scalable to tens of thousands or transactions per second with the addition or more DataSecure platforms. Less than 150 microseconds latency.

Interfaces	
Network	2 One-Gigabit 10/100/1000 Mbps

Power Supply Details	
Power Supply	Two 700W redundant; 84 - 264 VAC, auto-ranging, 47 - 63 Hz, 10.1 A

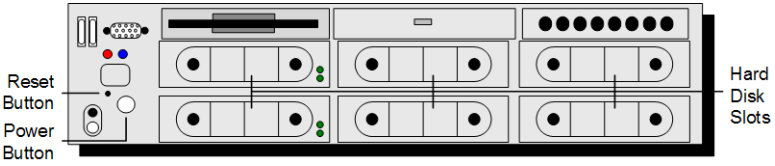
Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 35°C)
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C)
Operating Humidity	8% to 85% (non-condensing) with a maximum gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing)

Acoustic Noise Emissions	
Acoustic Noise	66 decibels

Dimensions	
Height	3.4 in (8.64 cm)
Width	17.6 in (44.7 cm)
Depth	30 in (76.2 cm)

Front Panel

The front panel of the i321 contains six hard disk slots, and a flip–down bezel that covers the system buttons.



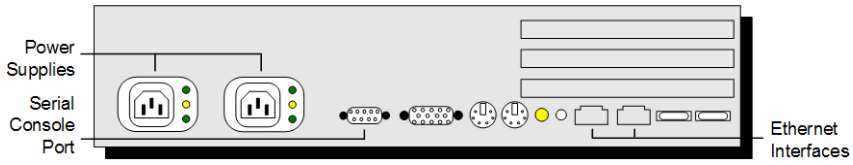
The following table describes the components on the front panel.

Component	Description
Hard Disk Slots	The appliance supports two SCSI hard disks. There are six physical slots. The hard disks can be inserted into any of the six slots. The hard disks are RAID–enabled. Please see “View RAID Status” on page 129 for more information. The auxiliary hard disk slots are not supported.
Power Button	This button is used to power up or turn off the DataSecure.
Reset Button	This button can be used to reboot the DataSecure. In order to reach the reset button, you must use an object that is long, slim, and rigid, such as a pin.

The LCD screen, colored LEDs, video and USB ports, and the CD-ROM and floppy disk drives are not supported on this appliance.

Back Panel

The back panel of the i321 contains two ethernet interfaces, and dual power supplies.



The following table describes the components on the back panel.

Component	Description
Ethernet Interfaces	The appliance has two gigabit ethernet interfaces. As you are facing the back panel, port 1 is on the right, and port 2 is on the left.
Power Supplies	The i321 platform has two 700W power supplies. As you are facing the back panel, the power supply on the left is the main power supply. The one on the right can be used for redundancy, but it is not required.
DB9 Serial Console Port	The DB9 port is used to perform first–time initialization, and gain console access to the DataSecure.
ID Button	This button illuminates a blue LED that is used to draw attention to a DataSecure. This button might be useful in an environment where you have many DataSecures. If a DataSecure needs to be serviced, you can press the ID button so that someone looking at a rack of DataSecures would know which device needs servicing.

The video, mouse, keyboard and USB ports are not supported on this appliance.

The i416

This section describes the hardware specifications of the i416.

WARNING! The delivered hardware configuration for the i416 platforms conforms to the Federal Information Processing Standard (FIPS) 140-2, Level 2 cryptography requirements and standards. Modifying the device *in any way* violates the FIPS standard and the device will no longer be FIPS-compliant. Further, any attempt to modify the device will break the tamper-evident sticker and void FIPS compliancy. The device *cannot* be restored to comply with FIPS requirements if the tamper-evident sticker is broken.

Processor Details	
Processor	One Xeon 5130 processor, 2.0 GHz
Cryptographic Operations per second	50,000 Scalable to hundreds of thousands of transactions per second with the addition of more DataSecure platforms Less than 100 microseconds latency.

Interfaces	
Network	2 10/100/1000 Mbps ethernet port
Hard Drive	Single 3.5” internal 80GB SATA drive.

Power Supply Details	
Power Supply	Single 670W, 90 - 264 VAC, auto-ranging, 47 - 63 Hz, 2697 BTU/hr maximum

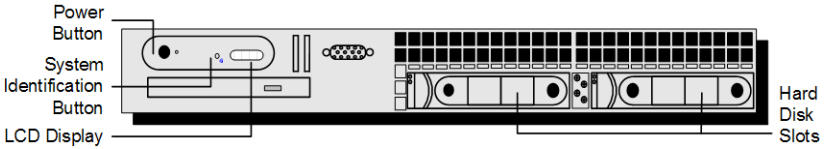
Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 35°C)
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C)
Operating Humidity	8% to 85% (non-condensing) with a maximum humidity gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing)

Acoustic Noise Emissions	
Acoustic Noise	66 decibels

Dimensions and Weight	
Height	1.7 in (4.32 cm)
Width	19 in (48.26 cm)
Depth	30 in (76.2 cm)
Weight	16.3 kg

Front Panel

The front panel of the i416 contains two hard disk slots (only one is supported), and LEDs. The locking bezel prevents the removal of the hard disk and restricts access to internal circuitry. A tamper-evident sticker covers the hard disk for added security.



