

SafeNet Luna Network HSM 7.4

SYSLOG AND SNMP MONITORING GUIDE



Document Information

Product Version	7.4
Document Part Number	007-013578-007
Release Date	16 December 2019

Revision History

Revision	Date	Reason
Rev. B	16 December 2019	Product updates

Trademarks, Copyrights, and Third-Party Software

Copyright 2001-2019 Thales. All rights reserved. Thales and the Thales logo are trademarks and service marks of Thales and/or its subsidiaries and are registered in certain countries. All other trademarks and service marks, whether registered or not in specific countries, are the property of their respective owners.

Disclaimer

All information herein is either public information or is the property of and owned solely by Thales and/or its subsidiaries who shall have and keep the sole right to file patent applications or any other kind of intellectual property protection in connection with such information.

Nothing herein shall be construed as implying or granting to you any rights, by license, grant or otherwise, under any intellectual and/or industrial property rights of or concerning any of Thales's information.

This document can be used for informational, non-commercial, internal, and personal use only provided that:

- > The copyright notice, the confidentiality and proprietary legend and this full warning notice appear in all copies.
- > This document shall not be posted on any publicly accessible network computer or broadcast in any media, and no modification of any part of this document shall be made.

Use for any other purpose is expressly prohibited and may result in severe civil and criminal liabilities.

The information contained in this document is provided "AS IS" without any warranty of any kind. Unless otherwise expressly agreed in writing, Thales makes no warranty as to the value or accuracy of information contained herein.

The document could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Furthermore, Thales reserves the right to make any change or improvement in the specifications data, information, and the like described herein, at any time.

Thales hereby disclaims all warranties and conditions with regard to the information contained herein, including all implied warranties of merchantability, fitness for a particular purpose, title and non-infringement. In no event shall Thales be liable, whether in contract, tort or otherwise, for any indirect, special or consequential

damages or any damages whatsoever including but not limited to damages resulting from loss of use, data, profits, revenues, or customers, arising out of or in connection with the use or performance of information contained in this document.

Thales does not and shall not warrant that this product will be resistant to all possible attacks and shall not incur, and disclaims, any liability in this respect. Even if each product is compliant with current security standards in force on the date of their design, security mechanisms' resistance necessarily evolves according to the state of the art in security and notably under the emergence of new attacks. Under no circumstances, shall Thales be held liable for any third party actions and in particular in case of any successful attack against systems or equipment incorporating Thales products. Thales disclaims any liability with respect to security for direct, indirect, incidental or consequential damages that result from any use of its products. It is further stressed that independent testing and verification by the person using the product is particularly encouraged, especially in any application in which defective, incorrect or insecure functioning could result in damage to persons or property, denial of service, or loss of privacy.

All intellectual property is protected by copyright. All trademarks and product names used or referred to are the copyright of their respective owners. No part of this document may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, chemical, photocopy, recording or otherwise without the prior written permission of Thales Group.

Regulatory Compliance

This product complies with the following regulatory regulations. To ensure compliancy, ensure that you install the products as specified in the installation instructions and use only Thales-supplied or approved accessories.

USA, FCC

This equipment has been tested and found to comply with the limits for a “Class B” digital device, pursuant to part 15 of the FCC rules.

Canada

This class B digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Europe

This product is in conformity with the protection requirements of EC Council Directive 2014/30/EU. This product satisfies the CLASS B limits of EN55032.

CONTENTS

Preface: About the Syslog and SNMP Monitoring Guide	7
How to Use This Document	7
Caveat Lector	7
Conventions & Style Used in this Document	7
Customer Release Notes	8
Audience	8
Document Conventions	9
Support Contacts	11
Chapter 1: Syslog Introduction	12
Structure of a syslog Message	12
lunaldogs	13
Audit Logs	15
Interpreting Logs	15
Configuring syslog	15
Chapter 2: Open Source Components	16
IPMI	16
Threshold Events	22
Discrete Events	24
CPU Sensor	25
VRD, PCH, and Inlet Sensors	25
IPMI Implementation	25
Significant Log Messages	25
Insignificant Log Messages	27
Unlikely Log Messages	27
Debug Messages	30
SMART	31
SMART Attributes	32
Significant Expected Log Messages	33
Unexpected Log Messages	35
SNMP	47
Expected Log Messages	47
Unexpected Log Messages	47
NTP	47
SSH	48
Expected Log Messages	48
Unexpected Log Messages	48
Privileged Services	49
Expected Log Messages	50
Unexpected Log Messages	51

Kernel	51
Expected Log Messages	51
Chapter 3: Thales Group Components	52
sysstat	52
Expected Log Messages	52
Unexpected Log Messages	53
HSM Callback Service	54
Network Trust Link Service	55
Datapath: Expected Log Messages	55
Datapath: Unexpected Log Messages	58
Luna SA Command Processor: Expected Log Messages	63
Luna SA Command Processor: Unexpected Log Messages	64
Host Trust Link	67
Expected Log Messages	68
Unexpected Log Messages	69
Network Bus Service	71
Remote Backup Service	71
Luna Administrative Shell: State and Status	71
Expected Log Messages	71
Unexpected Log Messages	72
Luna Shell: Command Logging	72
Expected Log Messages	73
Unexpected Log Messages	73
cron & crontab	74
Expected Log Messages	74
Unexpected Log Messages	74
Certificate Monitoring Daemon	75
Expected Log Messages	75
Unexpected Log Messages	76
Luna SNMP Trap Agent	77
Expected Log Messages	78
Unexpected Log Messages	78
Admin API	79
Expected Log Messages	80
Unexpected Log Messages	80
Chapter 4: Other Appliance Logging	82
hsm information show	82
Chapter 5: Client Logging	84
cklog	84
HA log	84
Chapter 6: SNMP Traps	85
Configuring and Enabling Traps on SafeNet Luna Network HSM	85
Configuring Trap Notification	86

Testing Trap Events on SafeNet Luna Network HSM	89
SafeNet Luna Network HSM Appliance Trap Events	89
Appliance MIB Overview	89
Sub-System Log Reference	90
Fan Failure	91
Power Supply Failure	92
Motherboard Failure	92
Disk Drive Failure	93
NTLS Failure	93
Crypto Failure	94
Caveats	94

PREFACE: About the Syslog and SNMP Monitoring Guide

Monitoring a SafeNet Luna Network HSM is an operational requirement for mission critical systems. Thales Group makes monitoring available through two principle facilities: the system log (syslog) and simple network management protocol (SNMP). This document describes the syslog facility and provides details for what various messages mean, the probability of observing them and what action to take if observed. It goes on to describe the SNMP traps supported by SafeNet Luna Network HSM appliances.

This guide contains the following chapters:

- > ["Syslog Introduction" on page 12](#)
- > ["Open Source Components" on page 16](#)
- > ["Thales Group Components" on page 52](#)
- > ["Other Appliance Logging" on page 82](#)
- > ["SNMP Traps" on page 85](#)

The preface includes the following information about this document:

- > ["Customer Release Notes" on the next page](#)
- > ["Audience" on the next page](#)
- > ["Document Conventions" on page 9](#)
- > ["Support Contacts" on page 11](#)

For information regarding the document status and revision history, see ["Document Information" on page 2](#).

How to Use This Document

Thales prepared this document for two primary purposes. Firstly, the information within should provide sufficient guidance for an administrator to review log messages and determine a course of action for significant events. Secondly, the contents of this document should provide sufficient information for a developer to create or configure a service to scan log messages for significant events and automate action based on the message.

Caveat Lector

Thales reserves the right to revise log messages with each new release. Consequently, do not hard code pattern matching strings to parse log files. If you intend to match on specific text, create a solution that enables you to easily configure pattern strings.

Conventions & Style Used in this Document

This section describes the conventions and style for this document. This section is important to you, the reader, so that you understand the format herein.

The following conventions apply throughout the document.

- > Use the same date and time in all examples unless the time is relevant to the example (e.g., a cron entry). For this version of the document, the date and time are: 2012 Feb 29 12:05:01.
- > Use **myLuna** for the hostname of the Luna appliance.
- > Use 192.168.0.xxx for example IP addresses. These values maintain consistency in the examples and ensures that no customer- or Thales Group-specific network configuration shows in an example.
- > Use [1234] for the process identifier.
- > Organize log messages into two distinct groups with the following headings: “Expected Log Messages” and “Unexpected Log Messages.”
- > Use a table like this example to identify the facility keyword, software process and log file for each new component to be described:

Facility Keyword	Software Process	Log File
user	root	messages

- > Use prose – not a bullets or tables – to describe log messages. Try to maintain the established introductory pre-amble, “This message indicates...” The document uses this structure so that parts can be extracted and provided electronically (e.g., via email) for customer assistance.
- > Use greater-than/less-than signs to delimit variable text in log messages (e.g., <user name>).

Customer Release Notes

The customer release notes (CRN) provide important information about this release that is not included in the customer documentation. Read the CRN to fully understand the capabilities, limitations, and known issues for this release. You can view or download the latest version of the CRN from the Technical Support Customer Portal at <https://supportportal.gemalto.com>.

Audience

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

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

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

Document Conventions

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

Notes

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

NOTE Take note. Contains important or helpful information.

Cautions

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

CAUTION! Exercise caution. Contains important information that may help prevent unexpected results or data loss.

Warnings

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

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

Command syntax and typeface conventions

Format	Convention
bold	<p>The bold attribute is used to indicate the following:</p> <ul style="list-style-type: none"> > Command-line commands and options (Type dir /p.) > Button names (Click Save As.) > Check box and radio button names (Select the Print Duplex check box.) > Dialog box titles (On the Protect Document dialog box, click Yes.) > Field names (User Name: Enter the name of the user.) > Menu names (On the File menu, click Save.) (Click Menu > Go To > Folders.) > User input (In the Date box, type April 1.)
<i>italics</i>	<p>In type, the italic attribute is used for emphasis or to indicate a related document. (See the <i>Installation Guide</i> for more information.)</p>

Format	Convention
<variable>	In command descriptions, angle brackets represent variables. You must substitute a value for command line arguments that are enclosed in angle brackets.
[optional] [<optional>]	Represent optional keywords or <variables> in a command line description. Optionally enter the keyword or <variable> that is enclosed in square brackets, if it is necessary or desirable to complete the task.
{ a b c } {<a> <c>}	Represent required alternate keywords or <variables> in a command line description. You must choose one command line argument enclosed within the braces. Choices are separated by vertical (OR) bars.
[a b c] [<a> <c>]	Represent optional alternate keywords or variables in a command line description. Choose one command line argument enclosed within the braces, if desired. Choices are separated by vertical (OR) bars.

Support Contacts

If you encounter a problem while installing, registering, or operating this product, please refer to the documentation before contacting support. If you cannot resolve the issue, contact your supplier or [Thales Customer Support](#).

Thales Customer 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 Thales and your organization. Please consult this support plan for further information about your entitlements, including the hours when telephone support is available to you.

Customer Support Portal

The Customer Support Portal, at <https://supportportal.thalesgroup.com>, is where you can find solutions for most common problems. The Customer Support Portal is a comprehensive, fully searchable database of support resources, including software and firmware downloads, release notes listing known problems and workarounds, a knowledge base, FAQs, product documentation, technical notes, and more. You can also use the portal to create and manage support cases.

NOTE You require an account to access the Customer Support Portal. To create a new account, go to the portal and click on the **REGISTER** link.

Telephone

The support portal also lists telephone numbers for voice contact ([Contact Us](#)).

CHAPTER 1: Syslog Introduction

Syslog is a standard logging facility, standardized within the Syslog working group of the IETF. Software processes use an API to generate messages that the syslog facility writes to organized log files. If configured, syslog can also send messages to remote syslog servers.

NOTE Luna appliances use **rsyslog**. This facility provides the same features as syslog with the addition of reliable transport using TCP. Unless relevant to the accuracy of a point being made, this document uses the term **syslog** rather than **rsyslog**.

This chapter contains the following sections:

- > ["Structure of a syslog Message" below](#)
- > ["lunalog" on the next page](#)
- > ["Audit Logs" on page 15](#)
- > ["Interpreting Logs" on page 15](#)
- > ["Configuring syslog" on page 15](#)

Structure of a syslog Message

The following image shows an example of a syslog message.

2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor - Transition to Power Off

1. This field is the date and time.
2. This field is the system host name.
3. This field is the facility keyword, explained below.
4. This field is the log severity level, explained below.
5. This field is the software process that generated the log message.
6. This field is a process-specific log message.

["syslog Facility Keywords" below](#) summarizes the facility keywords applicable for the Luna appliance.

Table 1: syslog Facility Keywords

Facility Keyword	Facility Description
kern	kernel messages
user	user-level messages
daemon	system daemons

Facility Keyword	Facility Description
auth	security/authorization messages
syslog	messages generated internally by syslogd
authpriv	security/authorization messages
cron	clock daemon
local#	local use #, where # is 0 to 7

"[syslog Severity Levels](#)" below summarizes the log severity levels.

Table 2: syslog Severity Levels

Severity Keyword	Severity Description
emerg/panic	System is unusable
alert	Action must be taken immediately
critical	Critical condition
err/error	Error condition
warn/warn	Warning condition
notice	Normal but significant condition
info	Informational message
debug	Debug-level message

The primary log file is **messages**, but the SafeNet Luna Network HSM appliance also creates **lunalog**s.

lunalog

lunalogs log messages follow a similar format as standard syslog messages with some slight differences. The following image shows an example segment of a lunalog message. The format up to the second field is identical to that for a syslog message.

```

... local15 info lunash [3442]: info : 0 : Command: hsm show : admin : 192.168.0.111/2719

```

1. The facility keyword for lunalog varies. A table in relevant sections identifies the facility keyword for the component that writes log messages to lunalog.
2. This field is the application string, itemized below.
3. This field is the process identifier, if available.
4. lunalog has a subsidiary severity level, itemized below.

5. This field is the Luna-specific error code associated with the lunalog entry.
6. This field is the description, the format and contents determined by the application identifier of the lunalog message. In most cases, the description is a concise statement of the issue that led to the log entry (e.g., oamp – “Cobra SQL service online.”). In other cases, the description comprises multiple fields of information, described below in ["Application-Specific Description" on the next page](#).

["lunalog Application Identifiers" below](#) summarizes the application identifiers available in a lunalog message.

Table 3: lunalog Application Identifiers

Application Identifier
oamp
Recover
NTLS
lunash
cluster
Luna PED Client
hsm_login
certmonitord
pam_swift
sysstatd
AdminAPI

["lunalog Severity Levels" below](#) summarizes the subsidiary log severity levels of lunalog.

Table 4: lunalog Severity Levels

Severity Keyword
critical
error
warning
audit
info
debug

"Application-Specific Description" below shows the application-specific description for the more comprehensive lunlogs messages.

Table 5: Application-Specific Description

Application	Description Field
NTLS	<p><message> : <IP address of client> / <application identifier of client></p> <p>Example #1: Client opened session 18478 : HSM1:Part171 : 192.168.0.100/40847</p> <p>Example #2: Received a command LUNA_DESTROY_OBJECT and object handle 20262 : 192.168.0.100/40847</p>
lunash	<p><command> : <account> : <IP address> / <application identifier></p> <p>Example #1: Lush user login : monitor : 192.168.0.100/40847</p> <p>Example #2: Command: log show : monitor : 192.168.0.100/40847</p>

Audit Logs

See "Audit Logging" on page 1 in the *Administration Guide* for a description of audit logs.

Interpreting Logs

No hard and fast rules exist for how to parse and interpret logs for significant events. For example, a "notice" severity from the IPMI daemon could be significant (e.g., PSU failed) or simply status information (e.g., reading sensors). The following bullets provide some guidance on how to parse log messages.

- > Scan for "critical" severity log entries. These logs represent significant events.
- > Scan for "error" severity log entries. In most cases, these logs represent significant events.
- > Scan for "notify" severity log entries from the ipmievd process and look for "Failure detected asserted", "Lower Critical going low", "Upper Critical going high", "Lower Non-Recoverable going low" and "Upper Non-Recoverable going high."
- > Scan for "crit" severity logs entries for smartd. Look for "Temperature changed" to track internal appliance temperature measured at the hard drive. Look for excessive conditions with the string "reached critical limit" (e.g., temperature).
- > Scan for "CRASH AND BURN" in the logs. An instance of this string indicates a programming or logic error.

Configuring syslog

See "System Logging" on page 1 in the *Appliance Administration Guide* for details on how to configure syslog messages in the SafeNet Luna Network HSM appliance.

CHAPTER 2: Open Source Components

Gemalto uses several open source components that leverage the syslog facility. Sections that follow describe syslog messages that each of these open source components can generate.

- > "IPMI" below
- > "SMART" on page 31
- > "SNMP" on page 47
- > "NTP" on page 47
- > "SSH" on page 48
- > "Privileged Services" on page 49
- > "Kernel" on page 51

IPMI

The intelligent platform monitoring interface (IPMI) is a hardware-level specification for monitoring the operation of a computer system. In the case of the SafeNet Luna Network HSM appliance, IPMI monitors sensors within the appliance. Broad categories of these sensors are fans, power supplies and the system motherboard. ["SafeNet Luna Network HSM Appliance Sensors" on the next page](#) identifies:

- > the specific sensors;
- > their locations;
- > the specific text string that represents each sensor;
- > the thresholds for a sensor;
- > threshold values;
- > the unit of measure for each threshold.