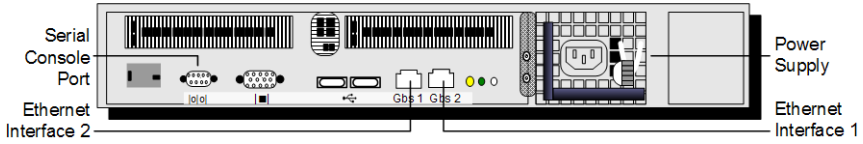
The following table describes the components on the front panel.

Component	Description
Hard Disks	The appliance supports one 3.5" SATA hard disk. The unit provides two slots. The auxiliary hard disk slot is not supported.
Power Button and Power Indicator	This button is used to power up or turn off the DataSecure. The power-on indicator lights when the system power is on.
System Identification Button	Pushing this button causes the blue system indicator LED to blink.
NIC Indicators	The NIC indicators are solid green when they are connected to the network; they blink intermittently when the NICs are in use.
LCD Display	Provides system ID, status information, and system error messages. The following states may be detected during operation: • Blue flashing – Indicates the systems management software or the identification buttons, located on the back of the system, have been activated to identify a particular system. • Amber – Indicates the system needs attention due to a problem with power supplies, fans, system temperature, or hard drives. **Note:** If the system is connected to AC power and an error has been detected, the LCD display lights amber regardless of whether the system has been powered on.

The video and USB ports and the CD-ROM and floppy disk drives are not supported.

Back Panel

The back panel of the i416 contains two ethernet interfaces, a serial port, and a power supply.



The following table describes the components on the back panel.

Component	Description
DB9 Serial Console Port	The DB9 port is used to perform first–time initialization, and gain console access to the appliance.
Ethernet Interfaces	The appliance has two gigabit ethernet interfaces. As you are facing the back panel, port 1 is on the right, and port 2 is on the left.
Power Supply	The appliance has one 670W power supply. The unit provides an additional slot.

The video, keyboard, mouse, and USB ports are not supported on this appliance.

The i426

This section describes the hardware specifications of the i426.

WARNING! The delivered hardware configuration for the i426 platforms conforms to the Federal Information Processing Standard (FIPS) 140-2, Level 2 cryptography requirements and standards. Modifying the device *in any way* violates the FIPS standard and the device will no longer be FIPS-compliant. Further, any attempt to modify the device will break the tamper-evident sticker and void FIPS compliancy. The device *cannot* be restored to comply with FIPS requirements if the tamper-evident sticker is broken.

Processor Details	
Processor	Dual Xeon 5130 processors, 2.0GHz
Cryptographic Operations per second	100,000 Scalable to hundreds of thousands of transactions per second with the addition of more DataSecure platforms Less than 100 microseconds latency.

Interfaces	
Network	2 10/100/1000 Mbps ethernet ports
Hard Drive	Two 3.5” internal hot-pluggable 80GB SATA drives.

Power Supply Details	
Power Supply	Dual 750W redundant; 85 - 264 VAC, auto-ranging, 47 - 63 Hz, 2697 BTU/hr maximum

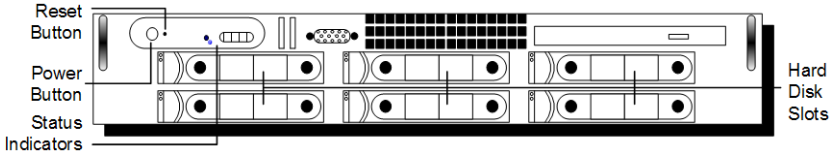
Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 35°C)
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C)
Operating Humidity	8% to 85% (non-condensing) with a maximum humidity gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing)

Acoustic Noise Emissions	
Acoustic Noise	66 decibels

Dimensions and Weight	
Height	3.4 in (8.64 cm)
Width	17.6 in (44.7 cm)
Depth	30 in (76.2 cm)
Weight	50.71 lbs (23 kg)

Front Panel

The front panel of the i426 contains six hard disk slots. The locking bezel prevents the removal of the hard disk and restricts access to internal circuitry. A tamper-evident sticker covers the hard disks for added security.



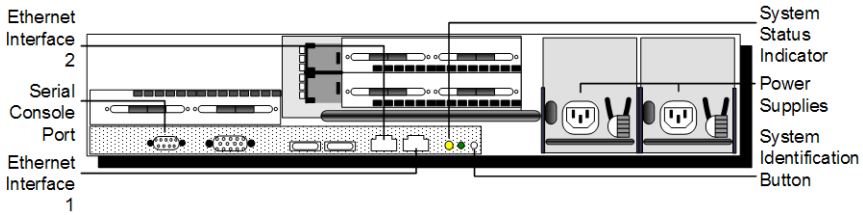
The following table describes the components on the front panel.

Component	Description
Hard Disk Slots	The appliance supports two SATA hard disks. There are six physical slots. The hard disks should be inserted only into slots 0 and 1. The auxiliary hard disk slots are not supported. The hard disks are RAID-enabled. Please see “View RAID Status” on page 129 for more information.

Component	Description *(continued)*
Power Button	This button is used to power up or turn off the DataSecure.
Reset Button	This button can be used to reboot the DataSecure. In order to reach the reset button, you must use an object that is long, slim, and rigid, such as a pin.

Back Panel

The back panel of the i426 contains two ethernet interfaces, a serial port, and dual power supplies.



The following table describes the components on the back panel.

Component	Description
Ethernet Interfaces	The appliance has two gigabit ethernet interfaces. As you are facing the back panel, port 1 is on the right, and port 2 is on the left.
Power Supplies	The appliance has two 750W power supplies. As you are facing the back panel, the power supply on the left is the main power supply. The one on the right can be used for redundancy, but it is not required.
DB9 Serial Console Port	The DB9 port is used to perform first–time initialization, and gain console access to the DataSecure.
System Identification Button	This button illuminates a blue LED that is used to draw attention to a DataSecure. This button might be useful in an environment where you have many DataSecures. If a DataSecure needs to be serviced, you can press the ID button so that someone looking at a rack of DataSecures would know which device needs servicing.

The video port, mouse port, keyboard port, and USB ports are not supported on this appliance.

The i430

This section describes the hardware specifications of the i430.

WARNING! The delivered hardware configuration for the i430 platform conforms to the Federal Information Processing Standard (FIPS) 140-2, Level 2 cryptography requirements and standards. Modifying the device *in any way* violates the FIPS standard and the device will no longer be FIPS-compliant. Further, any attempt to modify the device will break the tamper-evident sticker and void FIPS compliancy. The device *cannot* be restored to comply with FIPS requirements if the tamper-evident sticker is broken.

Processor Details	
Processor	
Cryptographic Operations per second	100,000 Scalable to hundreds of thousands of transactions per second with the addition of more DataSecure platforms Less than 100 microseconds latency.

Interfaces	
Network	2 x 10/100/1000 Mbps

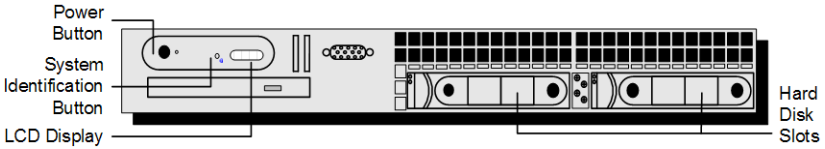
Power Supply Details	
Power Supply	Redundant 670 W hot-plug power supplies. Auto-switching universal 110/220 Volts.

Environmental Requirements	
Operating Temperature	Ambient temperature: 50° to 95°F (10° to 35°C) with a maximum temperature gradation of 10°C per hour. For altitudes above 2950 feet, the maximum operating temperature is de-rated 1°F/550 ft.
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C) with a maximum temperature gradation of 20°C per hour.
Operating Humidity	20% to 80% (non-condensing) with a maximum humidity gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing) with a maximum humidity gradation of 10% per hour.

Dimensions and Weight	
Height	1.67 in (4.26 cm)
Width	16.7 in (42.6 cm)
Depth	30.4 in (77.2 cm)
Weight	35.8 lbs (16.3 kg)

Front Panel

The front panel of the i430 contains two hard disks, a power button, and LEDs. The locking bezel prevents the removal of the hard disk and restricts access to internal circuitry. A tamper-evident sticker covers the hard disk for added security.



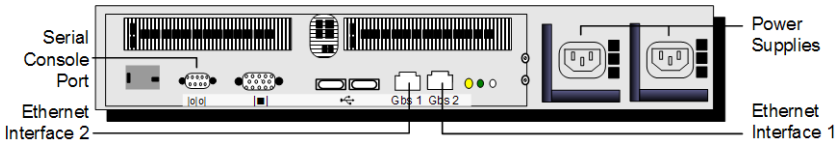
The following table describes the components on the front panel.

Component	Description
Hard Disks	The appliance supports two 3.5" SATA hard disks.
Power Button and Power Indicator	This button is used to power up or turn off the appliance. The power-on indicator lights when the system power is on.
System Identification Button	Pushing this button causes the blue system indicator LED to blink.
NIC Indicators	The NIC indicators are solid green when they are connected to the network; they blink intermittently when the NICs are in use.
LCD Display	Provides system ID, status information, and system error messages. The following states may be detected during operation: • Blue flashing – Indicates the systems management software or the identification buttons, located on the back of the system, have been activated to identify a particular system. • Amber – Indicates the system needs attention due to a problem with power supplies, fans, system temperature, or hard drives. **Note:** If the system is connected to AC power and an error has been detected, the LCD display lights amber regardless of whether the system has been powered on.

The video port, CD-ROM drive, floppy disk drive, and USB ports are not supported on this appliance.

Back Panel

The back panel of the i430 contains two ethernet interfaces, a serial port, and two power supplies.



The following table describes the components on the back panel.

Component	Description
DB9 Serial Console Port	The DB9 port is used to perform first–time initialization, and gain console access to the appliance.
Ethernet Interfaces	The appliance has two gigabit ethernet interfaces. As you are facing the back panel, port 1 is on the right, and port 2 is on the left.
Power Supplies	The appliance has two 670W power supplies.

The video port, mouse port, keyboard port, and USB ports are not supported on this appliance.

The i450

This section describes the hardware specifications of the i450.