Subsequent subsections of this document delve into each of the columns of the table, and the types of messages received:

- > ["Threshold Events" on page 22](#)
- > ["Discrete Events" on page 24](#)
- > ["CPU Sensor" on page 25](#)
- > ["VRD, PCH, and Inlet Sensors" on page 25](#)
- > ["IPMI Implementation" on page 25](#)
- > ["Significant Log Messages" on page 25](#)
- > ["Insignificant Log Messages" on page 27](#)
- > ["Unlikely Log Messages" on page 27](#)
- > ["Debug Messages" on page 30](#)

Table 1: SafeNet Luna Network HSM Appliance Sensors

Sensor & Location	Sensor Text	Threshold	Threshold Value	Measure & Hysteresis
Cooling fan; left-most of three fans, rear-most blade within fan unit.	Fan1A .	LNR assert	1000	Speed RPM
		LC assert	2000	Negative 500
		LNR deassert		Positive 500
		LC deassert		
Cooling fan; left-most of three fans, front-most blade within fan unit.	Fan1B .	LNR assert	1000	Speed RPM
		LC assert	2000	Negative 500
		LNR deassert		Positive 500
		LC deassert		
Cooling fan; center of three fans, rear-most blade within fan unit.	Fan2A .	LNR assert	1000	Speed RPM
		LC assert	2000	Negative 500
		LNR deassert		Positive 500
		LC deassert		
Cooling fan; center of three fans, front-most blade within fan unit.	Fan2B .	LNR assert	1000	Speed RPM
		LC assert	2000	Negative 500
		LNR deassert		Positive 500
		LC deassert		
Cooling fan; right-most of three fans, rear-most blade within fan unit.	Fan3A .	LNR assert	1000	Speed RPM
		LC assert	2000	Negative 500
		LNR deassert		Positive 500
		LC deassert		

Sensor & Location	Sensor Text	Threshold	Threshold Value	Measure & Hysteresis
Cooling fan; right-most of three fans, front-most blade within fan unit.	Fan3B	LNR assert	1000	Speed RPM
		LC assert	2000	Negative 500
		LNR deassert		Positive 500
		LC deassert		
CPU temperature measured at the geometric center of the CPU package; located approximately center of appliance, offset to right-hand side.	CPU	UNR assert	89	Temperature Degrees C
		UC assert	72	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Voltage Regulator Down; located approximately 3cm toward front from CPU.	VRD	UNR assert	100	Temperature Degrees C
		UC assert	90	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Platform Controller Hub; located approximately center of appliance, 10cm from rear.	PCH	UNR assert	100	Temperature Degrees C
		UC assert	90	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Located approximately center of appliance, 20 cm from front.	Inlet	UNR assert	45	Temperature Degrees C
		UC assert	39	Negative 3
		UNR deassert		Positive 3
		UC deassert		

Sensor & Location	Sensor Text	Threshold	Threshold Value	Measure & Hysteresis
Centered DIMM of six sockets; approximately center of chassis, left of CPU.	CHA DIMM 0 .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Luna appliances do not have memory installed for this device. "ns" readings result for this sensor.	CHA DIMM 1 .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Luna appliances do not have memory installed for this device. "ns" readings result for this sensor.	CHA DIMM 2 .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Left-most DIMM, approximately center of chassis, right of power supplies.	CHB DIMM 0 .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		
Luna appliances do not have memory installed for this device. "ns" readings result for this sensor.	CHB DIMM 1 .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		

Sensor & Location	Sensor Text	Threshold	Threshold Value	Measure & Hysteresis
Luna appliances do not have memory installed for this device. "ns" readings result for this sensor.	CHB_DIMM_2 .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		
More information on this sensor is forthcoming in a future revision	RAM_TMax .	UNR assert	97	Temperature Degrees C
		UC assert	87	Negative 3
		UNR deassert		Positive 3
		UC deassert		
CPU core voltage.	CPU_VCORE .	UC assert	1.44	Voltage Volts
		LC assert	0.63	No hysteresis
		UC deassert		
		LC deassert		
Motherboard battery.	VBAT .	LC assert	2.796	Voltage Volts
		LC deassert		No hysteresis
3V supply used by south bridge chip.	3VSB .	UC assert	3.492	Voltage Volts
		LC assert	3.092	No hysteresis
		UC deassert		
		LC deassert		
+3.3 volt rail.	3VMain .	UC assert	3.492	Voltage Volts
		LC assert	3.092	No hysteresis
		UC deassert		
		LC deassert		

Sensor & Location	Sensor Text	Threshold	Threshold Value	Measure & Hysteresis
+5 volt rail.	+5V .	UC assert	5.304	Voltage Volts
		LC assert	4.692	No hysteresis
		UC deassert		
		LC deassert		
+12 volt rail.	+12V .	UC assert	12.740	Voltage Volts
		LC assert	11.284	No hysteresis
		UC deassert		
		LC deassert		
+12 volt monitor of right power supply unit.	PSU1_+12V_value.	UNR assert	13.392	Voltage Volts
		LNR assert	11.232	No hysteresis
		UNR deassert		
		LNR deassert		
Temperature of right power supply unit.	PSU1 Temp_value.	UNR assert	115	
		UNR deassert		Temperature Degrees C
				Negative 1
				Positive 1
Fan speed of right power supply unit.	PSU1 FAN_value .	LNR assert	300	Speed RPM
		LNR deassert		Negative 100
				Positive 100

Sensor & Location	Sensor Text	Threshold	Threshold Value	Measure & Hysteresis
+12 volt monitor of left power supply unit.	PSU2_+12V_value.	UNR assert	13.392	Voltage Volts
		LNR assert	11.232	No hysteresis
		UNR deassert		
		LNR deassert		
Temperature of left power supply unit.	PSU2_Temp_value.	UNR assert	115	Temperature Degrees C
		UNR deassert		Negative 1
				Positive 1
Fan speed of left power supply unit.	PSU2_FAN_value .	LNR assert	300	Speed RPM
		LNR deassert		Negative 100
				Positive 100
Right power supply status – presence detected	PSU1_Status .			
Left power supply status – presence detected	PSU2_Status .			

Key to Threshold	
UNR	Upper Non-Recoverable Threshold
UC	Upper Critical Threshold
LNR	Lower Non-Recoverable Threshold
LC	Lower Critical Threshold

Threshold Events

Here is an example sensor log.

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Fan sensor Fan3B . Lower Critical
going low (Reading 0 < Threshold 2000 RPM)
```

Most of the sensors monitored by IPMI on the SafeNet Luna Network HSM appliance generate threshold-based events. Threshold events occur when a sensor reading changes by an amount that crosses a configured boundary defined in the sensor data repository. THE IPMI specification defines six thresholds; the SafeNet Luna Network HSM appliance generates log messages on four of them. The four thresholds are:

1. Upper Non-Recoverable (UNR)
2. Upper Critical (UC)
3. Lower Non-Recoverable (LNC)
4. Lower Critical (LC)

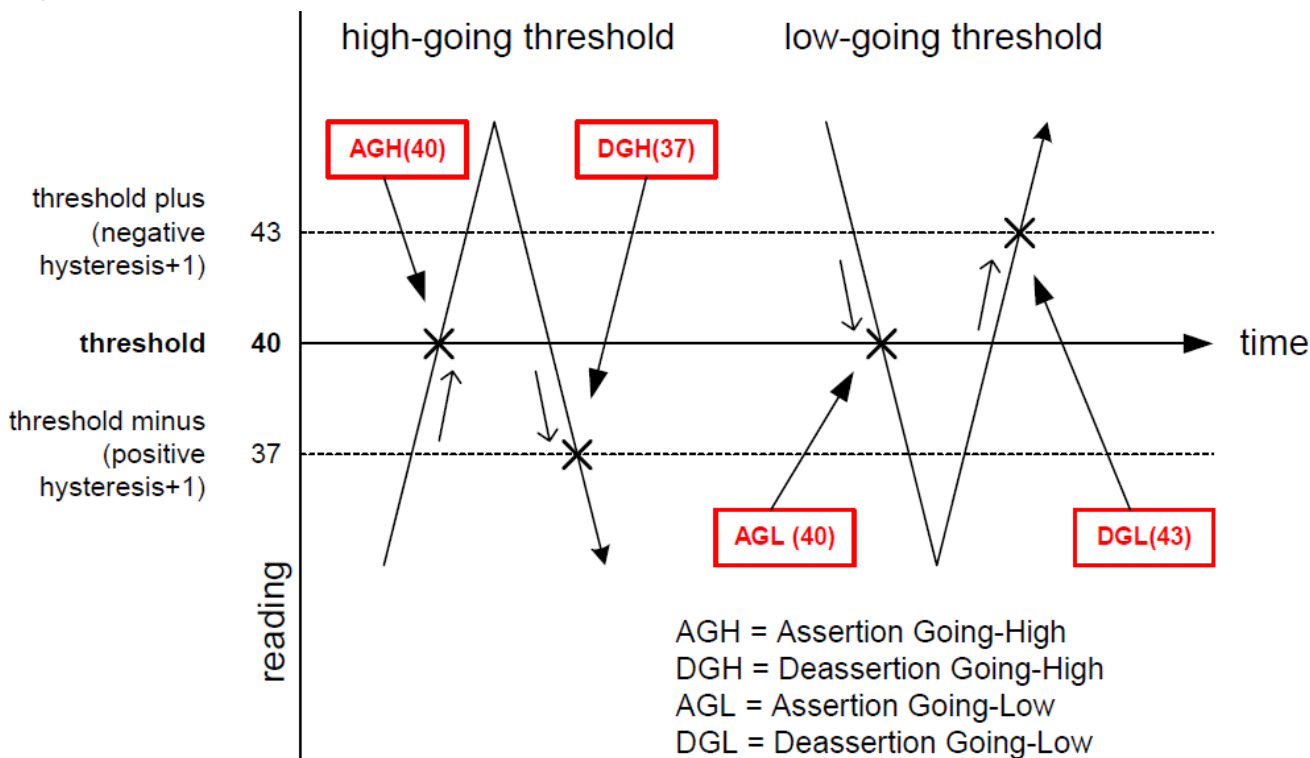
Upper and lower critical thresholds are ‘fatal’ and mean that the hardware is exceeding above or below a specified rating respectively. Upper and lower non-recoverable thresholds are ‘potential damage’ and mean that the hardware is in jeopardy or damaged.

A sensor value can change in one of two ways. It can go to an active state which IPMI calls asserted. The second state is inactive or de-asserted.

IPMI also allows for a sensor to have a hysteresis. The importance of having a hysteresis is to reduce the chance of a “flood” of events as the sensor hovers around a threshold. For example, if a fan sensor has a going-low threshold of 1000 RPM and the reading goes slightly above and below this value repeated, IPMI will generate an event for every assertion and de-assertion as the reading crosses the 1000 RPM threshold. With a hysteresis of 100, for example, the event would assert at 1000 RPM but not de-assert until the reading was 1100 RPM or greater.

Combining the thresholds, hysteresis and state changes, IPMI has a means to create an event to describe what a sensor is doing. "[Event Assertion/Desertion Thresholds](#)" below from the IPMI specification illustrates event assertion and desertion at different thresholds.

Figure 1: Event Assertion/Desertion Thresholds



To apply the meaning of thresholds, hysteresis and states, consider a real sensor on the Luna appliance: a cooling fan. A normal fan speed varies but generally ranges between 4000 RPM and 6000 RPM. The fan speed can fall below a threshold (e.g., when it fails) or rise above a threshold (e.g., when the ambient air temperature rises and more cooling is necessary). By way of an example, assume that someone impedes the propeller of a fan blade to slow it down but not stop it entirely. After ten seconds, our antagonist impedes the fan blade so that it is barely turning. This sequence of events results in two log messages. The first represents a lower critical assertion going low; the second, a lower non-recoverable assertion going low.

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Fan sensor Fan3B . Lower Critical
going low (Reading 1600 < Threshold 2000 RPM)
2012 Feb 29 12:05:11 myLuna local4 notice ipmievd: Fan sensor Fan3B . Lower Non-
recoverable going low (Reading 500 < Threshold 1000 RPM)
```

Correlating the information in these two log messages with the data in third, fourth and fifth columns of ["SafeNet Luna Network HSM Appliance Sensors" on page 17](#), note that the first log message results because the fan speed has dropped below 2000 RPM to a reading of 1600 RPM (LC assert: 2000). The second message results because the fan speed has now crossed the non-recoverable threshold of 1000 RPM (LNR assert: 1000).

After some period, with one less fan to cool the appliance, it begins to heat up, leading to the baseboard management controller to command the remaining fans to speed up. At this time, our antagonist discontinues impeding the fan blade. It immediately begins to spin and joins the other five at a higher-than-normal RPM. When the BMC detects the temperature back at a normal value, the BMC commands the fans to return to their normal speeds. The following log message records this event, the sensor de-asserting the last threshold change. Note that several seconds have elapsed after the fan threshold deserted the LNR event and IPMI detected the change and read the sensor. Hence, the reading of 15900 represents a sensor value when the fans are at maximum revolutions.

```
2012 Feb 29 12:05:21 myLuna local4 notice ipmievd: Fan sensor Fan3B . Lower Non-
recoverable going low (Reading 15900 < Threshold 1000 RPM)
```

Upon examining log messages, you might also observe instances where two messages similar to the following examples occur in close proximity:

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Fan sensor Fan3B . Lower Critical
going low (Reading 0 < Threshold 2000 RPM)
2012 Feb 29 12:05:51 myLuna local4 notice ipmievd: Fan sensor Fan3B . Lower Non-
recoverable going low (Reading 15900 < Threshold 1000 RPM)
```

The first message is the event of the fan stopping. The second message is the fan speed going from very fast back to a normal range after it has become freed to spin again and join the other five fans to cool the overheating appliance. This second log message represents the de-assert LNR event: by the time IPMI has scanned and read the sensors, the fan has asserted the LNR event and subsequently de-asserted it. IPMI only generates the log message for the more recent of the two events.

Discrete Events

The Luna appliance reports three discrete events:

1. OEM #0xa1. Because the IPMI specification does not define a power reset function, an OEM sensor serves this purpose. This OEM sensor links to a system reset function. The BMC records an event in the event log for a system reset: by pushing the power button; through a BMC reset; or via an operating system reset.
2. Power Supply PSU1_Status. This event reports the presence (asserted) or absence (de-asserted) of the right power supply.

3. Power Supply PSU2_Status. This event reports the presence (asserted) or absence (de-asserted) of the left power supply.

CPU Sensor

The CPU temperature reflects the use of the platform environment control interface (PECI) specification used for thermal management in the Intel Core 2 Duo microprocessor. PEFI reports a negative value that expresses the difference between the current temperature and the thermal throttle point at which the CPU takes action to reduce speed or shut down to prevent damage. In other words, the PEFI value is a relative and not an absolute temperature. The value reported by IPMI is calculated as the measured PEFI value + an offset + a margin. As an example, if the PEFI value is -89, the offset is 92 and the margin is 0, the IPMI reported temperature is 11 degrees C. This value is representative of a Luna appliance operating in a climate controlled data center. The important point is to monitor the CPU value in relation to the upper critical threshold of 72 degrees C and not as an absolute measure of the temperature of this sensor.

VRD, PCH, and Inlet Sensors

The VRD, PCK and Inlet sensor values reported by IPMI reflect real-time temperature values. They differ in readings because of the heat generated at the different locations within the chassis (e.g., inlet near fans, PCH consumes considerable power).

IPMI Implementation

The principal entity responsible for reporting IPMI events within the Luna appliance is a daemon called **ipmievd**. This daemon listens for events from the baseboard management controller (BMC) sent to the system event log (SEL). ipmievd polls the contents of the SEL for new events. When it receives a new event, the daemon logs it to syslog. ipmievd is a standard Linux component, used unchanged by Thales Group. The daemon is based on the **ipmitool** utility and it shares the same IPMI support and session setup options: some of the potential log messages from ipmievd originate from the ipmitool utility.

ipmievd can potentially generate hundreds of different log messages. Of these potential messages, some are sensor-specific. Other messages are unlikely but, because Thales Group uses the Linux component unchanged, are possible. The first subsection that follows describes the sensor events of most interest. The succeeding three subsections show insignificant messages, followed by the unlikely ones and debug messages.

Significant Log Messages

The log messages described in this subsection are the ones that report pertinent sensor events. The IPMI daemon reports on the sensor types shown in "[SafeNet Luna Network HSM Appliance Sensor Types](#)" below.

Table 2: SafeNet Luna Network HSM Appliance Sensor Types

Sensor Type
Fan
Temperature

Sensor Type

Voltage

Power Supply

OEM

Full Sensor Record Threshold Reading

```
... ipmievd: ①Fan sensor ②Fan3B . ③Lower Critical going low (Reading ④1600 < ⑤Threshold ⑥2000 ⑦RPM)
```

A full sensor record threshold reading message consists of the fields shown in the example above.

1. This field is the sensor type, one of values from ["SafeNet Luna Network HSM Appliance Sensor Types" on the previous page](#).
2. This field is the specific sensor from column 2 of ["SafeNet Luna Network HSM Appliance Sensors" on page 17](#).
3. This field is the description, formed from the threshold of column 3 of ["SafeNet Luna Network HSM Appliance Sensors" on page 17](#) combined with the direction of the threshold.
4. This field is the trigger reading as reported by the BMC for the sensor.
5. This field is the comparison that resulted in the event.
6. This field is the threshold value of column 4 of ["SafeNet Luna Network HSM Appliance Sensors" on page 17](#) for the applicable threshold.
7. This field is the unit of measure from column 5 of ["SafeNet Luna Network HSM Appliance Sensors" on page 17](#).

Reproducing all possible threshold messages within this document is impractical. Rather, a more reasonable solution is to provide guidance for how to parse threshold messages.

1. Parse for `ipmievd` and `Threshold` in the log message.
2. Determine whether the event is an assertion or de-assertion. Use fields **4**, **5** and **6** for this step. The event is an assertion if the logical evaluation of the statement formed from these three fields is true (e.g., `Reading 1600 < Threshold 2000 RPM`). Otherwise, the event is a de-assertion (e.g., `Reading 15900 < Threshold 1000 RPM`).
3. Parse the remaining fields to obtain the sensor type, specific sensor affected, the trigger reading, the threshold, the threshold value and the unit of measure.

With the information of the above list, you have the information available to create custom messages and/or take specific actions for threshold events.

Compact Sensor Record Asserted/Deasserted

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor PSU2_Status . -
Failure detected Asserted
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor PSU2_Status . -
Failure detected Deasserted
```

The first field after `ipmievd:` is the sensor type: see ["SafeNet Luna Network HSM Appliance Sensor Types" on page 25](#). The text after `sensor` is the specific sensor from column 2 of ["SafeNet Luna Network HSM Appliance Sensors" on page 17](#). The text after the dash is the description of the event with a specific indication of either `Asserted` or `De-asserted` at the end of the message.

You should review these messages within the context of any administrative or maintenance activities carried out on the Luna appliance. The severity and action depends upon what is reported. In the two examples above, the first log message indicates that PSU2 failed (e.g., A/C lost) while the second message indicates that PSU2 once again became operational.

Non-Specific Sensor Record with Description

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor - Transition to Power Off
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: OEM sensor - OEM Specific
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Unit sensor - Failure detected*
```

* Reported by BMC firmware on older Luna appliances.

These messages represent log entries for non-specific sensor records as per the IPMI specification. The first field after `ipmievd:` is the sensor type: see ["SafeNet Luna Network HSM Appliance Sensor Types" on page 25](#). The text after the dash is the description of the event.

Like the compact sensor records, the context of any administrative or maintenance activities carried out on the SafeNet Luna Network HSM appliance as well as the description affects the action appropriate for the log message.

Insignificant Log Messages

The following log messages represent start up notices for `ipmievd`.

Reading Sensors

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Reading sensors...
```

This message indicates that the IPMI monitoring daemon successfully started just prior to setting up the event handler.

Waiting For Events

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Waiting for events...
```

This message indicates that the IPMI monitoring daemon successfully established communication with the IPMI device driver to relay events.

Unlikely Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

No ipmievd Messages in Log File

If you do not see any `ipmievd` messages in the messages log file, check to see if `rsyslogd` is running.

Kernel Panic

```
2012 Feb 29 12:05:01 myLuna local4 alert ipmievd: Linux kernel panic: mod xyz fai
```

A “panic” is an unrecoverable system error detected by the Linux kernel. A panic can result from unhandled processor exceptions such as references to invalid memory addresses. In the case of an IPMI-reported panic, the likely cause is a hardware failure such as a failed RAM cell, errors in the arithmetic functions of the processor or an overheating/damaged processor. If you find this message in the log files, review other messages around it for an indication of what might have failed. Power up the appliance again and monitor for similar events.

OEM Record

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: IPMI Event OEM Record 0xa1
Thales Group knows of no OEM records for the Luna appliance.
```

Sensor Record without Description

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor 0xa2
```

Sensor records with description should be all that the daemon reports. Note that the difference between a sensor record with a description versus one without is the dash after the word `sensor` in the message. See the subsection ["Full Sensor Record Threshold Reading" on page 26](#) for a discussion of the records you should be most interested in.

Full Sensor Record for Discrete and OEM Events

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor PSU1_Status .
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor PSU1_Status . some
status message
```

A “full sensor record” is one formatted as `<sensor name> sensor <full sensor name> <description>`. This formatting is for discrete and OEM sensor events for which the SafeNet Luna Network HSM appliance reports none of these types.

Compact Sensor Record With No Event Direction

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Power Supply sensor PSU2_Status . -
Failure detected
```

This formatting is for compact sensor records with no direction reported for the threshold change. Thales Group is not aware of any events that report a message according to this format.

Sensor Record With Only Sensor Number

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: Fan sensor 16
```

Thales Group is not aware of any events that report a message according to this format.

BMC Event Message Buffer Failure

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Get BMC Global Enables command failed
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Get BMC Global Enables command failed: 71
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Set BMC Global Enables command failed
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Set BMC Global Enables command failed: 23
```

Before the IPMI daemon can log messages, it must first open the BMC event message buffer. Under normal circumstances, this operation succeeds.

Unable to Receive IPMI Message

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Unable to receive IPMI message
```

The SafeNet Luna Network HSM appliance loads the IPMI device drivers before starting the IPMI daemon. This message means that the request to the device driver for an IPMI event message failed.

No Event Data

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: No data in event
```

All IPMI messages for the SafeNet Luna Network HSM appliance have well-formed event data. This message means that the IPMI daemon read an event from the IPMI message buffer but the event had no data associated with it.

Not An Event

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Type 9 is not an event
```

Only the asynchronous event receive type should be available in the BMC event message buffer. This message means that the IPMI daemon read an event from the IPMI message buffer that was not the expected asynchronous receive type.

Unable to Read from IPMI Device

```
2012 Feb 29 12:05:01 myLuna local4 critical ipmievd: Unable to read from IPMI device
```

This message means that the IPMI daemon failed to read from the event message buffer while polling for events.

Get SEL Info Command Failed

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Get SEL Info command failed
```

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Get SEL Info command failed: 80
```

These messages indicate that the IPMI daemon was unable to get the system event log information for the storage network function.

SEL Buffer Use

```
2012 Feb 29 12:05:01 myLuna local4 warning ipmievd: SEL buffer used at 85%, please consider clearing the SEL buffer
```

This message means that the sensor event log buffer is filling faster than events can be processed by the IPMI daemon.

SEL Buffer Overflow

```
2012 Feb 29 12:05:01 myLuna local4 alert ipmievd: SEL buffer overflow, no SEL message can be logged until the SEL buffer is cleared
```

This message means that the sensor event log buffer is full and no new messages can be queued.

Unable to Retrieve SEL Data

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Unable to retrieve SEL data
```

This message means that the IPMI daemon was unable to receive sensor event log data when it should have.

SEL Overflow on Check for Waiting Events

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd: SEL overflow is cleared
```

```
2012 Feb 29 12:05:01 myLuna local4 alert ipmievd: SEL buffer overflow, no new SEL message will be logged until the SEL buffer is cleared
```

```
2012 Feb 29 12:05:01 myLuna local4 warning ipmievd: SEL buffer is 85% full, please consider clearing the SEL buffer
```

The IPMI daemon should process sensor event log messages in a timely fashion. These messages mean that the daemon is falling behind in doing so.

PID File Already Exists

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: PID file '/var/run/ipmievd.pid0' already exists.
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Perhaps another instance is already running.
```

These messages suggest: a failure of the operating system or file structure within the appliance; or a configuration error within a Thales Group-provided component.

Failed to Open PID File

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Failed to open PID file '/var/run/ipmievd.pid0'
for writing. Check file permission.
```

This message suggests a failure of the operating system or file structure within the appliance.

Unable to Open SDR File

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Unable to open SDR for reading
```

This message suggests a failure in the IPMI subsystem.

Malloc Failure

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: ipmitool: malloc failure
```

This message indicates that the system is low on virtual memory while attempting to create a cache for the sensor data repository.

IPMI Event Setup Failed

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Could not enable event message buffer
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Could not enable event receiver
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Error setting up Event Interface open
```

These messages indicate a failure of the ipmievd daemon to establish the interface via the IPMI device driver to relay events.

Error Waiting For Events

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Error waiting for events!
```

This message indicates a failure by the daemon to wait for events relayed via the IPMI device driver.

Unable to Load Event Interface

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Unable to load event interface
```

This message indicates a failure by the daemon to establish the IPMI event interface.

Invalid Interface

```
2012 Feb 29 12:05:01 myLuna local4 err ipmievd: Invalid Interface for OpenIPMI Event Handler:
<xxxxxx>
```

This message suggests a corrupted disk system or a configuration error: the only potential value for <xxxxxx> is “open.”

Debug Messages

Thales Group does not enable logging of debug messages from the IPMI daemon. If in future Thales Group does enable this level of log messages, this subsection describes the possible messages you might find in the log files.

BMC Event Message Buffer Opened

```
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: BMC Event Message Buffer enabled
```

This message indicates that the IPMI daemon successfully opened the BMC event message buffer.

BMC Event Message Debug

```
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: netfn:6 cmd:5 ccode:80
```

This message shows the network function code, command and completion code of the raw IPMI message.

SEL Watch Debug

```
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL count is 3
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL freespace is 1502
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL Percent Used: 80%
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL Overflow: false
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL Next ID: 00da
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL lastid is 00d9
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: Current SEL count is 4
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: Current SEL lastid is 00ac
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL count is 0 (old=3), resetting lastid to 0
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL count lowered, new SEL lastid is 0112
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: SEL Read ID: 023f
2012 Feb 29 12:05:01 myLuna local4 debug ipmievd: New Events
```

These messages show details of the sensor event log at various processing points within the daemon.

Sensors Cached

```
2012 Feb 29 12:05:01 myLuna ipmievd: Getting 8 bytes from SDR at offset 64
2012 Feb 29 12:05:01 myLuna ipmievd: SDR reservation cancelled. Sleeping a bit and retrying...
2012 Feb 29 12:05:01 myLuna ipmievd: Sensors cached
```

These messages indicate that the IPMI daemon successfully generated a fast lookup cache for the sensor data repository.

IPMI Event Setup

```
2012 Feb 29 12:05:01 myLuna ipmievd: Enabling event message buffer
2012 Feb 29 12:05:01 myLuna ipmievd: Enabling event receiver
2012 Feb 29 12:05:01 myLuna ipmievd: Getting 8 bytes from SDR at offset 64
```

These messages log the process to set up the IPMI event interface.

SMART

Self-Monitoring, Analysis and Reporting Technology (SMART) is a technology built into modern hard drives to monitor the health of the drive and anticipate failures. The two classes of failures are: predictable and unpredictable. Examples of predictable failures are increased number of bad sectors and increased temperature from wear; they typically occur from slow processes. Unpredictable failures occur without warning and suddenly; for example, a hard drive dropped may report more than a normalized number of read errors.

The hard drives within SafeNet Luna Network HSM appliances implements SMART. A background process called the SMART control daemon (**smartd**) starts automatically at power up and is responsible for monitoring the hard drive via the SMART technology in it. The daemon records its findings via syslog.

Facility Keyword	Software Process	Log File
daemon	smartd[pid]	messages

SMART Attributes

From LunaSH, you can query the SMART attributes (Luna SA/SP: status disk; Luna IS: system disk). The example below shows the SMART attributes reported from the shell command `lunash:>status disk:`

ID#	ATTRIBUTE_NAME	FLAG	VALUE	WORST	THRESH	TYPE	UPDATED	WHEN_FAILED	RAW_VALUE
1	Raw_Read_Error_Rate	0x002f	200	200	051	Pre-fail	Always	-	0
3	Spin_Up_Time	0x0027	154	152	021	Pre-fail	Always	-	1300
4	Start_Stop_Count	0x0032	100	100	000	Old_age	Always	-	601
5	Reallocated_Sector_Ct	0x0033	200	200	140	Pre-fail	Always	-	0
7	Seek_Error_Rate	0x002e	200	200	000	Old_age	Always	-	0
9	Power_On_Hours	0x0032	099	099	000	Old_age	Always	-	1383
10	Spin_Retry_Count	0x0032	100	100	000	Old_age	Always	-	0
11	Calibration_Retry_Count	0x0032	100	100	000	Old_age	Always	-	0
12	Power_Cycle_Count	0x0032	100	100	000	Old_age	Always	-	601
192	Power-Off_Retract_Count	0x0032	200	200	000	Old_age	Always	-	138
193	Load_Cycle_Count	0x0032	200	200	000	Old_age	Always	-	462
194	Temperature_Celsius	0x0022	115	092	000	Old_age	Always	-	28
196	Reallocated_Event_Count	0x0032	200	200	000	Old_age	Always	-	0
197	Current_Pending_Sector	0x0032	200	200	000	Old_age	Always	-	0
198	Offline_Uncorrectable	0x0030	200	200	000	Old_age	Offline	-	0
199	UDMA_CRC_Error_Count	0x0032	200	200	000	Old_age	Always	-	1
200	Multi_Zone_Error_Rate	0x0008	200	200	000	Old_age	Offline	-	0

The ID# and ATTRIBUTE NAME columns are the SMART attribute defined by the drive vendor. Note that vendors have generally standardized on the attributes and their meaning. The FLAG column indicates the main purpose of each attribute; correlating to the text in the TYPE and UPDATED columns. Only the last two bits are of any significance. Bit 0 identifies whether the attribute is an advisory (0) or a pre-fail notification (1). An advisory means that the disk has exceeded its intended design life while a pre-fail notification means that the disk is predicated to fail within 24 hours. Bit 1 indicates whether attribute monitoring occurs strictly offline (0) or during offline and normal operations (1).

The RAW_VALUE, VALUE, WORST and THRESH columns report on the specific attribute. The drive controller reports the RAW_VALUE. VALUE is normalized where a higher value is better. As VALUE drops (i.e., becomes worse), it approaches a threshold. THRESH is the value at which SMART reports a 'threshold exceeded' event. WORST is the most extreme reading recorded for the attribute. A VALUE of 100 is an initial default value. Consider attribute #174 (Temperature) as an example to put these four values in context. The example shows the current temperature reading of the drive as 28 degrees Celsius. Normalized, this reading is 115. A value of 100 therefore is 43 degrees Celsius. The worst reading recorded is a normalized value of 092 which translates to 51 degrees Celsius. This attribute has no threshold as it represents an advisory.

Assume that the SMART control daemon generated the following log message:

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, SMART Prefailure
Attribute: 1 Raw_Read_Error_Rate changed from 200 to 92
```

The next query of the SMART attributes might report the following information for attribute #1:

ID#	ATTRIBUTE_NAME	FLAG	VALUE	WORST	THRESH	TYPE	UPDATED	WHEN_FAILED	RAW_VALUE
1	Raw_Read_Error_Rate	0x002f	092	092	051	Pre-fail	Always	-	37767785

If the drive controller reads a value that, once normalized, is less than or equal to the THRESH value, the daemon generates a critical log message and a query of the SMART attributes reports a VALUE less than or equal to THRESH as the following example shows.

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, SMART Prefailure
Attribute: 1 Raw_Read_Error_Rate changed from 92 to 51
```

ID#	ATTRIBUTE_NAME	FLAG	VALUE	WORST	THRESH	TYPE	UPDATED	WHEN_FAILED	RAW VALUE
1	Raw_Read_Error_Rate	0x002f	051	051	051	Pre-fail	Always	FAILING_NOW	4528445

The WHEN_FAILED column indicates that the attribute has reached the THRESH value.

Significant Expected Log Messages

Banner at Start Up

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: smartd version 5.38 [i686-redhat-linux-
gnu] Copyright (C) 2002-8 Bruce Allen
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Home page is
http://smartmontools.sourceforge.net/#012
```

These two messages are the first log entries written by the smart control daemon. When Thales Group updates the SMART control daemon to a more recent version, the following messages more closely resemble the startup banner.

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: 1411:smartd 6.2 2013-07-26 r3841 [i686-
linux-2.6.18-164.el5] (local build)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Copyright (C) 2002-13, Bruce Allen,
Christian Franke, www.smartmontools.org
```

Read Configuration File

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Opened configuration file /etc/smartd.conf
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Configuration file /etc/smartd.conf
parsed.
```

These messages indicate that the SMART control daemon successfully opened and read the contents of the configuration file that contains the directives for how the daemon is to operate. When Thales Group updates the daemon to a newer release, the location of the configuration file will change as represented in the follow examples.

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Opened configuration file
/usr/local/etc/smartd.conf
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Configuration file
/usr/local/etc/smartd.conf parsed.
```

Monitoring Devices at Start Up

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, opened
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device /dev/sda: using '-d sat' for ATA
disk behind SAT layer.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, opened
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, not found in smartd
database.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, enabled SMART Attribute
Autosave.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, enabled SMART Automatic
Offline Testing.
```

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, is SMART capable. Adding to "monitor" list.
```

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Monitoring 0 ATA and 1 SCSI devices
```

These messages indicate that the SMART control daemon was successful in starting up and identifies the type and number of each device the daemon is monitoring. For SafeNet Luna Network HSM appliances, only one serial ATA device applies. The daemon opens the device to query its capabilities [the first message in the examples above]. The daemon uses SCSI/ATA Translation (SAT) to enable communication with the drive [the second message]. In SAT mode, the daemon reopens the device [third message] and looks for it in an internal database [fourth message] but does not find an entry for the device. The smart.conf file sets the directives for the daemon and these directives include attribute autosave (-S on) and automatic offline testing (-o on) [fifth and sixth messages]. Turning on attribute autosave instructs the disk drive to use non-volatile storage for attributes such as error counters, power-up hours and other useful data so that these values do not get reset to zero the next time the device is power-cycled. Turning on automatic offline testing instructs the drive to update certain SMART attributes every four hours. The disk used in the SafeNet Luna Network HSM appliance is SMART-capable [seventh message] so the daemon monitors it [eighth message].

In preparing this document, Thales Group reviewed the source code of a newer version of the smart control daemon. Thales Group plans to update the daemon at some future date. The next set of messages show the messages this new daemon outputs at start up.

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, type changed from 'scsi' to 'sat'
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], opened
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], WDC WD2500BHTZ-04JCPV0, S/N:WD-WX11EC1TE568, WWN:5-0014ee-058a177e6, FW:04.06A00, 250 GB
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], not found in smartd database.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], enabled SMART Attribute Autosave.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], enabled SMART Automatic Offline Testing.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], is SMART capable. Adding to "monitor" list.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Monitoring 1 ATA and 0 SCSI devices
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda [SAT], initial Temperature is 28 Celsius (Min/Max ??/28)
```

The SMART control daemon opens the device [third message] and successfully queries it for device-specific information [fourth message]. Similar messages follow in the output. The newer daemon reports the initial temperature reading from a sensor built into the disk [tenth message].

Fork Into Background Process

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: smartd has fork()ed into background mode. New PID=23509.
```

This message indicates that the startup sequence for the smart control daemon completed successfully, leading to the daemon to fork into a background mode process as exhibited if you query the process list.

```
root      23509      1  0 11:04 ?          00:00:00 /usr/sbin/smartd -q never
```

Self Tests

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, starting scheduled Short Self-Test.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, starting scheduled Long Self-Test.
```

These messages record that the smart-enabled drive ran a short and/or long self-test. The short self-test runs daily; the long self-test runs weekly, an hour after the short test. These tests usually run early in the morning.

Attribute Change

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, SMART Usage Attribute:
7 Seek_Error_Rate changed from 100 to 200
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, SMART Usage Attribute:
9 Power_On_Hours changed from 100 to 99
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, SMART Usage Attribute:
200 Multi_Zone_Error_Rate changed from 100 to 200
```

These messages show changes in SMART attributes. The log severity of `info` means that the new values are still within acceptable ranges.