WARNING! The delivered hardware configuration for the i450 platform conforms to the Federal Information Processing Standard (FIPS) 140-2, Level 2 cryptography requirements and standards. Modifying the device *in any way* violates the FIPS standard and the device will no longer be FIPS-compliant. Further, any attempt to modify the device will break the tamper-evident sticker and void FIPS compliancy. The device *cannot* be restored to comply with FIPS requirements if the tamper-evident sticker is broken.

Processor Details	
Processor	E5504 Xeon processor, 2.0GHz

Interfaces	
Network	4 x 10/100/1000 Mbps
Hard Drive	Two 250 GB 7200 RPM SATA 2.5” Hard Drives

Power Supply Details	
Power Supply	Two 502W Energy Smart Hot-Plug Power Supplies
Power Supply Output Rating	502 Watts
Input Power Range	100-240 VAC

Power Supply Details

Maximum Input Current	7.0A @ 90 VAC, 3.5A @ 180 VAC
Maximum Heat Dissipation	1712.9 BTU per hour
Power Supply Efficiency at Specified Loadings	79.9%@10% 88.4%@20% 92.5%@50% 92%@100%
Power Supply Power Factor at Specified Loadings	0.74@10% 0.85@20% 0.95@50% 0.98@100%

Environmental Requirements

Operating Temperature	Ambient temperature: 50° to 95°F (10° to 35°C) with a maximum temperature gradation of 10°C per hour. For altitudes above 2950 feet, the maximum operating temperature is de-rated 1°F/550 ft.
Non-operating Temperature	Ambient temperature: -40° to 149°F (-40° to 65°C) with a maximum temperature gradation of 20°C per hour.
Operating Humidity	20% to 80% (non-condensing) with a maximum humidity gradation of 10% per hour.
Non-operating Humidity	5% to 95% (non-condensing) with a maximum humidity gradation of 10% per hour.

Acoustic Noise Emissions

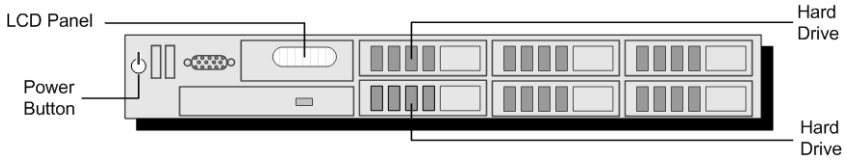
Acoustic Noise	Typically configured 2. 5” chassis in 23 +/- 2 C ambient Idle: LwA-UL = 5.3 bels, LpAm = 35 dBA

Dimensions and Weight

Height	1.7 in (4.32 cm)
Width	19 in (48.26 cm) - includes rack latches. 16.65 in (42.30 cm) without side latches.
Depth	30 in (76.2 cm) - includes PSU handles and bezel. 30 in (76.40) without bezel.
Weight	39 lbs (17.69 kg)

Front Panel

The front panel of the i450 contains two hard disks, a power button, and a LCD panel. The locking bezel prevents the removal of the hard disk and restricts access to internal circuitry. A tamper-evident sticker covers the hard disk for added security.



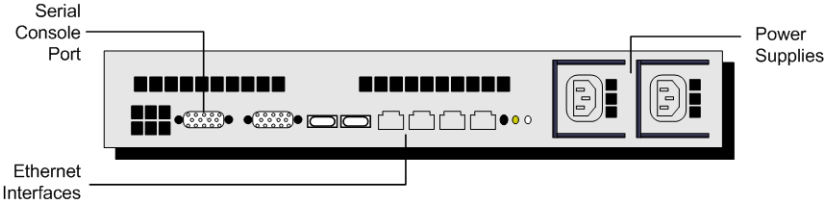
The following table describes the components on the front panel.

Component	Description
Power Button and Power Indicator	This button is used to power up or turn off the appliance. The power-on indicator lights when the system power is on.
LCD Panel	Provides ID, status information, and system error messages.
Hard Disks	The appliance supports two 2.5” SATA hard disks.

The video port, CD-ROM drive and USB ports are not supported on this appliance.

Back Panel

The back panel of the i450 contains two ethernet interfaces, a serial port, and two power supplies.



The following table describes the components on the back panel.

Component	Description
DB9 Serial Console Port	The DB9 port is used to perform first–time initialization, and gain console access to the appliance.
Ethernet Interfaces	The appliance has two gigabit ethernet interfaces.
Power Supplies	The appliance has two hot-plug high-efficient 502W Energy Smart PSUs.

The video port, mouse port, keyboard port, and USB ports are not supported on this appliance.

Appendix C

Supported Key Algorithms

When people think of cryptography, they often think of encrypting and decrypting information, but cryptography goes beyond encryption and decryption. Using the DataSecure you can encrypt or decrypt data, create a MAC, create a digital signature, and generate random numbers. These topics are described in the following sections:

- Encryption and Decryption with Symmetric Keys
- Encryption and Decryption with Asymmetric Keys
- Message Authentication Codes (MACs)
- Digital Signatures

Encryption and Decryption with Symmetric Keys

Encryption is the process of obscuring information (plaintext data) to make it unreadable (ciphertext) to anyone who does not possess a key, secret, or code. Decryption, then, uses a key, secret, or code to transform ciphertext into something readable. Because you can derive the original plaintext data from the ciphertext (provided, of course, that you have the correct key), encryption is a reversible operation. Encryption and decryption are, by far, the most common cryptographic requests made by NAE clients.