Prefailure Change

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, SMART Prefailure
Attribute: 1 Raw_Read_Error_Rate changed from 100 to 200
```

Messages such as this example show changes in SMART pre-failure attributes.

Temperature Change

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Temperature changed +5
Celsius to 37 Celsius (Min/Max 26/37)
```

This message is common in the log file and indicates a change in temperature measured at the hard disk sensor. The SMART control daemon monitors the sensor once every 30 minutes and logs the temperature if it has changed from the last reading.

Temperature Limit Reached

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, Temperature 45 Celsius
reached limit of 44 Celsius (Min/Max 31/49)
```

This message indicates that the temperature measured at the hard disk drive reached an upper limit for normally expected readings.

Critical Temperature Change

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, Temperature 49 Celsius
reached critical limit of 48 Celsius (Min/Max 31/49)
```

This message indicates that the temperature measured at the hard disk drive exceeds the critical upper limit.

Received Exit Signal

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: smartd received signal 15: Terminated
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: smartd received signal 3: Quit
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: smartd received signal <#>: <XXXXXXX>
```

These messages indicate that the SMART control daemon received an exit signal. `info` severity messages are normal and expected; `crit` severity messages are not. In the latter case, the signal number is `<#>` and the text translation of this signal is `<XXXXXXX>`.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do so, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

Configuration File not in Expected Location

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: No configuration file
/usr/local/etc/smartd.conf found, scanning devices
```

At start up, the SMART control daemon expects to find the configuration file for its directives in the **/usr/local/etc** directory.

Cannot Open Configuration File

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: <error message>: Unable to open
configuration file /usr/local/etc/smartd.conf
```

This message indicates that although the SMART control daemon located the configuration file, the daemon was unable to open it for the reason cited by <error message> in the log message.

Configuration File Format Errors

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Error: line 14 of file
/usr/local/etc/smartd.conf is more than MAXLINELEN=256 characters.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Error: continued line 44 (actual line 14)
of file /usr/local/etc/smartd.conf is more than MAXCONTLINE=1023 characters.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 1
(drive DEVICSCAN): unknown Directive: /dev/sd4
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Run smartd -D to print a list of valid
Directives.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 15
(drive /dev/sda): -s argument "(" is INVALID extended regular expression. Unmatched ( or \(.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: File /usr/local/etc/smartd.conf line 15
(drive /dev/sda): ignoring previous Test Directive -s (S/../../02)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: File /usr/local/etc/smartd.conf line 15
(drive /dev/sda): warning, character 4 (x) looks odd in extended regular expression (S/x/../../02)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: File /usr/local/etc/smartd.conf line 15
(drive /dev/sda): ignoring previous Address Directive -m john@email.com
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Configuration file
/usr/local/etc/smartd.conf has fatal syntax errors.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Configuration file
/usr/local/etc/smartd.conf parsed but has no entries (like /dev/hda)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 16
(drive /dev/sda): Directive -M 'exec' argument: missing closing quote
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 16
(drive /dev/sda): Directive -M 'exec' argument must be followed by executable path.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: File /usr/local/etc/smartd.conf line 16
(drive /dev/sda): ignoring previous mail Directive -M exec /usr/local/smtp
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line %18
(drive /dev/sda): unknown Directive: -b
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line %19
(drive /dev/sda): Missing argument to -W Directive
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line %20
(drive /dev/sda): Invalid argument to -M Directive: yearly
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Valid arguments to -n Directive are:
never[,N][,q], sleep[,N][,q], standby[,N][,q], idle[,N][,q] *
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Drive: /dev/sda, implied '-a' Directive on
line 21 of file /usr/local/etc/smartd.conf
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Drive: /dev/sda, -M Directive(s) on line
22 of file /usr/local/etc/smartd.conf need -m ADDRESS Directive
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Drive: /dev/sda, -m <nomailer> Directive
on line 23 of file /usr/local/etc/smartd.conf needs -M exec Directive
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 35
(drive /dev/sda): Directive: -i takes integer argument from 1 to 255.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 36
```

```
(drive /dev/sda): Directive: -I has argument: on; needs integer from 1 to 255.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 37
(drive /dev/sda): Directive: -W takes 1-3 integer argument(s) from 0 to 255.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: File /usr/local/etc/smartd.conf line 38
(drive /dev/sda): Directive: -W has argument: off; needs 1-3 integer(s) from 0 to 255.
```

These messages indicate format errors in the **smartd.conf** file. Depending upon the version of the smart control daemon, the configuration file might be **/etc/smartd.conf** or **/usr/local/etc/smartd.conf**.

* This text is an example. See **man smartd.conf** for a complete list and description of directives and arguments.

Cannot Register Device

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Unable to register scsi device /dev/sda at
line 17 of file /usr/local/etc/smartd.conf
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Unable to register scsi device /dev/sda
```

These messages indicate that the smart control daemon was unable to register the device specified in the **smartd.conf** file.

Force Scan For Devices

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Configuration file
/usr/local/etc/smartd.conf was parsed, found DEVICESCAN, scanning devices
```

This message indicates that the configuration file specified that the SMART control daemon was to scan for devices rather than rely on entries in the file.

Could Not Scan For Devices or No Devices To Scan

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Problem creating device name scan list
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: In the system's table of devices NO
devices found to scan
```

The first message indicates that the configuration file specified that the SMART control daemon was to scan for devices but that the scan failed. The second message indicates that daemon has no SMART-enabled devices to scan.

Out of Memory

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Smartd: Out of memory
```

This message indicates that the SMART control daemon did not have sufficient memory on startup.

Exception

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Smartd: Exception: <xxxxxxx>
```

This message indicates that the SMART control daemon encountered an exception **<xxxxxxx>** on startup and exited.

Received Hang Up or Interrupt Signal

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Signal HUP - rereading configuration file
/etc/smartd.conf
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Signal INT - rereading configuration file
/etc/smartd.conf ("SIGQUIT_KEYNAME" quits)
```

These messages indicate that the SMART control daemon was instructed via a signal to reread the configuration file normally read on startup.

Continue on Error

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Reusing previous configuration
```

This message indicates that while rereading the configuration file, the daemon encountered an error and reverted to the previously-read configuration settings instead.

Unable to Monitor Devices

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Unable to monitor any SMART enabled devices. Try debug (-d) option. Exiting...
```

This message indicates that the SMART control daemon did not find any SMART-enabled devices to monitor.

Mail-Related Messages

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Mail can't be enabled together with -- capabilities. All mail will be suppressed.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Sending a mail was suppressed. Mails can't be send when capabilites [sic] are enabled
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: internal error in MailWarning(): cfg.mailwarn->emailfreq=0
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Contact smartmontools-support@lists.sourceforge.net; internal error in MailWarning(): which=-1, size=88
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Sending warning via <mail> to <nomailer>
...
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Executing test of <mail> to <nomailer> ...
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: failed (fork or pipe failed, or no memory) <error string>
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer> produced unexpected output (here truncated to 1024 bytes) to STDOUT/STDERR:
<unexpected output>
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: flushed remaining STDOUT/STDERR
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: more than 1 MB STDOUT/STDERR flushed, breaking pipe
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: pclose (3) failed <error string>
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: failed (32-bit/8-bit exit status: 255/133) perhaps caught signal 5 [Trace/breakpoint trap]
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: failed (32-bit/8-bit exit status: 255/133)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Warning via <mail> to <nomailer>: successful
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Warning via <mail> to <nomailer>: exited because of uncaught signal 5 [Trace/breakpoint trap]
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Warning via <mail> to <nomailer>: process STOPPED because it caught signal 5 [Trace/breakpoint trap]
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Read SMART Self-Test Log worked again, warning condition reset after 16 emails
```

Thales Group does not compile the SMART control daemon with libcap-ng enabled to send mail. The first two messages indicate that the daemon is compiled this way and that the settings in the configuration file are incompatible with libcap-ng settings. The latter messages indicate problems with how mail is configured to be sent and/or status of sending mail.

One Check

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Started with '-q onecheck' option. All devices successfully [sic] checked once.
smartd is exiting (exit status 0)
```

The message indicates that the **smartd.conf** file contains a directive for the SMART control daemon to start and terminate with only a check of any SMART-enabled devices.

Ignore Device or Duplicate Device

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda[auto], ignored
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, duplicate, ignored
```

The first message indicates that the **smartd.conf** file identifies a device but directs the SMART control daemon to ignore the device for monitoring. The second message indicates that the device is specified more than once in the **smartd.conf** file.

Could Not Detect Device, Unsupported Device, Not a ATA/SCSI Device or Device Cannot be Registered

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, unable to autodetect
device type
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, unsupported device type
'auto'
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, neither ATA nor SCSI
device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, not available
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Unable to register device /dev/sda (no
Directive -d removable). Exiting.
```

The first message indicates that the SMART control daemon was unable to interrogate the device specified in the **smartd.conf** file. The second message indicates that the device is not SMART-enabled. The third message indicates that the device is not ATA or SCSI. The fourth message is a warning that the daemon could not detect the device but is continuing, while the fifth message indicates that the daemon is stopping because it could not detect the device and the **smartd.conf** file contains a directive to do so under this circumstance.

Could Not Open Device

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, open() failed: <xxxxxxx>
```

If debug is enabled or scanning is not, this message indicates that the SMART control daemon was unable to open the device for monitoring: <xxxxxxx> is the reason why.

Could Not Fork Into Background Process

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: smartd unable to fork daemon process!
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: PID file /var/run/smartd.pid0 didn't show
up!
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: unable to write PID file
/var/run/smartd.pid0 - exiting.
```

These messages indicate that the startup sequence for the SMART control daemon was unable to complete successfully because the daemon could not properly fork a new process.

Writing PID File

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: file /var/run/smartd.pid0 written
containing PID 1729
```

This message identifies the process identifier and process identifier file for the background smart control daemon process.

Help for Configuration File Directives

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]:Configuration file
(/usr/local/etc/smartd.conf) Directives (after device name):
-d TYPE Set the device type: auto, ignore, removable
...
-T TYPE Set the tolerance to one of: normal, permissive
-o VAL Enable/disable automatic offline tests (on/off)
-S VAL Enable/disable attribute autosave (on/off)
-n MODE No check if: never, sleep[,N][,q], standby[,N][,q], idle[,N][,q]
-H Monitor SMART Health Status, report if failed
-s REG Do Self-Test at time(s) given by regular expression REG
-l TYPE Monitor SMART log or self-test status:
    error, selftest, xerror, offlinests[,ns], selfteststs[,ns]
-l scterc,R,W Set SCT Error Recovery Control
-e Change device setting: aam,[N|off], apm,[N|off], lookahead,[on|off],
    security-freeze, standby,[N|off], wcache,[on|off]
-f Monitor 'Usage' Attributes, report failures
-m ADD Send email warning to address ADD
-M TYPE Modify email warning behavior (see man page)
-p Report changes in 'Prefailure' Attributes
-u Report changes in 'Usage' Attributes
-t Equivalent to -p and -u Directives
-r ID Also report Raw values of Attribute ID with -p, -u or -t
-R ID Track changes in Attribute ID Raw value with -p, -u or -t
-i ID Ignore Attribute ID for -f Directive
-I ID Ignore Attribute ID for -p, -u or -t Directive
-C ID[+] Monitor [increases of] Current Pending Sectors in Attribute ID
-U ID[+] Monitor [increases of] Offline Uncorrectable Sectors in Attribute ID
-W D,I,C Monitor Temperature D)ifference, I)nformal limit, C)ritical limit
-v N,ST Modifies labeling of Attribute N (see man page)
-P TYPE Drive-specific presets: use, ignore, show, showall
-a Default: -H -f -t -l error -l selftest -l selfteststs -C 197 -U 198
-F TYPE Use firmware bug workaround:
...

```

Attribute ID is a decimal integer $1 \leq ID \leq 255$

Use ID = 0 to turn off -C and/or -U Directives

Example: /dev/sda -a

This text is the help information for configuring the **smartd.conf** file.

Write State File

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, state written to
/var/log/devstate
```

This message indicates that the SMART control daemon wrote the state(s) of monitored device(s) to a file.

Cannot Unlink PID File

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Can't unlink PID file
/var/run/smartd.pid0 (<error string>).
```

This message indicates that the SMART control daemon was unable to delete a process identifier file because of the error reported: <error string>.

Close Failed

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, <error string>, close()
failed
```


This message indicates that the SMART control daemon was unable to close a monitored device because of the error reported: <error string>.

Code Bug

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Please inform smartmontools-
support@lists.sourceforge.net, including output of smartd -V.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: smartd is exiting (exit status 10)
```

These messages indicate a coding error in the SMART control daemon.

ATA Error Log Read Failure

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, Read Summary SMART
Error Log failed
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, Read Extended
Comprehensive SMART Error Log failed
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, Read SMART Self Test
Log Failed
```

These messages indicate a failure to read the error log(s) of ATA devices.

ATA Device Scan Messages

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, not ATA, no IDENTIFY
DEVICE Structure
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, packet devices [this
device CD/DVD] not SMART capable
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, smartd database not
searched (Directive: -P ignore).
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, found in smartd
database.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, WARNING: <warning text>*
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, presets are: ...
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, lacks SMART capability
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, ATA IDENTIFY DEVICE
words 82-83 don't specify if SMART capable.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, proceeding since '-T
permissive' Directive given.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, to proceed anyway, use
'-T permissive' Directive.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, could not enable SMART
capability
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, could not disable SMART
Attribute Autosave.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, disabled SMART
Attribute Autosave.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, could not enable SMART
Attribute Autosave.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, not capable of SMART
Health Status check
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, Read SMART Values
failed
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, Read SMART Thresholds
failed, ignoring -f Directive
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, can't monitor
Temperature, ignoring -W 3,44,48
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no Attribute 279,
ignoring -r 279!
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, not monitoring
```

```

Prefailure Attributes, ignoring -r 196!
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, could not disable SMART
Automatic Offline Testing.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, SMART Automatic Offline
Testing unsupported...
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, enable SMART Automatic
Offline Testing failed.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SMART Self-test Log,
ignoring -l selftest (override with -T permissive)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SMART Self-test Log,
ignoring -l selftest
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SMART Error Log,
ignoring -l error (override with -T permissive)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SMART Error Log,
ignoring -l error
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no Extended
Comprehensive SMART Error Log, ignoring -l xerror (override with -T permissive)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no Extended
Comprehensive SMART Error Log, ignoring -l xerror
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, SMART Error Logs report
different error counts: 12 != 143
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SMART Offline Data
Collection capability, ignoring -l offlinests (override with -T permissive)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SMART Self-test
capability, ignoring -l selfteststs (override with -T permissive)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, no ATA CHECK POWER
STATUS support, ignoring -n Directive
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, CHECK POWER STATUS
returned 17, not ATA compliant, ignoring -n Directive
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, ATA settings applied:
<settings string>
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, no SCT Error Recovery
Control support, ignoring -l scterc
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, set of SCT Error
Recovery Control failed
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, SCT Error Recovery
Control set to: Read: 7, Write: 7
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, state read from
/var/lib/smartmontools/smartd.ST3500620AS-5QM2644Q.ata.state

```

*** Example: ATA error count 9 inconsistent with error log pointer 5**

These messages indicate the status or a failure of a scan of an ATA device. The SafeNet Luna Network HSM appliance does not use ATA devices.

SCSI Device Scan Messages

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Both 36 and 64 byte
INQUIRY failed; skip device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, INQUIRY response less
than 36 bytes; skip device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, not a disk like device
[PDT=0x7], skip
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, WDC WD2500JS-60NCB1
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, NOT READY (e.g. spun
down); skip device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, NO MEDIUM present; skip
device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, BECOMING (but not yet)

```

```

READY; skip device
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, failed Test Unit Ready
[err=-22]
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Bad IEC (SMART) mode
page, err=-5, skip device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, IE (SMART) not enabled,
skip device
Try 'smartctl -s on /dev/sda' to turn on SMART features
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, unexpectedly failed to
read SMART values
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, can't monitor
Temperature, ignoring -W 3,44,48
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, does not support SMART
Self-Test Log.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, could not disable
autosave (set GLTSD bit).
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, disabled autosave (set
GLTSD bit).
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, could not enable
autosave (clear GLTSD bit).
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, enabled autosave
(cleared GLTSD bit).
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, state read from
/var/lib/smartmontools/smartd.ST3500620AS-5QM2644Q.ata.state

```

These messages indicate the status or a failure of a scan of a SCSI or SCSI-like device. The SafeNet Luna Network HSM appliance uses a serial ATA device which SMART considers SCSI-like. However, the messages in this section are unexpected in the logs.

Log Self-Test Progress & Errors

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, previous self-test
completed without error
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, previous self-test was
aborted by the host
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, previous self-test was
interrupted by the host with a reset
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, previous self-test
could not complete due to a fatal or unknown error
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, previous self-test
completed with error (unknown test element)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, previous self-test
completed with error (electrical test element)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, previous self-test
completed with error (servo/seek test element)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, previous self-test
completed with error (read test element)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, previous self-test
completed with error (handling damage?)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, self-test in progress,
80% remaining
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, unknown self-test
status 0x1f
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, Self-Test Log error
count increased from 12 to 13
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, new Self-Test Log error
at hour timestamp 7202
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Self-Test Log error
count decreased from 27 to 26

```

```

2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, does not support Self-
Tests
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, skip since Self-Test
already in progress
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, not capable of L Self-
Test
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, not capable of Long
Self-Test
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, execute Long Self-Test
failed (err: -1)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of Offline
or Self-Testing.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of Offline
or Self-Testing.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of Offline
Immediate Test
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of
Conveyance Self-Test
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of Short
Self-Test
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of Long
Self-Test
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of
Selective Self-Test
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, will not skip scheduled
Offline Immediate Test despite unclear Self-Test byte (SAMSUNG Firmware bug).
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, skip scheduled Offline
Immediate Test; 20% remaining of current Self-Test.
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, prepare Offline
Immediate Test failed
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, next test span at LBA
1256500 - 1460000 2500000 sectors, 50% - 58% of disk).
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, execute Offline
Immediate Test failed.

```

These messages indicate the status of an in-progress self-test, a failure to log self-tests or a self-test error.

Test Schedule

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, old test of type S not
run at Wed Feb 29 02:00:00 2012 GMT, starting now.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Next scheduled self tests (at most 5 of
each type per device):
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, will do test 1 of type
S at Wed Feb 29 02:00:00 2012 GMT
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Totals [Wed Feb 29 12:05:00 2012 GMT -
Wed Feb 29 02:00:00 2012 GMT]:
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, will do 050 tests of
type S

```

These messages indicate status of scheduled tests.

Check Pending Sector Count Identifier

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, can't monitor Current
Pending Sector count - no Attribute 197
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, ignoring Current
Pending Sector count - bogus Attribute 197 value 3442 (0xd72)

```

These messages indicate an error on the sector count identifier for a SMART attribute.

Critical Attribute Change

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, SMART Usage Attribute:
7 Seek_Error_Rate changed from 10000 to 20000
```

Messages such as this example, show critical changes in SMART attributes, possibly indicating impending disk failure.

Critical Prefailure Change

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, SMART Prefailure
Attribute: 1 Raw_Read_Error_Rate changed from 92 to 51
```

Messages such as this example, show critical changes in SMART pre-failure attributes, possibly indicating impending disk failure.

Sector Count Change

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, 1237505 Currently
unreadable (pending) sectors
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, 1237505 Total
unreadable (pending) sectors
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, 1237505 Offline
uncorrectable sectors
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, 1237505 Total offline
uncorrectable sectors
```

These messages indicate sector attribute changes. Any one of these messages may include additional information at the end of the message to indicate the change from the last measure, [e.g., (changed 57500)].

Temperature Change

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, failed to read
Temperature
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: [trip Temperature is 65 Celsius]
```

The first message indicates that the SMART control daemon was unable to obtain a measure of the temperature attribute. The second message indicates the temperature at which the drive shuts down if it measures this value.

Attribute Error

```
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, Failed SMART usage
Attribute: 185 Head Stability.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, same Attribute has
different ID numbers: 185 = 200
```

These messages indicate errors by the SMART control daemon to interpret SMART attributes.

Check ATA Device Health

```
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, open() failed: No such
device or address
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, opened ATA device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, CHECK POWER STATUS
spins up disk (0x00 -> 0xff)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, CHECK POWER STATUS
returned 1, not ATA compliant, ignoring -n Directive
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, is in STANDBY mode,
suspending checks
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, IDLE mode ignored due
to reached limit of skipped checks (15 checks skipped)
```

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/ada, is back in ACTIVE or
IDLE mode, resuming checks (1 check skipped)
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, not capable of SMART
self-check
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, FAILED SMART self-
check. BACK UP DATA NOW!
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, failed to read SMART
Attribute Data
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/ada, ATA error count
increased from 15 to 16

```

These messages provide health status of ATA device attributes.

Check SCSI Device Health

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, open() failed: No such
device or address
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, opened SCSI device
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, failed to read SMART
values
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, SMART Failure: <failure
string>
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, self-test in progress
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, non-SMART asc,ascq:
4,26
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, SMART health: passed*

```

* if debug mode enabled.

These messages provide health status of SCSI device attributes.

Auto Standby Feature

```

2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, System auto standby
enable failed: <failure string>
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Disable auto standby
not supported, ignoring ',ns' from -l offlinests,ns and -l selfteststs,ns
2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: Device: /dev/sda, Self-test(s) completed,
system auto standby enable failed: <failure string>
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Self-test(s) completed,
system auto standby enabled
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Self-test(s) in
progress, system auto standby disable rejected: <failure string>
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, Self-test(s) in
progress, system auto standby disabled

```

These messages indicate failures of the auto standby feature of the hard disk.

Sleep and Wakeup

```

2012 Feb 29 12:05:01 myLuna daemon crit smartd[1234]: System clock time adjusted to the past.
Resetting next wakeup time.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Sleep time was 10 seconds too long,
assuming wakeup from standby mode.
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Signal USR1 - checking devices now rather
than in 30 seconds.

```

These messages indicate failures in the mechanism to sleep and wake up the SMART control daemon at prescribed intervals to query and report on SMART attributes.

Offline Log Collection Status

```

2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, offline data collection
was never started (auto:on)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, offline data collection
was completed without error (auto:on)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, offline data collection
is in progress (auto:on)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, offline data collection
was suspended by an interrupting command from host (auto:on)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, offline data collection
was aborted by an interrupting command from host (auto:on)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, offline data collection
was aborted by the device with a fatal error (auto:on)
2012 Feb 29 12:05:01 myLuna daemon info smartd[1234]: Device: /dev/sda, unknown offline data
collection status 0x78

```

These messages indicate failures to perform offline data collection. Depending upon the status, the SMART control daemon logs these messages as either `crit` or `info`; the examples above show `info` only.

SNMP

SafeNet Luna Network HSM appliances support monitoring via the simple network management protocol. A daemon, **snmp**, runs in the background on the appliance for this purpose.

Facility Keyword	Software Process	Log File
user	root	messages

Expected Log Messages

This revision of *Syslog and SNMP Monitoring Guide* identifies only one expected log message.

Starting Daemon

```
2012 Feb 29 12:05:01 myLuna user notice root: Starting snmpd
```

This message indicates that the SNMP daemon is being started.

Unexpected Log Messages

A future revision of *Syslog and SNMP Monitoring Guide* will describe unexpected log messages.

NTP

Network Time Protocol is an optional service of Luna appliances to synchronize the system clock to a coordinated universal time.

A future revision of *Syslog and SNMP Monitoring Guide* will describe NTP log messages.

SSH

Secure Shell or SSH is the process that offers secure, trusted connection to a restricted shell on the SafeNet Luna Network HSM appliance for administrative purposes.

Facility Keyword	Software Process	Log File
Authpriv	sshd[pid]	secure

This version of *Syslog and SNMP Monitoring Guide* shows some examples of log messages you might find for SSH but is not a comprehensive account of all possible messages.

- > ["Expected Log Messages" below](#)
- > ["Unexpected Log Messages" below](#)

Expected Log Messages

```
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Server listening on 0.0.0.0 port 22.
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Received signal 15; terminating.
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Accepted password for <user name> from
192.168.10.100 port 51286 ssh2
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Received disconnect from 192.168.10.100:
11: disconnected by user
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Did not receive identification string from
192.168.0.100
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Received disconnect from 192.168.0.100:
11: The user disconnected the application
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Accepted publickey for <admin | monitor>
from 192.168.0.100 port 2299 ssh2
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: pam_unix(sshd[1234]:session): session
opened for user admin by (uid=0)
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: pam_unix(sshd[1234]:session): session
closed for user admin
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Received disconnect from 192.168.0.100: 2:
disconnected by server request
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Connection closed by 192.168.0.100
[preauth]
```

These messages indicate normal SSH activity. <user name> is “admin”, “operator”, “monitor”, “audit” or a customer-defined name.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

```
2012 Feb 29 12:05:01 myLuna authpriv err  sshd[1234]: error: Bind to port 22 on 0.0.0.0 failed:
Address already in use.
2012 Feb 29 12:05:01 myLuna authpriv crit  sshd[1234]: fatal: Cannot bind any address.
2012 Feb 29 12:05:01 myLuna authpriv crit  sshd[1234]: fatal: Read from socket failed: Connection
reset by peer [preauth]
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Disconnecting: Too many authentication
failures for <user name> [preauth]
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Invalid user <user name> from
192.168.0.100
```



```

2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: input_userauth_request: invalid user <user
name> [preauth]
2012 Feb 29 12:05:01 myLuna authpriv notice  sshd[1234]: pam_unix(sshd[1234]:auth):
authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=192.168.0.100 user=admin
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Failed password for admin from
192.168.0.100 port 1615 ssh2
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: subsystem request for sftp
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: subsystem request for sftp failed,
subsystem not found
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: syslogin_perform_logout: logout() returned
an error
2012 Feb 29 12:05:01 myLuna authpriv alert  sshd[1234]: pam_unix(sshd[1234]:auth): check pass;
user unknown
2012 Feb 29 12:05:01 myLuna authpriv crit  sshd[1234]: pam_succeed_if(sshd[1234]:auth): error
retrieving information about user <user name>
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: User root from 192.168.0.100 not allowed
because not listed in AllowUsers
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Bad protocol version identification 'id'
from 10.168.64.4
2012 Feb 29 12:05:01 myLuna authpriv warn  sshd[1234]: Deprecated pam_stack module called from
service "sshd[1234]"
2012 Feb 29 12:05:01 myLuna authpriv notice  sshd[1234]: PAM 4 more authentication failures;
logname= uid=0 euid=0 tty=ssh ruser= rhost=10.101.18.32 user=admin
2012 Feb 29 12:05:01 myLuna authpriv alert  sshd[1234]: PAM service(sshd[1234]) ignoring max
retries; 5 > 3
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Received request to connect to host
127.0.0.1 port 3306, but the request was denied.
2012 Feb 29 12:05:01 myLuna authpriv err  sshd[1234]: error: Received disconnect from
192.168.0.100: 3: com.jcraft.jsch.JSchException: Auth fail [preauth]
2012 Feb 29 12:05:01 myLuna authpriv crit  sshd[1234]: fatal: Access denied for user admin by PAM
account configuration [preauth]
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Setting tty modes failed: Invalid argument
2012 Feb 29 12:05:01 myLuna authpriv crit  sshd[1234]: fatal: PAM: pam_chauthtok():
Authentication token manipulation error
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: syslogin_perform_logout: logout() returned
an error
2012 Feb 29 12:05:01 myLuna authpriv info  sshd[1234]: Received SIGHUP; restarting.

```

These messages indicate abnormal SSH activity. A future revision of *Syslog and SNMP Monitoring Guide* will provide more details of what each message means.

Privileged Services

Facility Keyword	Software Process	Log File
Authpriv	See list that follows	secure

The following privileged services log messages to the secure log file with a software process identifier if shown.

- > useradd[pid]
- > chage[pid]
- > passwd
- > usermod[pid]
- > login

> groupadd[pid]

Expected Log Messages

useradd

```
2012 Feb 29 12:05:01 myLuna authpriv info useradd[1234]: new user: name=recover, UID=0, GID=0,
home=/home/recover, shell=/usr/lunasa/bin/recover
2012 Feb 29 12:05:01 myLuna authpriv info useradd[1234]: new user: name=<admin | monitor |
operator>, UID=0, GID=0, home=/home/admin, shell=/usr/lunasa/lush/lush
2012 Feb 29 12:05:01 myLuna authpriv info useradd[1234]: new user: name=mysql, UID=500, GID=500,
home=/usr/local/mysql, shell=/sbin/nologin
```

These messages indicate that the Linux utility **useradd(1)** successfully created accounts for the identified user (e.g., recover, admin, monitor, operatory or mysql).

chage

```
2012 Feb 29 12:05:01 myLuna authpriv info chage[1234]: changed password expiry for <username>
```

This message indicates that the Linux utility **chage(1)** successfully changed the number of days between password changes and the date of the last password change for <username>. <username> is one of “admin”, “operator”, “monitor” or a user created by an administrator.

passwd

```
2012 Feb 29 12:05:01 myLuna authpriv notice passwd: pam_unix(passwd:chauthtok): password changed
for admin
```

This message indicates that the Linux utility **passwd(1)** successfully updated the admin user’s authentication token.

usermod

```
2012 Feb 29 12:05:01 myLuna authpriv info authpriv info usermod[1234]: change user '<username>'
password
```

This message indicates that the Linux utility **usermod(1)** successfully updated the login information for <username>. <username> is one of “admin”, “operator”, “monitor” or “audit.”

login

```
2012 Feb 29 12:05:01 myLuna authpriv authpriv info login: pam_unix(login:session): session
opened for user < admin | recover> by LOGIN(uid=0)
2012 Feb 29 12:05:01 myLuna authpriv authpriv info login: pam_unix(login:session): session
closed for user <admin | recover>
2012 Feb 29 12:05:01 myLuna authpriv authpriv info login: DIALUP AT ttyS0 BY <admin | recover>
```

The first two messages indicate that the Linux utility **login(1)** successfully established a new session with the SafeNet Luna Network HSM appliance or terminated a session. The third message indicates that the session is via the serial port on the front console of the appliance.

groupadd

```
2012 Feb 29 12:05:01 myLuna authpriv authpriv info groupadd[2558]: new group: name=<uucp |
mysql>, GID=<14 | 500>
```

This message indicates that the Linux utility **groupadd(1)** successfully created a new group definition with the GID shown. The <gid> for uucp is 14; for mysql, 500.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

login

```
2012 Feb 29 12:05:01 myLuna authpriv authpriv alert login: pam_unix(login:auth): check pass;
user unknown
2012 Feb 29 12:05:01 myLuna authpriv authpriv notice login: pam_unix(login:auth): authentication
failure; logname=LOGIN uid=0 euid=0 tty=ttyS0 ruser=<user name> rhost=192.168.0.100
2012 Feb 29 12:05:01 myLuna authpriv authpriv crit login: pam_succeed_if(login:auth): error
retrieving information about user <user name>
2012 Feb 29 12:05:01 myLuna authpriv authpriv notice login: FAILED LOGIN 1 FROM (null) FOR <user
name>, User not known to the underlying authentication module
2012 Feb 29 12:05:01 myLuna authpriv authpriv alert login: PAM service(login) ignoring max
retries; 4 > 3
2012 Feb 29 12:05:01 myLuna authpriv authpriv err login: Authentication failure
```

These messages indicate failure on the part of an administrator to login to the SafeNet Luna Network HSM appliance. The first four messages indicate that the login attempt was with a username unknown to the appliance. The fifth message indicates that the threshold number of failed login attempts has been reached or exceeded. The last message is the Luna IS-specific message in place of the second message above.

Kernel

Facility Keyword	Software Process	Log File
kern	kernel	messages

Expected Log Messages

Shutting Down Watchdog Timer

```
2012 Feb 29 12:05:01 myLuna kern info kernel: iTCO_wdt: Unexpected close, not stopping watchdog.
2012 Feb 29 12:05:01 myLuna kern info kernel: iTCO_wdt: Watchdog Module Unloaded.
```

These messages indicate that the kernel shutdown the hardware watchdog timer, likely a result of the `lunash:>sysconf appliance watchdog disable` command.

CHAPTER 3: Thales Group Components

Thales Group has developed a number of services that run within the SafeNet Luna Network HSM appliance. Some of these services use **syslog** to record significant actions and events. The following list identifies the Thales Group services that use syslog.

- > ["sysstat" below](#) -- system status and monitoring (including LCD)
- > ["HSM Callback Service" on page 54](#) -- CBS (HSM callback service and remote PED)
- > ["Network Trust Link Service" on page 55](#) -- NTLS
- > ["Host Trust Link" on page 67](#) -- HTL
- > ["Network Bus Service" on page 71](#) -- NBS
- > ["Remote Backup Service" on page 71](#) -- RBS
- > ["Luna Administrative Shell: State and Status" on page 71](#)
- > ["Luna Shell: Command Logging" on page 72](#)
- > ["cron & crontab" on page 74](#)
- > ["Certificate Monitoring Daemon" on page 75](#) -- certmonitord (NTLS certificate expiration monitoring)
- > ["Luna SNMP Trap Agent" on page 77](#) -- LSTA
- > ["Admin API" on page 79](#)

sysstat

The system status daemon reports on the health of the SafeNet Luna Network HSM appliance via syslog and the LCD on the front panel of the appliance.

Facility Keyword	Software Process	Log File
user	sysstatd	messages

Expected Log Messages

The following log messages are normal and expected entries in the log files.

Service Started

2012 Feb 29 12:05:01 myLuna user info sysstatd: ----- Luna System State Server - Started.
This message indicates that the system status daemon is running, normal for a SafeNet Luna Network HSM appliance power up operation.

Service Stopped

2012 Feb 29 12:05:01 myLuna user info sysstatd: ----- Luna System State Server - Stopped.

This message indicates that the system status daemon is stopped, normal for a SafeNet Luna Network HSM appliance shutdown operation.

System Status

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Luna System State Server - OOS Errors:
15,100,60!
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Luna System State Server - OFL Errors:
50,15,20,100,55,60!
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Luna System State Server - InSrvTrb Errors: 1!
```

Messages formatted like these examples represent normal reporting of SafeNet Luna Network HSM appliance health when it is not “in service.” The specific error codes indicate one or more potential problems with specific services of the SafeNet Luna Network HSM appliance operation. For details of their meaning, refer to the description of the error codes in ["Front-panel LCD Display" on page 1](#) in the *Appliance Administration Guide*.

Up Time

```
2012 Feb 29 04:02:01 myLuna syslog info logger: uptime: 04:02:01 up 6:50, 2 users, load average:
0.38, 0.14, 0.04
```

This message indicates the uptime for the SafeNet Luna Network HSM appliance. **cron** is responsible for the message on a daily basis, usually early in the morning. Note that the facility keyword and software process are not the same as those for the system status daemon but is included in this section given its relationship to status monitoring.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do so, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

Cannot Open Files Needed to Identify Product

```
2012 Feb 29 12:05:01 myLuna user err sysstatd: Cannot open PRODUCT file.
```

```
2012 Feb 29 12:05:01 myLuna user err sysstatd: Cannot open VERSION file.
```

```
2012 Feb 29 12:05:01 myLuna user err sysstatd: Cannot open RELEASE file.
```

These messages indicate a missing or corrupted file necessary to identify the product on the LCD and/or via a LunaSH command. A PRODUCT:VERSION:RELEASE example is SA:5.3.0:5.

Cannot Set Signal Handler

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Cannot set sighandler for SIGTERM.
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Cannot set sighandler for SIGINT.
```

These messages indicate that the system status daemon was unable to set up signal handling for the SIGTERM and/or SIGINT signals.