The vast majority of encrypt and decrypt operations performed in the DataSecure environment are with symmetric key algorithms. Symmetric key algorithms can be divided into stream ciphers and block ciphers. Stream ciphers process data bit–by–bit, while block ciphers process fixed–size blocks of data. For a variety of reasons, we discourage the use of stream ciphers. Encryption and decryption with symmetric keys is quite simple. The following example illustrates this exchange:

- Bob wants to send a message to Alice, and Bob wants to be sure that no one else can read that message, so Alice and Bob agree on a shared secret key (let's call it Key1).
- The message Bob wants to send Alice is "This is a super secret message from Bob." Bob encrypts that message using Key1 and sends Alice the ciphertext (`6QNKMgUDJcE....`).
- Alice decrypts the ciphertext with Key1 and is now able to read Bob's message.

In this way, Alice and Bob can continue communicating over a network while preventing potential eavesdroppers from understanding their messages. If Alice wants to indicate to Bob that she received his message, she can encrypt her message with Key1 and send Bob the ciphertext, which Bob can then decrypt with Key1.

Block Ciphers

To encrypt or decrypt with a block algorithm, it must be possible to divide the plaintext value into full blocks of a specific size. (In the case of AES and SEED, the block size is sixteen bytes; in the case of DESede and DES, the block size is eight bytes.) If the plaintext length is not a multiple of the algorithm's block size, padding is used to fill the remainder of the last block. If the length of the plaintext value is a multiple of the

block size, padding is used to fill an additional, trailing block. This additional block is used to indicate that padding is not present in the preceding blocks. Whichever algorithm is used to encrypt data, the ciphertext is larger than the original plaintext value. The following table illustrates how this is true for the AES and SEED algorithms.

Plaintext Size in bytes	Ciphertext Size in bytes
15	16
16	32
17	32
127	128
128	144

As mentioned, DESede and DES use a block size of eight bytes. The following table illustrates how padding affects the length of ciphertexts from DES and DESede algorithms.

Plaintext Size in bytes	Ciphertext Size in bytes
7	8
8	16
9	16
95	96
96	104

Modes of Operation

If you are using a block cipher (AES, DESede, or DES), decide whether you want to use the algorithm in electronic codebook (ECB) mode, or cipher-block chaining (CBC) mode.

- In ECB mode, each block is encrypted separately, through the same procedure. Thus, two identical plaintext blocks encrypt to the same ciphertext and any data patterns in the plaintext can be detected in the encrypted data.
- In CBC mode, the first block is XORed with an initialization vector before being encrypted. All subsequent plaintext blocks are XORed with the previous ciphertext block before being encrypted. This dependency makes it more difficult for an attacker to swap blocks, because blocks must be decrypted in the same order in which they were encrypted to produce the original plaintext.

  When the same key and different IVs are used, identical plaintexts are guaranteed to have different ciphertexts.

We recommend that you use CBC mode, unless you have a compelling reason to use ECB mode.

Initialization Vectors

An initialization vector (IV) is a sequence of random bytes appended to the front of the plaintext before encryption. Use of a unique IV eliminates the possibility that the initial ciphertext block is the same for any two encryption operations of the same plaintext that use the same key. In the DataSecure environment, IVs are only used by block ciphers in CBC mode. The size of the IV depends on the algorithm; AES and SEED use a sixteen byte IV, while DESede and DES use an eight byte IV. The DataSecure can generate random IVs for you, or you can supply your own.

When supplying your own IV for data migration, it is important to note that IVs must be specified in hexadecimal (base 16 encoded) characters. As such, an eight byte IV requires sixteen characters; likewise, a sixteen byte IV requires thirty-two characters. Sometimes, the examples in this documentation show impractical IVs for the sake of simplicity, for example 112233445566.... Make sure that your IV is sufficiently complex, and if you are supplying your own IV for anything other than data migration, it is crucial that you remember the IV your supplied.

Note: To ensure a unique ciphertext during data migration, you would have to apply IVs at the field–level and not the column–level.

Supported Algorithms

- AES
- DES
- DESede (triple DES)
- SEED
- RC4

In general, we recommend that you use symmetric one of the following block ciphers to encrypt data in the DataSecure environment: AES, DESede, or SEED (if enabled). Of the symmetric block ciphers, we recommend AES because it performs better and is considered to be more secure than the others.

We recommend that you not use the DES algorithm, because it is known to be a weak algorithm and is supported only for backward compatibility.

Encryption and Decryption with Asymmetric Keys

While symmetric key encryption utilizes a shared secret key, public key cryptography (crypto operations performed with asymmetric keys) typically utilizes a pair of keys: one public, the other private. This allows users to communicate securely without having prior access to a shared secret key. All public keys are published and therefore available to anyone, while all private keys remain with the user. Keys are related mathematically, such that each key allows you to reverse the operations performed with the other key. In other words, you can encrypt with the public key and decrypt with the private key. This method of encryption is extremely slow compared to symmetric ciphers.