Failed to Detach

```
2012 Feb 29 12:05:01 myLuna user err sysstatd: Failed to detach sysstatd from console.
```

This message indicates that the startup procedure for the system status daemon failed, specifically that the daemon did not launch into a background process.

Unknown Error

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: unknown error while trying to obtain the system
state.
```

This message indicates that the system status daemon was unable to determine health of the SafeNet Luna Network HSM appliance and represents a logic error within how the daemon was instrumented.

Failed to Open Device

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Failed to open the LCD device.
```

This message indicates that the system status daemon was unable to open the TTY device that maps to the LCD on the front of the SafeNet Luna Network HSM appliance.

Failed to Open or Read File

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Did NOT find a system state error file here: /usr/lunasa/sysstat/statuserror.txt.
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: Did NOT find a system status file here: /usr/lunasa/sysstat/statusoutput.txt.
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: The SysStat service failed while reading the file: /usr/lunasa/sysstat/statusoutput.txt. It appears to be empty.
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: The SysStat service cannot determine the system state. Missing the status script: /usr/lunasa/sysstat/statusscript.sh.
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: The SysStat service failed while trying to open the file: /usr/lunasa/sysstat/ethip.txt.
```

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: The SysStat service failed while reading the file: /usr/lunasa/sysstat/ethip.txt. It appears to be empty.
```

These messages indicate a failure to find and/or open status files used by the system state daemon to determine the health of the SafeNet Luna Network HSM appliance. **statuserror.txt** shows the error codes, status codes and explanations for the different health status items reported for the appliance.

statusoutput.txt contains the current status of the appliance. **statusscript.sh** is a shell script that creates the **statusoutput.txt** file by running several other scripts and utilities to collect the state of the appliance. **ethip.txt** contains the details of the Ethernet ports (whether configured, IP address, host name and link status).

Failed to Determine IP Address

```
2012 Feb 29 12:05:01 myLuna user info sysstatd: The SysStat service failed while trying to obtain the ethernet IP addresses.
```

This message indicates that the script used to determine the IP address of the SafeNet Luna Network HSM appliance failed to execute successfully.

HSM Callback Service

The HSM Callback Service (CBS) is a Thales Group daemon that communicates with the cryptographic keycard (i.e., the PCIe expansion card) within the SafeNet Luna Network HSM appliance. This service supports audit logging and remote PED features.

Facility Keyword	Software Process	Log File
local5	PEDclient [pid]	lunalog

There are hundreds of callback service messages. A future version of *Syslog and SNMP Monitoring Guide* will attempt to document callback service messages. If you encounter any and you would like more information, please contact Thales Group Technical Support for assistance.

Network Trust Link Service

The network trust link service (NTLS) is the cryptographic services dispatcher of the SafeNet Luna Network HSM appliance. On system startup, NTLS runs as a daemon and listens for incoming connection requests on TCP/IP sockets. Using Secure Sockets Layer, NTLS secures communication between the appliance and a client, each party authenticating the other with certificates and encrypting data exchanged.

Thales Group has arranged NTLS into two principal components and the organization of NTLS log messages in this document reflects this architecture. A generic datapath engine manages the socket communications. This engine is common across Luna appliances (e.g., Luna SA, Luna SP and Luna IS use the same engine). A product-specific command processor parses and responds to the messages NTLS receives from and sends back to the client. This document makes explicit note for older messages; otherwise, assume that the descriptions apply for more current product releases.

Facility Keyword	Software Process	Log File
Local5	NTLS [pid]	lunalog

- > ["Datapath: Expected Log Messages" below](#)
- > ["Datapath: Unexpected Log Messages" on page 58](#)
- > ["Luna SA Command Processor: Expected Log Messages" on page 63](#)
- > ["Luna SA Command Processor: Unexpected Log Messages" on page 64](#)

Datapath: Expected Log Messages

The following log messages are normal and expected entries in the log files from the datapath engine of NTLS.

Startup

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Starting up NTLS.....
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_preload:
SUCCESSFULLY loaded
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : 1 = ENGINE_ctrl_cmd_string
(...SO_PATH...)
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : 1 = ENGINE_ctrl_cmd_string
(...ID...)
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : 1 = ENGINE_ctrl_cmd_string
(...LOAD...)
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_load: SUCCESSFULLY
enabled for ALL ops
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : HSM crypto support for data
path* SSL operations enabled**
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : "Luna SA 5.0 Command Processor"
module version 1.0 loaded
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLS data path configured with 5
inbound worker threads and 5 outbound worker threads
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLS is online and operational.
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Data path TCP keep alive is
configured as : TCP_KEEPIDLE = 10 sec : TCP_KEEPINTVL = 10 sec : TCP_KEEPCNT = 2 retries
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Data path TCP keep alive is
configured as : TCP_KEEPIDLE = 10 sec : SSL cipher list set to AES256-GCM-SHA384
    
```

The first message indicates that NTLS is starting up. The next five messages trace the progress of the SSL start up sequence. The remaining messages show the progress through to a successful startup.

* "NTLS" in older implementations

** Or "disabled" or "NOT enabled" if the keys-in-hardware option is enabled but the SSL engine failed to load ("luna_engine_load: failed to ENGINE_set_default for ALL ops").

Failed to Enable SSL Engine for All Operations

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_load: failed to
ENGINE_set_default for ALL ops
```

This message indicates that the SSL engine was unable to initialize properly.

Client Connections

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Incoming connection request... :
192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Connection accepted
from: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Handshake result from:
192.168.0.100/40847, result: Success
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : NTLS Client
"192.168.0.100" connected and authenticated : 192.168.0.100/40847.
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Connection
terminating: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLA client "192.168.0.100" has
disconnected: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Receive timer expired for client
"192.168.0.100". Terminate client connection: 192.168.0.100/40847*
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Receive timer expired for client
"192.168.0.100" : 192.168.0.100/40847**
```

These messages indicate connect establishment and termination by NTLS. You should find pairs of connection accepted and disconnected messages in the logs. The last two messages result when a client connects but is inactive for a period configured for NTLS.

* This message results if the timeout is for a scheduled cleanup.

** This message results if the timeout is not for a scheduled cleanup.

Client Credentials Cannot be Verified

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Client credentials
cannot be verified. Connection terminated : 192.168.0.100/40847
```

This message indicates that the client connection request could not be completed. A possible root cause is that the client's certificate is invalid (e.g., has a wrong IP address or hostname).

Cache Monitor

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Client certificate verify
location monitor started
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Detected client certificate
removed from verify location. Flush verify location cache
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Client certificate verify
location monitor terminated
```

These messages indicate that NTLS has started to monitor client certificates registered with the process.

Connection Instance Added and Removed

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLA Client "192.168.0.100"
Connection instance removed : 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLA Client "192.168.0.100"
connected and authenticated : 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLA Client "192.168.0.100" has
disconnected: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLA Client "192.168.0.100" has
disconnected: 192.168.0.100/40847
```

These messages indicate NTLS's action to add and remove connection instances.

Client Credentials Cannot be Verified

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Client credentials cannot be
verified. Connection terminated : 192.168.0.100/40847
```

This message indicates that an application connected to NTLS but did not provide the SSL credentials to complete authentication.

Handshake Failed

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000711 : Fail to establish a
secure channel with client : 192.168.0.100/40847 : RC_SSL_FAILED_HANDSHAKE
```

This message indicates that an application attempted to connect with SSL credentials that did not conform to the algorithms and/or cryptographic strength expected by NTLS.

Unable to Initialize Server Socket

```
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000500 : NTLS listening port
could not Bind : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000500 : Unable to initialize
data path* server socket : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000500 : NTLS initialization
failed : RC_SOCKET_ERROR
```

These messages indicate that NTLS was unable to initialize the server socket. A possible root cause is that the network interface is not properly configured.

*"NTLS" in older implementations.

Connected to Server

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : 192.168.0.100
connected to server : 192.168.0.100/40847
```

This message indicates that NTLS has successfully established an outgoing connection with a peer or remote server.

Shutting Down

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Shutting down NTLS....
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Initiating [sic] dispatch
termination.
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Dispatching has been
terminated.
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Terminating.
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : "Luna SA 5.0 Command Processor"
shut downed
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : NTLS terminated
```

These messages show the progression of steps as NTLS terminates.

Datapath: Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do so, please consult the user documentation for guidance on how to correct the problem.

NTLS Terminating

```
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Terminating.
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Failed to start as
daemon. Terminating.
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Failed to
initialize application. Terminating.
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Failed to create
server. Terminating.
```

These messages indicate that NTLS failed at startup. Possible root causes for the first message are a failure to create internal data structures needed by NTLS or a failure to generate the private key and certificate needed by NTLS.

Failed to Load SSL Engine

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_load: failed to
ENGINE_by_id
```

This message indicates that OpenSSL was unable to load the specified engine. A possible root cause is the wrong engine identifier specified in the OpenSSL configuration file.

Skip C_Initialize

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : 1 = ENGINE_ctrl_cmd_string
(...SKIP_C_INITIALIZE...)
```

This message indicates that the OpenSSL engine for LunaCA3 skipped the call the C_Initialize. Luna appliances do not use the LunaCA3 engine.

Configured for RSA Operations

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_load: SUCCESSFULLY
enabled for RSA ops
```

This message indicates that the SSL engine used by NTLS is configured only for RSA operations.

Failed to Pre-Load SSL Engine

```
Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_preload: failed to load
```

This message indicates that the SSL engine was unable to preload. A possible root cause is the wrong engine identifier configured on the Luna appliance.

Failed to Enable SSL Engine for RSA Operations

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : luna_engine_load: failed to
ENGINE_set_default for RSA ops
```

This message indicates that the SSL engine was unable to initialize properly for RSA operations.

Failed to Initialize

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Missing command processor
library for NTLS.
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Command processor
module not found : "Luna SA 5.0 Command Processor" : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000105 : cp_get_supported_
versions function not found in command processor "Luna SA 5.0 Command Processor" : RC_FUNCTION_
```

NOT_SUPPORTED

```

2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000105 : cp_initialize_p
function not found in command processor "Luna SA 5.0 Command Processor" : RC_FUNCTION_NOT_
SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000105 : cp_get_processor_
name_p function not found in command processor "Luna SA 5.0 Command Processor" : RC_FUNCTION_NOT_
SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000105 : cp_shutdown
function not found in command processor "Luna SA 5.0 Command Processor" : RC_FUNCTION_NOT_
SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000105 : cp_client_
registration_observer function not found in command processor "Luna SA 5.0 Command Processor" :
RC_FUNCTION_NOT_SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000105 : cp_configure
function not found in command processor "Luna SA 5.0 Command Processor" : RC_FUNCTION_NOT_
SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to initialize
"Luna SA 5.0 Command Processor" module version 1.0 for data path module version 1.0 : RC_GENERAL_
ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000102 : Failed to initialize
"Luna SA 5.0 Command Processor" module version 1.0 : RC_GENERAL_ERROR*
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000105 : "Luna SA 5.0 Command
Processor" module version 1.0 is incompatable [sic] with data path : RC_FUNCTION_NOT_SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000500 : Unable to initialize
openssl library : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000500 : Unable to initialize
openssl server context : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Application
specific initialization failed for NTLS.
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Unable to
initialize dispatcher.
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration client certificate file name invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration client private key file name invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration ssl configuration file name invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Failed to create
private key/certificate: RC_GENERAL_ERROR, error: -1

```

These messages indicate a failure of the datapath component to initialize itself at NTLS startup.

* For older implementations.

No Command Processor Module Configured

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Data path is not configured with
a command processor module. Use default command processor setting

```

This message indicates an error in how NTLS is configured.

Fail to Accept Connections

```

2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Unable to create a
new connection.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Accept failed.
Reason: RC_GENERAL_ERROR

```

These messages indicate an NTLS failure to establish the TCP/IP socket necessary to listen for and accept connections from clients.

Fail to Create Client Connection

```
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000500 : Fail to create
connection instance : 192.168.0.100/40847 : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 warn NTLS [1234]: warning : 0xc0000500 : Fail to accept a
client TCP connection : RC_SOCKET_ERROR
```

These messages indicate a failure to create a client connection on an incoming request.

Cache Monitor Failed

```
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : CA cache monitor fail
to initialize : RC_GENERAL_ERROR
```

This message indicates that the thread spawned to monitor client certificates failed to initialize.

Connection Instance Failures

```
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to create timer
object for connection instance : 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000004 : Fail to create ssl
object for connection instance : 192.168.0.100/40847 : RC_UNEXPECTED
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Client request
header malformed : 192.168.0.100/40847 : RC_DATA_INVALID
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000001 : Fail to allocate
command buffer : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to forward client
request to command processor module : 192.168.0.100/40847 : RC_GENERAL_ERROR
```

These messages indicate a failure of NTLS to add or remove a client connection instance.

Non-Luna Client Connect Attempt

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000004 : Connection attempt
from non-Luna client : 192.168.0.100/40847 : RC_UNEXPECTED
```

This message indicates that an application attempted to connect to the Luna appliance via NTLS but did not provide the proper SSL message exchange expected.

Command Process Unloaded

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Command Processor module
unloaded
```

This message indicates that NTLS unloaded its command processor module (a shared object library).

SSL Certificates Problems

```
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000701 : Bad SSL handle
while determining hostname: RC_SSL_CTX_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc000070a : Failed to get
current certificate while determining hostname: RC_SSL_INVALID_CERT_STRUCTURE
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc000070a : Failed to get
certificate text while determining hostname: RC_SSL_INVALID_CERT_STRUCTURE
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc000070a : Invalid client
certificate while determining hostname: RC_SSL_INVALID_CERT_STRUCTURE
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000701 : Unable to retrieve
native SSL CTX handle: RC_SSL_CTX_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000702 : SSL error setting
cipher list: RC_SSL_CIPHER_LIST_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration client certificate path invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000703 : Load verify
locations failed for: CACert.pem, RC_SSL_CERT_VERIFICATION_LOCATION_ERROR
```

```

2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000703 : Load verify
locations failed for single client: CACert.pem, RC_SSL_CERT_VERIFICATION_LOCATION_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration server certificate filename invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000704 : Chrystoki using
server certificate failed: /usr/lunasa/vts/server/server.pem, RC_SSL_LOAD_SERVER_CERT_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration server private key filename invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000705 : Error loading the
server private key: RC_SSL_LOAD_SERVER_PRIVATE_KEY_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000706 : Error checking the
server private key: RC_SSL_VALIDATE_SERVER_PRIVATE_KEY_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000406 : Fail to retrieve
host IP Address : RC_SOCKET_ADDRESS_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000406 : Fail to retrieve
host port : RC_SOCKET_ADDRESS_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000406 : Unable to create
context. : RC_SOCKET_ADDRESS_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000002 : Failed to
initialize server for address 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000002 : Chrystoki
configuration client certificate filename invalid: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000708 : Chrystoki using
client certificate failed: CACert.pem, RC_SSL_LOAD_CLIENT_CERT_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration client private key filename invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc000070b : Error loading the
client private key: RC_SSL_LOAD_CLIENT_PRIVATE_KEY_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000402 : Chrystoki
configuration server certificate authority filename invalid: RC_FILE_NAME_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000703 : Error loading
server certificate authorities: RC_SSL_CERT_VERIFICATION_LOCATION_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000002 : Unable to update
context. : RC_GENERAL_ERROR

```

These messages indicate a failure of the underlying communication mechanism NTLS uses to exchange messages between a client application and the Luna appliance.

Client Authentication Failures

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Failed writing
identity string. Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Failed connect.
Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Failed handshake.
Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Identify result from:
192.168.0.100/40847, result: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Failed reading
identity string. Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to forward
dataless client request to command processor module : 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000102 : Client request
header malformed : 192.168.0.100/40847 : RC_DATA_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000001 : Fail to allocate
command buffer : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Failed reading command
buffer. Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to forward

```

```

client request to command processor module : 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Failed writing to
client Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Last write before
reinitializing failed. Reason: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Expected cancelled
operation, actual: RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Reinitializing
connection for: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to get response
buffer: 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Expecting client
certificate. None received.
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : Unable to retrieve
client certificate.: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0xc0000002 : cp_server_connected
failed : 192.168.0.100/40847

```

These messages indicate a failure of NTLS to verify the client requesting to connect to the Luna appliance.

Port Monitoring Failures

```

2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000406 : Fail to retrieve
host IP Address : RC_SOCKET_ADDRESS_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000406 : Fail to retrieve
host port : RC_SOCKET_ADDRESS_INVALID
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000500 : Fail to set socket
linger option : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000500 : Fail to set socket
reuse option : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000500 : Data path
listening port could not Bind : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000500 : Fail to set socket
non-blocking option : RC_SOCKET_ERROR
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0xc0000002 : Data path
listening port not listening

```

These messages indicate a failure of NTLS to set up the port upon which the process will listen for incoming connection requests.

Could Not Initialize Command Processor

```

2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to initialize
"Luna SA 5.0 Command Processor" module version 1.0 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to initialize
command processor cleanup mechanism.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to create
Appliance Handler for NTLS: RC_GENERAL_ERROR.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to initialize
Appliance Handler for NTLS: RC_GENERAL_ERROR.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to create server
for NTLS: RC_GENERAL_ERROR.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Failed to create thread
pool for NTLS: RC_GENERAL_ERROR.

```

These messages indicate a failure to initialize the command processor, a shared library module within the Luna appliance.

Datapath Debug Messages

```

2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Data path is using OpenSSL
0.9.5a 1 Apr 2000
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0xc0000002 Unexpected connect
response in <state string>
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0xc0000002 Unexpected client
response in <state string>
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0xc0000002 Unexpected
handshake response in <state string>
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0xc0000002 Unexpected read
response in <state string>
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0xc0000002 Unexpected write
response in <state string>

```

Thales Group does not enable logging of debug messages for NTLS. If in future Thales Group does enable this level of log messages, the messages above show examples of what you might find in the log files. In the examples above, <state string> is one of the following set: [IDENTITY STATE | HANDSHAKE STATE | PROCESSING STATE | HEADER STATE | COMMAND STATE | CONNECTING STATE | IDENTIFYING STATE | OUT OF SERVICE STATE | REINITIALIZING STATE].

NTLS Crash and Burn

```

2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: info : 0 : NTLS CRASH AND BURN! Stack dump
saved to /var/log/ntls_bt_2012-02-29_12:05:01
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: info : 0 : NTLS CRASH AND BURN and unable
to dump the stack!

```

These messages indicate a programming error. The first message indicates that NTLS terminated abnormally (on one of SIGSEGV, SIGILL or SIGBUS signals), generating a stack trace file in the process. An example stack trace file is: `ntls_bt_2012-02-29_12:05:01` found in the logs directory. Forwarding this file to Thales Group product engineering may assist a developer to isolate the reason for the abnormal termination. The second message indicates an abnormal termination but with no resulting stack trace created.

Luna SA Command Processor: Expected Log Messages

The following log messages are normal and expected entries in the log files from the Luna SA command processor of NTLS.

Configured with Worker Threads

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : SA command processor configured
with 50 worker threads

```

This message indicates that NTLS has successfully started its command processor.

HTL Configured

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Listening for HTL kill requests

```

This message indicates that host trust link (HTL) is configured and started.

USB Backup and PKI Bundle Device

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: USB token: Backup1 with serial number:
123456 has been undeployed!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: Re-deployed the USB token: Backup1 with
serial number: 123456 to Virtual token list
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: Added USB token: Backup1 with serial
number: 123456 at slot: 4 and container id: 8 to Virtual token list
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: Deployed token Backup1 with Serial Number

```

```

123456 inserted into slot 4!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: NON Deployed token Backup1 with Serial
Number 123456 inserted into slot 4!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: NON Deployed token with no label and Serial
Number 123456 inserted into slot 4!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: Deployed token Backup1 with Serial Number
123456 ejected from slot 4!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: NON Deployed token Backup1 with Serial
Number 123456 ejected from slot 4!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: NON Deployed token with no label and Serial
Number 123456 ejected from slot 4!
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Waited to find PKI token:
PKIToken with serial number: 123456 at slot: 4

```

These messages indicate actions associated with devices connected to the USB port on the Luna appliance. Luna SA supports secure backup from the internal HSM to a USB-attached backup device. Luna SA also supports a “PKI bundle” feature for root keys stored and accessed on a USB-attached device (e.g., Luna G5). The examples above show “Backup1” for the label name of the USB-attached device but this label could be PKI bundle-centric (e.g., “RootCA1”) – the messages are common for both use cases.

Command Processor Instance Removed

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: Command processor instance for client
192.168.0.100 removed : 192.168.0.100/40847

```

This message indicates that a client connection terminated and NTLS removed the command processor instance allocated for this client.

HTL Kill Request

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Received NTLS kill request from
HTL for client 192.168.0.100

```

This message indicates that the host trust link was forcibly terminated for the specified client.

Shutdown

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : "Luna SA 5.0 Command Processor"
shut downed

```

This message indicates an orderly shutdown of the Luna SA command processor.

Luna SA Command Processor: Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do so, please consult the user documentation to seek guidance on how to correct the problem.

Keep-alive Timer Failures

```

2012 Feb 29 12:05:01 myLuna local5 warn NTLS [1234]: warning : 0xc0000002 : Fail to create
client command keepalive timer : 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 warn NTLS [1234]: warning : 0 : Client command keepalive
function is disabled : 192.168.0.100/40847

```

These messages indicate a failure to start the keep-alive timer that monitors for inactive client connections.

Startup and Operational Failures

```

2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate
connection request response buffer [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate
connection request response buffer [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR

```



```

2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate
termination response buffer [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate slot
state response buffer [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate
response message buffer [type = 7] [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate
response message buffer [type = 7] [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Fail to allocate a keep
alive message buffer [size = 100] : 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to initialize token
interface : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to initialize App ID
mapping object : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Failed to initialize
remote PED support.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to initialize client
registration database : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to populate client
registration database : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to reset client
registration entries flags : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to create token
manager object : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to Initialize VToken
Manager : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000105 Version 5.0 is not
supported by command processor version 1.0 : RC_FUNCTION_NOT_SUPPORTED
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Connection count is not
incremented for APP ID [b43 : 0 : 1] : [5 : 1] 192.168.0.100/40847 :RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Out of Memory Error in
ConnectionClass::AttachResponseBuffer SetResponseBuffer : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000001 Fail to create command
processor instance for client 192.168.0.100 : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Invalid client
registration observer.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Invalid client
registration observer operation: 9.
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 Fail to return a command
response to 192.168.0.100 : 192.168.0.100/40847 : RC_GENERAL_ERROR

```

These messages indicate a failure of NTLS to start the component responsible for managing connection queues and for processing HSM-specific requests for service from clients.

Fail to Initialize Appliance Statistics

```

2012 Feb 29 12:05:01 myLuna local5 warn NTLS [1234]: warning : 0xc0000002 : Fail to initialize
appliance statistic object : RC_GENERAL_ERROR

```

This message indicates a failure of the Luna SA command processor to initialize data structures necessary to compile operational statistics. NTLS continues to operate.

HTL Required

```

2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Client 192.168.0.100 requires
HTL; HTL status is 5

```

This message indicates that the client is configured to use HTL but the host trust link is not up.

HTL Failure

```
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0 : Exception in HTL kill listener: <exception string>
```

This message indicates a failure of the HTL component of the Luna SA 5 command processor.

Client Credentials Cannot be Verified

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Client credentials cannot be verified : 192.168.0.100/40847
```

This message indicates that the client credentials cannot be verified. A possible root cause is an inconsistent entry in the client certificate for IP address or host name.

Client Terminating

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: info : 0 : Client 192.168.0.100 requested termination : 192.168.0.100/40847
```

This message indicates that the client is terminating under normal (i.e., graceful) circumstances.

Unsupported Command

```
2012 Feb 29 12:05:01 myLuna local5 info NTLS [1234]: Client attempted unsupported command 0x00000000.
```

This message indicates that the command request received by NTLS is unexpected. A possible root cause is from an application that calls a PKCS#11 function that NTLS is not programmed to either accept or ignore.

Failure to Retrieve Container List

```
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0x300000 : Fail to retrieve container list : LUNA_RET_DEVICE_ERROR
```

```
2012 Feb 29 12:05:01 myLuna local5 crit NTLS [1234]: critical : 0x300000 : Unable to load system containers! : LUNA_RET_DEVICE_ERROR
```

These messages indicate that NTLS was unable to retrieve from the internal HSM its representation of how cryptographic objects are segregated from one another. A possible root cause is a loss of communication between the internal HSM and its associated device driver.

Luna SA Command Processor Debug Messages

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Transient APP ID Mapping [5 / 5 : 1] removed :192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Open session : [1 / 0 : 1 : 20] : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Open session APP ID major [b43] doesn't have 0x80000000 set : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Create transient APP ID mapping for open session : [b43 : 0 : 1] : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : APP ID mapping already exist : [b43 : 0 : 1] : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Open session get APP ID : [b43 : 0 : 1] : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Close all sessions : [b43 : 0 : 1] : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Open Access : b43 : 0 : 1] :192.168.0.100/40847 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Create persistent APP ID mapping for [b43 : 0 : 1] : [5 : 1] : 192.168.0.100/40847
```

```
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Change existing APP ID mapping for [5 : 1] to persistent state : [80000005 : 1] : 192.168.0.100/40847
```

```

2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Closing Access for [b43 : 0 :
1] : 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Close Access APP ID major
[b43] doesn't have 0x80000000 set : [5 : 1] : 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : APP ID Mapping [b43 : 0 : 1] :
[5 : 1] removed :192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Bypassed LUNA_SEED_RANDOM
command : 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Closed Session : [5 : 1 : 266]
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Closed All Sessions : [5 / 5 :
1]
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Removed All Sessions : [5 / 5
: 1 : 20]
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Opened Session : [5 / 5 : 1 :
20 : 266]
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Created VToken for 4/8.
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : viper slot = 1
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Found 20 partitions on HSM.
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Looking for index for token
with S/N 123456 amount 4 tokens.
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Token 4 has S/N 123456.
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Token 4 is dirty.
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Entering
USBSlotHandler::MonitorSlot for slot 4
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Leaving
USBSlotHandler::MonitorSlot for slot 4
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Entering
USBSlotHandler::MonitorConfig for slot 4
2012 Feb 29 12:05:01 myLuna local5 debug NTLS [1234]: debug : 0 : Leaving
USBSlotHandler::MonitorConfig for slot 4

```

Thales Group does not enable logging of debug messages for NTLS. If in future Thales Group does enable this level of log messages, the messages above show examples of what you might find in the log files. These messages are for developer testing and hence are undocumented.

Virtual Token Create and Add Failures

```

2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Unable to add VToken
4/8 to table : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Unable to start VToken
4/8 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err NTLS [1234]: error : 0xc0000002 : Unable to initialize
VToken 4/8 : RC_GENERAL_ERROR

```

These messages indicate a failure to complete an intended operation on a virtual token within NTLS.

Host Trust Link

Host Trust Link (HTL) is an optional service to tightly bind communication between a client application and the SafeNet Luna Network HSM appliance. HTL offers protection of appliance/client registrations for cloud solutions. HTL operates as a process within the appliance (**htld**).

Facility Keyword	Software Process	Log File
Local5	HTLD [pid]	lunalog

Expected Log Messages

Normal Startup

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : NBSD loaded a PCI HSM at physical slot 2
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Network Bus Command Processor configured with 50 worker threads
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Listening for HTL status queries
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Listening for OTT expiry events
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : "Luna Network Bus 1.0 Command Processor" module version 2.0 loaded
```

These messages indicate normal startup of the HTL process.

Client Connection

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Connection accepted from: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Identify result from: 192.168.0.100/40847, result: Success
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Handshake result from: 192.168.0.100/40847, result: Success
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Starting connection processing
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : HTLD Client "192.168.0.100" connected and authenticated : 192.168.0.100/40847.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : One-time token validated successfully
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Sending dynamic certificate and private key sent to client
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Reinitializing connection for: 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Handshake result from: 192.168.0.100/40847, result: Success
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Starting connection processing
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Client connection exists; resuming : 192.168.0.100/40847
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : HTLD Client "192.168.0.100" connected and authenticated : 192.168.0.100/40847.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Initial counter information sent to client
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Client acknowledged counter data; HTL link is up
```

These messages indicate successful HTL establishment between the HTL service and a client.

Connection Removed

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Grace period expired for client 192.168.0.100; cleaning up
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Terminated 1 NTLS connections for user 192.168.0.100
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Command processor instance for client 192.168.0.100 removed : 192.168.0.100/40847
```

These messages indicate that the HTL service terminated a host trust link with a client.

Instance Wrapped

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Unique command processor instance ID wrapped around.
```

This message indicates that the internal counter that maps HTL identifiers reached its limit and reset to 1.

Shutdown

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 :: Terminating.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : "Luna Network Bus 1.0 Command Processor" shutting down.
```

These messages indicate an orderly shutdown of the HTL service.

Unexpected Log Messages

Incompatible Components

```
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000105 : Version 2.0 is not supported by HTL command processor : RC_FUNCTION_NOT_SUPPORTED
```

This message indicates an incompatibility between the datapath and command processor components of the HTL service.

Client Connection Failures

```
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to return a command response to 192.168.0.100 : 192.168.0.100/40847 : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000001 : Fail to create command processor instance for client 192.168.0.100 : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Invalid client registration observer.
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Invalid client registration observer operation: 9.
```

These messages indicate a failure of the HTL service to complete the host trust link for a client.

Client Connection in Progress

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Client connection already in progress : 192.168.0.100/40847
```

This message indicates that the HTL service detected a connection request in an unexpected state.

Invalid Client Credentials

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : Client credentials cannot be verified : 192.168.0.100/40847
```

This message indicates that the HTL service did not receive valid client credentials.

One-Time Token Expiry Handler

```
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0 : Exception in OTT expiry handler: <exception string>
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0 : Error accepting connection in OTT expiry handler: <error string>
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0 : Cannot get OTT expiry: client config file invalid
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0 : OTT expiry timer fired for client 192.168.0.100; removing OTT
```

These messages indicate a problem with the one-time token that is integral to the HTL service.

HTL Status

```
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0 : Exception in HTL status query handler: <exception string>
```

This message indicates a failure to get the status of the HTL service.

Memory Errors

```
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000001 : Failed to allocate connection request response buffer [size = 100] : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000001 : Failed to allocate auth response buffer [size = 100] : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000001 : Failed to allocate key exchange response buffer [size = 100] : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000001 : Failed to allocate counter init response buffer [size = 100] : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000001 : Failed to allocate sync beacon response buffer [size = 100] : 192.168.0.100/40847 : RC_MEMORY_ALLOCATION
```

These messages indicate a failure to allocate memory within the HTL service.

Client Setup Errors

```
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to initialize token interface : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to initialize client registration database : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to populate client registration database : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to reset client registration entry's flags : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to create token manager object : RC_GENERAL_ERROR
2012 Feb 29 12:05:01 myLuna local5 err HTLD[1234]: error : 0xc0000002 : Fail to Initialize VToken Manager : RC_GENERAL_ERROR
```

These messages indicate that the HTL service failed to set up the host trust link with an intended client.

Connection Errors

```
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Backup OTT matched in grace period
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: One-time token validated successfully
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Unable to validate one-time token
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Unable to derive shared secret for dynamic certificate exchange
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Unable to create dynamic certificate and private key
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Unable to register dynamic certificate
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Sending dynamic certificate and private key sent to client
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Initial counter information sent to client
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Received counter is not aligned with increment steps
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Counter is outside allowable drift range
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Client acknowledged
```

```

counter data; HTL link is up
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: HTL message timer
expired. Terminating HTL link.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Client disconnected.
Entering grace period.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Client disconnected.
Cleaning up.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Server closed HTL
connection. Entering grace period.
2012 Feb 29 12:05:01 myLuna local5 info HTLD[1234]: info : 0xc0000002: Server closed HTL
connection. Cleaning up.

```

These messages indicate a failure in the HTL service's ability to establish and maintain a connection with a client.

Random Number Generator

```

2012 Feb 29 12:05:01 myLuna local5 crit HTLD[1234]: critical : 0 : Unable to find HSM for RNG

```

This message indicates that the HTL service was unable to connect to the internal HSM for the service's source of random number data.

Network Bus Service

Network Bus Service (NBS) is unreleased and undocumented at this time.

Remote Backup Service

Remote Backup Service (RBS) is a client-side component of the SafeNet Luna Network HSM. A future version of *Syslog and SNMP Monitoring Guide* will describe log messages generated by RBS.

Luna Administrative Shell: State and Status

The Luna administrator shell – aka LunaSH (Luna SA) and lush (Luna IS) – is a secure shell for administering the SafeNet Luna Network HSM appliance.

Facility Keyword	Software Process	Log File
syslog or user	lush	messages

Expected Log Messages

The following log messages are normal and expected entries in the log files from various LunaSH commands.

Uptime

```

2012 Feb 29 12:05:01 myLuna syslog info lush: uptime before poweroff: 12:05:01 up 4 min, 1 user,
load average: 0.08, 0.05, 0.01
2012 Feb 29 12:05:01 myLuna syslog info lush: uptime before reboot: 12:05:01 up 8 min, 1 user,
load average: 0.09, 0.04, 0.01

```

These messages record how long the system had been up before an administrator restarted the SafeNet Luna Network HSM appliance via `lunash:>sysconf appliance poweroff` or `lunash:>sysconf appliance reboot`.

Log Cleanup

```
2012 Feb 29 12:05:01 myLuna syslog info lush: Running the 'syslog cleanup' command, creating
tarlogs then deleting all log files except hsm.log ...
2012 Feb 29 12:05:01 myLuna user notice lush: Running the 'syslog cleanup' command; created
"logs_cleanup_20120229_0234.tgz" in the scp directory.
2012 Feb 29 12:05:01 myLuna user notice lush: The tar file containing logs is now available via
scp as filename "logs_cleanup_20120229_0234.tgz".
2012 Feb 29 12:05:01 myLuna syslog info lush: Executed the 'syslog cleanup' command. Deleted all
the log files except hsm.log.
2012 Feb 29 12:05:01 myLuna user notice lush: Executed the 'syslog cleanup' command. Created
"logs_cleanup_20120229_0234.tgz" in the scp directory.
2012 Feb 29 12:05:01 myLuna user notice lush: The tar file containing logs is now available via
scp as filename "logs_cleanup_20120229_0234.tgz".
```

These messages record that an administrator initiated a log compression and archival operation via syslog cleanup. The first three messages log initiation of the action and the last three messages log completion in the new messages file.

Change SSH Port

```
2012 Feb 29 12:05:01 myLuna user notice Lush: Changing the SSHD listen port number from 22 to
23.
```

This message records that an administrator changed the SSH listening port via sysconf ssh port.

Disabled Watchdog Timer

```
2012 Feb 29 12:05:01 myLuna user info wdt_heartbeat*: Disabled the WDT heartbeat program.
```

This message records that an administrator disabled the hardware watchdog timer via lunash:>**sysconf appliance watchdog disable**.

* Note that lush executes a utility to disable the watchdog timer. This utility creates the log entry under its process name.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

Failed to Create Log Archive

```
2012 Feb 29 12:05:01 myLuna syslog info lush: Failed to create logs_cleanup_20120229_0234.tgz: -
1.
```

This message indicates that the syslog cleanup command failed to create the backup file: the tar utility returned an error, the last number in the log message.

Invalid Signature Mechanism

```
2012 Feb 29 12:05:01 myLuna user notice lush: ERROR - The current client certificate specifies
md5WithRSAEncryption as the signature mechanism. This certificate is no longer useable and must be
replaced in order to register the client. Please regenerate the client certificate.
```

This message indicates that the signature of the client certificate found while executing the client register command uses an insecure mechanism.

Luna Shell: Command Logging

Command logging records administrator actions in a log file.

Facility Keyword	Software Process	Log File
local5	lunash [pid]	lunaloggs

Expected Log Messages

The following log messages are normal and expected entries in the log files for all LunaSH commands.