The following example illustrates the exchange:

- Bob and Alice each generate public/private key pairs and publish their public keys.
- Alice looks up Bob’s public key, encrypts her message with it, and send Bob her message.
- Bob gets Alice’s message and decrypts it with his private key.
- Bob looks up Alice’s public key, encrypts his reply with it, and sends it to Alice.
- Alice can then decrypt Bob’s message with her private key.

In this way, Alice and Bob can continue communicating over a network while preventing potential eavesdroppers from understanding their messages.

Supported Algorithms

- RSA

Asymmetric algorithms, such as RSA, can be up to an order of magnitude slower than symmetric algorithms.

When using RSA keys to encrypt data, the ciphertext is always the size of the key; if your RSA key is 2048 bits (or 256 bytes), then the ciphertext is also 256 bytes. And because PKCS #1 padding is always used with RSA keys, you can encrypt no more than the key size, less eleven. For example, if you use a 2048-bit RSA key, the maximum data size that you can encrypt with that key is 245 bytes.

The speed and size issues make public key cryptography impractical for encrypting data. Therefore, we recommend that you use symmetric key algorithms to encrypt your data.

Message Authentication Codes (MACs)

A cryptographic hash is a one–way (non–reversible) algorithm that applies a hash function and a secret key to any amount of input and returns a fixed–size output (the MAC). A MAC, short for Message Authentication Code, can be thought of as a keyed hash or checksum. Only if you hold the secret key used to calculate the MAC can you verify the MAC. MACs are used to ensure data integrity and authenticity.

The following example illustrates the exchange:

Bob wants to send a message to Alice, and Bob wants Alice to be able to trust that the message she receives is from Bob and that it has not been modified in any way. So Bob decides to create a MAC of the message that he wants to send Alice. Bob has already given Alice a copy of the HMAC key that Bob uses to compute the MAC.

- Bob composes the following plaintext message: “This is indeed a message from Bob, and it has not been altered.”
- Bob uses his HMAC key to compute the MAC of his message text. The MAC value for this particular key and text is: `k8vifJC1F4sgg6pbeSpp9iMRfQ4r2hMD`.
- Bob sends the plaintext message along with the MAC value he computed to Alice.
- Once she receives the message, Alice uses the HMAC key Bob gave her to compute the MAC value on the plaintext message Bob sent her.

When the MAC value Alice computes matches the MAC value Bob sent her, she can be confident that the message Bob sent her has not been altered (integrity), and Bob is the sender of the message (authenticity).

Supported Algorithms

- HMAC-SHA1
- HMAC-SHA256
- HMAC-SHA384

- HMAC-SHA512

If you have an interest in storing passwords securely, you might think about creating a MAC at the application level (using one of the Cryptographic Providers) on your passwords and storing the MAC values instead of the plaintext passwords. That way you minimize the amount of time that passwords are in plaintext in your network

MACs can be created through the XML interface and all of the Cryptographic Providers except for the MSCAPI Provider.

The same plaintext value, MACed with the same key, always yields the same output.

By unreversible, it is meant that you cannot apply a reverse function to the MAC value to derive the original plaintext message.

Digital Signatures

Digital signatures rely on the use of public key cryptography, which generally allows users to communicate securely without having prior access to a shared secret key. Digital signatures can be used to ensure the authenticity of a sender. For example, Bob can encrypt a message with his private key and send it to Alice. If Alice can successfully decrypt it using the corresponding public key, this provides assurance to Alice that Bob (and no one else) sent it.

Digital signatures can be created through all of the Cryptographic Providers except for the .NET Provider. You can also create MACs through the XML interface.

Supported Algorithm

- RSA

Summary

In summary, you can use the DataSecure to perform a variety of cryptographic operations. The following table lists the cryptographic algorithms supported by the DataSecure. Each algorithm is discussed in “Supported Algorithms” on page 234.

Note: Not all algorithms are supported by all client software.

Algorithm	Supported Operations	Description	Function
AES	• Encrypt • Decrypt	symmetric key block cipher	Highly secure algorithm; recommended for most environments. Discussed in detail in “AES” on page 234.
DES	• Encrypt • Decrypt	symmetric key block cipher	Known to be an insecure algorithm; not recommended for any environment. Discussed in detail in “DES” on page 235.
DESede	• Encrypt • Decrypt	symmetric key block cipher	Not as secure as AES; can be used in many environments. Discussed in detail in “DESede” on page 235.
HMAC-SHA1	• MAC • MAC Verify	keyed hash function	Used to protect integrity and authenticity. Strength is determined by key size. Discussed in detail in “HMAC-SHA1” on page 236.

Algorithm	Supported Operations	Description	Function
RC4	• Encrypt • Decrypt	symmetric key stream cipher	Extremely slow compared to block ciphers. Discussed in detail in “RC4” on page 237.
RSA	• Encrypt • Decrypt • Sign • Sign Verify	public key algorithm	Used to encrypt data and create digital signatures; not the recommended encryption algorithm. Discussed in detail in “RSA” on page 238.
SEED	• Encrypt • Decrypt	symmetric key block cipher	National standard encryption algorithm in the Republic of Korea. Discussed in detail in “SEED” on page 238.

Supported Algorithms

The DataSecure supports the following public algorithms:

- AES
- DES
- DESede
- HMAC-SHA1
- HMAC-SHA256
- HMAC-SHA384
- HMAC-SHA512
- RC4
- RSA
- SEED

A proprietary format, which utilizes the DES algorithm, is also supported.

Note: PKCS#11 does not support ECB mode with PKCS5Padding.

AES

Block Size	16 bytes
Supported Modes	• ECB (default) • CBC
Padding Schemes	• PKCS5Padding • NoPadding – When using AES is NoPadding mode, you must supply ciphertext in multiples of 16 bytes.
IV	• CBC mode requires a 16 byte IV. • IV is not allowed in ECB mode.
Key Size (in bits)	• 128 (default) • 192 • 256

Identifier Strings	• AES/CBC/NoPadding • AES/CBC/PKCS5Padding • AES/ECB/NoPadding • AES/ECB/PKCS5Padding • AES – This is equivalent to AES/ECB/PKCS5Padding
Additional Notes	When using AES keys with NoPadding, or in ECB mode, you must supply data (both ciphertext for decryption and plaintext for encryption) in multiples of 16 bytes.

DES

Block Size	8 bytes
Supported Modes	• ECB (default) • CBC
Padding Schemes	• PKCS5Padding (default) • NoPadding
IV	• CBC mode requires an 8 byte IV. • IV is not allowed in ECB mode.
Key Size	Supported key size is 56 bits. The key contains an extra 8 bits of parity, for a total key size to 64 bits.
Identifier Strings	• DES/CBC/NoPadding – Uses outer CBC mode • DES/CBC/PKCS5Padding – Uses outer CBC mode • DES/ECB/NoPadding • DES/ECB/PKCS5Padding • DES – This is equivalent to DES/ECB/PKCS5Padding
Additional Notes	When using DES keys with NoPadding, or in ECB mode, you must supply data (both ciphertext for decryption and plaintext for encryption) in multiples of 8 bytes.

DESede

Block Size	8 bytes
Supported Modes	• ECB (default) • CBC
Padding Schemes	• PKCS5Padding (default) • NoPadding • IngrianPadding
IV	• CBC mode requires an 8 byte IV. • IV is not allowed in ECB mode.

Key Size	Supported key sizes are 168 (default) and 112 bits. Each key contains an extra 8 bits of parity. Thus, when you create a key of 112 bits, the *actual* key size is 128 bits; when you crete a key of 168 bits, the *actual* key size is 192 bits. A key size of 112 bits refers to two–key triple DES. The sequence of operations in two–key triple DES is: • Encrypt with Key1 • Decrypt with Key2 • Encrypt with Key1 A key size of 168 bits refers to three–key triple DES. The sequence of operations in three–key triple DES is: • Encrypt with Key1 • Decrypt with Key2 • Encrypt with Key3
Identifier Strings	• DESede/CBC/NoPadding – Uses outer CBC mode • DESede/CBC/PKCS5Padding – Uses outer CBC mode • DESede/CBC/IngrianPadding • DESede/ECB/NoPadding • DESede/ECB/PKCS5Padding • DESede – This is equivalent to DESede/ECB/PKCS5Padding
Additional Notes	When using DESede keys with NoPadding, or in ECB mode, you must supply data (both ciphertext for decryption and plaintext for encryption) in multiples of 8 bytes.

HMAC-SHA1

Supported Hash Function	SHA-1
Padding Schemes	Uses padding from SHA-1 algorithm. No additional padding.
IV	No IV is required.
Key Size	Keys can be between 128 and 256 bits. We recommend that the key size be at least 160 bits, and sets the default at 160. The HMAC keys you generate should be a multiple of 8 bytes. On some platforms, HMAC keys that are not a multiple of 8 bytes might yield incorrect results when generating MACs.
Identifier String	• HmacSHA1
Additional Notes	HMAC is a stream cipher. HMAC keys are bitstreams of multiples of 8 bits.

HMAC-SHA256

Hash Function	SHA-2
Padding Schemes	Uses padding from SHA-2 algorithm. No additional padding.
IV	No IV is required.

Key Size	Keys can be 128, 192, or 256 bits. The default is 256. The HMAC keys you generate should be a multiple of 8 bytes. On some platforms, HMAC keys that are not a multiple of 8 bytes might yield incorrect results when generating MACs.
Identifier String	• HmacSHA256
Additional Notes	HMAC is a stream cipher. HMAC keys are bitstreams of multiples of 8 bits.

HMAC-SHA384

Hash Function	SHA-2
Padding Schemes	Uses padding from SHA-2 algorithm. No additional padding.
IV	No IV is required.
Key Size	Keys can be 192, 288, or 384 bits. The default is 384. The HMAC keys you generate should be a multiple of 8 bytes. On some platforms, HMAC keys that are not a multiple of 8 bytes might yield incorrect results when generating MACs.
Identifier String	• HmacSHA384
Additional Notes	HMAC is a stream cipher. HMAC keys are bitstreams of multiples of 8 bits.

HMAC-SHA512

Hash Function	SHA-2
Padding Schemes	Uses padding from SHA-2 algorithm. No additional padding.
IV	No IV is required.
Key Size	Keys can be 256, 384, or 512 bits. The default is 512. The HMAC keys you generate should be a multiple of 8 bytes. On some platforms, HMAC keys that are not a multiple of 8 bytes might yield incorrect results when generating MACs.
Identifier String	• HmacSHA512
Additional Notes	HMAC is a stream cipher. HMAC keys are bitstreams of multiples of 8 bits.

RC4

IV	No IV required.
Key Size	Supported key sizes are 40 and 128 bits.
Identifier String	RC4
Additional Notes	RC4 is a stream cipher with byte–oriented operations, which means that RC4 keys are bitstreams of multiples of 8 bits.

RSA

IV	No IV is required.
Key Size	• 512 • 1024 (default) • 2048 • 3072 • 4096 **Note:** RSA-3072 and RSA-4096 are not supported for cryptographic operations on i300 series DataSecures. Keys using these algorithms can still be created, imported, and exported on those devices.
Identifier Strings	• SHA1withRSA – for signatures • RSA – for encryption
Additional Notes	• The ciphertext is always the size of the RSA key; if your RSA key is 2048 bits (256 bytes), then the ciphertext is 256 bytes. Because they use PKCS#1 padding, RSA keys can encrypt data up to 11 bytes smaller than the key size. If you use a 2048–bit RSA key, then the maximum data size that you can encrypt with that key is 245 bytes. • RSA keys cannot be used to perform data migration operations.

SEED

Block Size	16 bytes
Supported Modes	• ECB • CBC
Padding Schemes	• PKCS5Padding • NoPadding
IV	• CBC mode requires a 16 byte IV. • IV is not allowed in ECB mode.
Key Size	Supported key size is 128 bits.
Additional Notes	Support for the SEED algorithm is only available on devices that are not FIPS compliant, and must be feature–activated. Both server and client must be running version 4.3 or later.

Appendix D

KMIP Support

The DataSecure offers support for version 1.0 of the Key Management Interoperability Protocol (KMIP). To see the details of that standard, visit the OASIS website: http://www.oasis-open.org/specs/index.php#kmip

Our implementation currently offers support for the following KMIP features:

KMIP Managed Object Support

- *Template* - Contains the client-settable attributes of a managed cryptographic object. Templates are used to specify the attributes of a new managed cryptographic object in various operations and are intended to be used to specify the cryptographic attributes of new objects in a standardized, convenient way. Supported attributes are shown in the section below.
- *Secret Data* - Contains a shared secret value that is not a key or certificate (e.g. a password). Composed of a secret data type and a key block.
- *Symmetric Key* - Asymmetric key. This object is composed of a key block.

KMIP Attribute Support

- *Unique Identifier* - Generated by the DataSecure to uniquely identify the managed object.
- *Name* (single value only) - Used to identify and locate an object. This attribute is assigned by the client and is composed of a name value and a name type. DataSecure supports name type *string*.
- *Object Type* - Describes the type of object: Symmetric Key, Template, or Secret Data.
- *Cryptographic Algorithm* - The algorithm used by the object, e.g., DES, AES, RSA.
- *Cryptographic Length* - The length, in bits, of the cleartext cryptographic key material.
- *Digest* - Contains the digest value of the key or secret data. The DataSecure only creates a SHA-256 digest. Digest is composed of a hashing algorithm and a digest value.
- *Initial Date* - The date and time when the managed object was first created or registered by the DataSecure.
- *Object Group** - A group of objects. An object may belong to more than one group of objects.
- *Contact Information** - User-defined contact information. This information is not used for policy enforcement.
- *Custom Attributes* (String type only) - Client- or server-defined attributes intended for vendor-specific purposes. Custom attribute structures are not supported.

* *Contact Information* and *Object Group* will appear as custom attributes in certain sections of the Management Console.

KMIP Operations Support

- *Register* - Requests that the server register a managed object that was created by the client or obtained by the client through some other means. Only templates, secret data, and symmetric keys are supported.
- *Get* - Requests that the server return the managed object specified by its unique identifier. Only a single object is returned. The response contains the object's unique identifier and the object itself. Compression and wrapping are **not** supported.
- *GetAttributes* - Requests one or more attributes of a managed object. The object is specified by its unique identifier. Attributes are specified by their name. If the specified attribute has multiple instances, then all instances are returned. If a specified attribute does not exist, then it is not present in the returned response. If none of the attributes exist, the response consists only of the unique identifier. If no attribute name is specified in the request, the server will act as if all attributes match the request.
- *Query* - Requests information about the server's capabilities and/or protocol mechanisms. The server vendor identification is *SafeNet, Inc*. The server information contains a structure with three extension tags:
  - 0x541000: SafeNet Device Model
  - 0x541001: SafeNet Device ID (box ID)
  - 0x541002: SafeNet Device Software Version

  We do not support any name spaces, so none are returned.
- *Locate* - Requests that the server search for one or more managed objects. The maximum number of items returned is 100,000. Wild cards are not supported. The server supports only online objects, so if the storage-status mask excludes online object, the search returns empty. All supported attributes are valid. Date matching is supported.
- *Destroy* - Requests that the key material for a managed object be destroyed. Our implementation of KMIP does not retain metadata. Once the managed object is destroyed, its metadata is erased, too. Because our KMIP implementation does not support object state, there is no state requirement when destroying objects - cryptographic objects can be destroyed regardless of their state.