```
2012 Feb 29 12:05:01 myLuna local5 info lunash [1234]: info : 0 : Command: hsm show : admin : Console
```

```
2012 Feb 29 12:05:01 myLuna local5 info lunash [1234]: info : 0 : Command: my file list : monitor : 192.168.0.100/40847
```

Every administrative command executed within the secure Luna shell results in a log message to lunaloggs.

This message records the command return code (e.g., 0), the command (e.g., `lunash:>hsm show` and `lunash:>my file list`), the user account (e.g., **admin** and **monitor**) and the connection of the secure shell (e.g., Console and 192.168.0.100/40847 – the IP address and outgoing port number on client system).

```
2012 Feb 29 12:05:01 myLuna local5 info lunash [1234]: info : 0 : Lush user login : admin : Console
```

```
2012 Feb 29 12:05:01 myLuna local5 info lunash [1234]: info : 0 : Lush user login : monitor : 192.168.0.100/4084
```

A slightly different formatted log message records the login action.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do so, please consult the user documentation for guidance on how to correct the problem.

Token State and Login Errors

```
2012 Feb 29 12:05:01 myLuna local5 warn lunash [1234]: HSM Admin Login: incorrect password or PED key
```

```
2012 Feb 29 12:05:01 myLuna local5 warn lunash [1234]: HSM Admin Login: HSM Zeroized due to three consecutive bad login attempts.
```

```
2012 Feb 29 12:05:01 myLuna local5 warn lunash [1234]: Backup Token Admin Login: incorrect password or PED key
```

```
2012 Feb 29 12:05:01 myLuna local5 warn lunash [1234]: Backup Token Admin Login: HSM Zeroized due to three consecutive bad login attempts.
```

On backup and restore operations, these messages indicate failure to successfully authenticate because of either incorrect credentials or the HSM/token being in a state that disallows authentication (i.e., zeroized).

Configuration File Error

```
2012 Feb 29 12:05:01 myLuna local5 info lunash [1234]: Config file for overriding hsm slot exists, but there is a problem reading it..
```

This message indicates that a lush utility was unable to read the slot number from a configuration file used to define a specific HSM slot identifier. This message is unexpected: contact Thales Group Technical Support for guidance on what to do next.

Node Not Loaded

```
2012 Feb 29 12:05:01 myLuna local5 err lunash [1234]: Node not loaded: hsm ped set
```

This message indicates that the lush interpreter was unable to load the logged node on start up. This message is unexpected: contact Thales Group Technical Support for guidance on what to do next.

cron & crontab

The Luna appliance relies upon the cron process to perform regular operations.

Facility Keyword	Software Process	Log File
syslog	crontab	messages

Facility Keyword	Software Process	Log File
cron	anacron[pid]	cron-yyyy-mm-dd

Facility Keyword	Software Process	Log File
auth	crond(pam_unix) [pid]	secure

Expected Log Messages

The following log messages are normal and expected entries in the log files from cron activities.

Updated Timestamp

```
2012 Feb 29 04:02:01 myLuna cron notice anacron[1234]: Updated timestamp for job `cron.monthly'*
to 2012-02-29
```

This message indicates that the cron process ran the scheduled monthly (or daily or weekly) cron job.

* Or `cron.daily' or `cron.weekly'.

Login and Logout

```
2012 Feb 29 12:05:01 myLuna auth info crond(pam_unix)[1234]: session opened for user root by
(uid=0)
```

```
2012 Feb 29 12:05:01 myLuna auth info crond(pam_unix)[1234]: session closed for user root
```

These messages record that cron opened a session to complete any scheduled activities and closed the session when done.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

Disk Filling

75% - 89%

```
2012 Feb 29 12:00:00 myLuna syslog warn crontab: DISK FULL: WARNING! First log threshold reached
75%. Please clean up the logs using the "syslog cleanup" command
```

90% - 94%

```

2012 Feb 29 12:00:00 myLuna  syslog alert  crontab: DISK FULL: 90%. All log files except hsm.log
deleted.
2012 Feb 29 12:00:00 myLuna  syslog alert  crontab: DISK FULL: Second log threshold reached 90%.
Created logs_diskFull_20120229_1234.tgz and deleted all log files.*
2012 Feb 29 12:00:00 myLuna  syslog alert  crontab: DISK FULL: WARNING! Second log threshold
reached 90% policy: tarlogs_cleanup.**
2012 Feb 29 12:00:00 myLuna  syslog alert  crontab: DISK FULL: Second log threshold reached 90%.
Created logs_diskFull_20120229_1234.tgz and deleted all log files.***
2012 Feb 29 12:00:00 myLuna  syslog alert  crontab: DISK FULL: The tar file containing logs is now
available via scp as filename "logs_diskFull_20120229_1234.tgz****
2012 Feb 29 12:00:00 myLuna  syslog alert  crontab: DISK FULL: Second log threshold reached
$percent%. Failed to create "logs_diskFull_20120229_1234.tgz*****
95% & >

```

```

2012 Feb 29 12:00:00 myLuna  syslog emerg  crontab: DISK FULL: EMERGENCY! Third log threshold
reached 95%. Please clean up the logs using the "syslog cleanup" command
2012 Feb 29 12:00:00 myLuna  syslog emerg  crontab: DISK FULL: EMERGENCY! Third log threshold
reached 95%. Stopping NTLS
2012 Feb 29 12:00:15 myLuna  syslog emerg  crontab: DISK FULL: EMERGENCY! Third log threshold
reached 95%. Stopping syslog soon

```

These messages indicate that disk use is reaching thresholds that require intervention to remove files.

- * Message written before syslog rotates logs.
- ** Message written before syslog rotates logs.
- *** Message written after syslog rotates logs.
- **** Message written before and after syslog rotates logs.
- ***** Message written if tar command failed to create file.

Read-Only File System

```

2012 Feb 29 04:02:01 myLuna  cron err    anacron[1234]: Cannot exclusively create
/var/run/anacron.pid: Read-only file system
2012 Feb 29 04:02:01 myLuna  cron err    anacron[1234]: Cannot run in daemon mode - anacron already
running.: Resource deadlock avoided
2012 Feb 29 04:02:01 myLuna  cron err    anacron[1234]: Aborted

```

These messages indicate that the file system is read-only. A possible root cause is a Linux journaling error or a failing hard drive.

Certificate Monitoring Daemon

The certificate monitoring daemon watches for an impending expiry of the NTLS certificate and sends a trap when the lifetime of the certificate falls within a configurable threshold number of days remaining.

Facility Keyword	Software Process	Log File
local5	certmonitord[pid]	lunalog

Expected Log Messages

The following log messages are normal and expected entries in the log files when NTLS certificate monitoring is enabled.

Daemon Started

```
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : NTLS certificate expiry monitor started
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : NTLS certificate expiry monitor is configured to send SNMP trap 5 day(s) before the NTLS certificate expires and on every 12 hour(s)
```

These messages indicate that the certificate monitoring daemon is running. The daemon does not run by default. Rather, an administrator must configure and start it from the Luna administrative shell. The number of days and hours in the message reflects the configuration set via LunaSH.

Daemon Stopping

```
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : Shutting down NTLS certificate expiry monitor....
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : NTLS certificate expiry monitor terminated
```

These messages indicate that the certificate monitoring daemon gracefully shut down as a result of a signal (SIGINT, SIGTERM, SIGABRT) outside of a normal system shutdown (e.g., lunash:>**ntls certificate monitor disable**).

Impending Certificate Expiry

```
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : NTLS certificate will be expire on Jul 26 16:32:48 2023 GMT
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : NTLS certificate expiry SNMP trap sent to trap host 192.168.0.115
```

These messages indicate that the NTLS certificate is set to expire and that the certificate monitoring daemon successfully sent a trap to the configured host.

Certificate Missing

```
2012 Feb 29 12:05:01 myLuna local5 warn certmonitord[1234]: warning : 0 : NTLS certificate is missing
```

This message indicates that the daemon failed to find the server.pem file for NTLS in the expected location on the hard drive. However, the daemon remains running in the event that an administrator creates the necessary server certificate in a subsequent operation. On a new SafeNet Luna Network HSM appliance from the factory, this message is normal. An administrator must create the NTLS certificate (lunash:>**sysconf regenCert**).

New NTLS Certificate

```
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : New NTLS certificate detected and the expiry date of this new certificate is Jul 26 16:32:48 2033 GMT
```

This message indicates that an administrator created a new NTLS certificate that is sufficiently far into the future such that a trap is no longer necessary. The daemon will continue to monitor for the certificate expiry window.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

Failed to Detach

```
2012 Feb 29 12:05:01 myLuna local5 err certmonitord[1234]: error : 0 : Failed to detach from console
```

This message indicates that the startup procedure for the certificate monitoring daemon failed, specifically that the daemon did not launch into a background process.

Running in Console Mode

```
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : NTLS certificate expiry monitor running in console mode
```

This message indicates that the certificate monitoring daemon is running in console mode rather than as a background process.

SNMP V3 Not Properly Configured

```
2012 Feb 29 12:05:01 myLuna local5 info certmonitord[1234]: info : 0 : SNMP v3 trap is not properly configured
```

This message indicates that either the engine identifier and/or the host IP address configured and stored in the snmp.conf is/are invalid. Lush command(s) that create these entries include the necessary processing checks to ensure the operation(s) writes valid entries to the configuration file.

Failed to Allocate Memory Buffers

```
2012 Feb 29 12:05:01 myLuna local5 err certmonitord[1234]: error : 0 : Failed to allocate memory buffers
```

This message indicates that the daemon was unable to allocate the requisite buffers for file handling and string manipulation.

Failed to Send Trap

```
2012 Feb 29 12:05:01 myLuna local5 err certmonitord[1234]: error : 0 : Failed to send NTLS certificate expiry SNMP trap to trap host 192.168.0.100
```

This message indicates that the certificate monitoring daemon was unable to execute a system call with a pre-formed command to send a trap. The daemon relies upon the Linux utility snmptrap() to complete this action. An invalid host IP address for example, would cause the system call to fail (e.g., 192.168.0.1004).

certmonitord Crash and Burn

```
2012 Feb 29 12:05:01 myLuna local5 crit certmonitord[1234]: info : 0 : certmonitord CRASH AND BURN! Stack dump saved to /var/log/certmonitord_bt_2012-02-29_12:05:01
```

```
2012 Feb 29 12:05:01 myLuna local5 crit certmonitord[1234]: info : 0 : certmonitord CRASH AND BURN and unable to dump the stack!
```

These messages indicate a programming error. The first message indicates that the certificate monitoring daemon terminated abnormally (on one of SIGSEGV, SIGILL or SIGBUS signals), generating a stack trace file certmonitord_bt_2012-02-29_12:05:01 in the process. Forwarding this file to Thales Group may assist a developer to isolate the reason for the abnormal termination. The second message indicates an abnormal termination but with no resulting stack trace created.

Luna SNMP Trap Agent

Luna SNMP Trap Agent or **Ista** looks for significant events within the SafeNet Luna Network HSM appliance. When it sees a worthy event, Ista formats a trap notification and sends it to the configured user.

Facility Keyword	Software Process	Log File
local5	Ista	lunalog

Expected Log Messages

The following log messages are normal and expected entries in the log files when lsta monitoring is enabled and started.

Agent Starting

```
2012 Feb 29 12:05:01 myLuna local5 info lsta: Starting Luna SNMP Trap Agent
```

This message indicates that lsta is starting. The agent does not run by default. Rather, an administrator must configure and start it from the Luna administrative shell.

Creating Named Pipe

```
2012 Feb 29 12:05:01 myLuna local5 info lsta: Created /home/admin/syslog.pipe as a named pipe
```

This message indicates that lsta created the necessary named pipe for interprocess communication with the syslog facility. This message results the first time lsta is started on a new SafeNet Luna Network HSM appliance.

Termination

```
2012 Feb 29 12:05:01 myLuna local5 info lsta: Luna SNMP Trap Agent terminated: Interrupted system call
```

This message indicates that lsta caught a SIGINT, SIGABRT or SIGTERM signal and terminated.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do so, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

SNMP Data Logged

```
2012 Feb 29 12:05:01 myLuna local5 info lsta: fanAttentionNotify for [myLUT:192.168.0.58 / messages / 2012 Feb 29 12:05:00 / ipmievd / 1]
```

When trace level debugging is enabled, this message records the SNMP trap notification data sent by lsta. Trace level debugging is off in Luna SA so this message is unexpected.

Missing SNMP Parameters

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Error opening /usr/local/share/snmp/snmp.conf
```

This message indicates that the SNMP parameters needed by lsta are missing. A likely root cause is that an administrator has not yet set the parameters via the lunash:>**sysconf snmp trap set** command.

snmptrap Failed

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: snmptrap failed: 256
```

This message indicates that lsta was unable to send a formatted trap notification to the intended user. A possible root cause is an out-of-date SAFENET-APPLIANCE-MIB on the appliance or a parameter defined by the lunash:>**sysconf snmp trap set** command in error (e.g., invalid IP address).

Interprocess Communication Failures

```
2012 Feb 29 12:05:01 myLuna local5 info lsta: Pipe file disappeared, stopping lsta
2012 Feb 29 12:05:01 myLuna local5 err lsta: Cannot read from pipe /home/admin/syslog.pipe: 5
2012 Feb 29 12:05:01 myLuna local5 err lsta: Will not overwrite /home/admin/syslog.pipe
2012 Feb 29 12:05:01 myLuna local5 err lsta: Cannot mknod /home/admin/syslog.pipe: 13
```

These messages indicate failure with the named pipe used for interprocess communication with the syslog facility. The first two messages represent failures during lsta operation; the last two on start up.

Unknown Sub-system

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Unknown/unsupported sub-system: xxx
```

This message indicates a programming error. lsta should have logic for all sub-systems defined in the SAFENET-APPLIANCE-MIB.

Log Record Parsing

```
2012 Feb 29 12:05:01 myLuna local5 info lsta: Could not parse log record: <log record>
```

This message indicates that lsta could not properly parse a log record for the fields expected. <log record> is the log message received by lsta from rsyslogd.

Could Not Close Parameters File

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Error closing /usr/local/share/snmp/snmp.conf
```

This message indicates that lsta could not properly close the SNMP parameters file.

Could Not Close Pipe

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Error closing /home/admin/syslog.pipe
```

This message indicates that lsta could not properly close the named pipe used by rsyslog to communicate log records.

chdir Failed

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Could not chdir
```

This message indicates that lsta could not properly change working directories.

umask Failed

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Could not umask
```

This message indicates that lsta could not properly determine the umask file settings.

Could Not Open stdin

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Error opening stdin
```

This message indicates that lsta could not properly open standard input.

Could Not Open stderr

```
2012 Feb 29 12:05:01 myLuna local5 err lsta: Error opening stderr
```

This message indicates that lsta could not properly open standard error.

Admin API

Admin API is the process that supports administration for the appliance via REST.

Facility Keyword	Software Process	Log File
local5	AdminAPI	lunalog

Expected Log Messages

The following log messages are normal and expected entries in the log files when the webserver for the REST API is running.

Web Server Started

```
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server is setting up on
192.168.0.79:8443
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server cipher set:
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server is using TLS1.2 only
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server is loading key file:
ssl_key.pem
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server is loading cert file:
ssl_cert.pem
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server is loading dh file
dh2048.pem
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server is using NID_X9_62_
prime256v1 named curve
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Server finished setting up
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Request hashing set: hmac_
sha256
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Asymmetric encryption set:
rsa_pkcs1
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Symmetric encryption set:
aes_256_cfb
```

These messages indicate that web server started successfully. The web server does not run by default. Rather, an administrator must configure and start it from the Luna administrative shell.

Client Connected

```
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Client 192.168.0.120:52500
connected
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Parsed client 192.168.0.120's
request
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : Client 192.168.0.120-SESSION_
ID=413ef8fe-3667-4083-ae2f-44e66e1ac70e requested POST:/lunasa/services/ntls/clients
2012 Feb 29 12:05:01 myLuna local5 info AdminAPI[1234]: info : 0 : 192.168.0.120 successfully
logged in as admin with session id of 413ef8fe-3667-4083-ae2f-44e66e1ac70e
```

These messages indicate that a client connected without issue to the web server and that the web server was able to fulfill the client's request.

Unexpected Log Messages

Under normal circumstances, you should not see any of these log messages. If you do, please contact Thales Group Technical Support to report the message and seek guidance on what to do next.

Web Server Busy

```
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120
connection refused because server is busy
```

This message indicates that the queue of client connections is full and the web server is unable to respond to any additional request.

Client Session Problems

```

2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120
submitted a request without a session token
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120
submitted a bad cookie
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120 has no
session
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120-
7e33c7bb-54a0-4a92-a031-4e08fc90cfa5 session keys do not match an active session
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120-
7e33c7bb-54a0-4a92-a031-4e08fc90cfa5 requested access to GET:/api/lunasa/hsms/4343343 and access
was denied
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120-
7e33c7bb-54a0-4a92-a031-4e08fc90cfa5 failed to decrypt packet
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120-
7e33c7bb-54a0-4a92-a031-4e08fc90cfa5 requested a non-existent resource
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120-
7e33c7bb-54a0-4a92-a031-4e08fc90cfa5 sent a bad payload
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120-
7e33c7bb-54a0-4a92-a031-4e08fc90cfa5 failed to include authentication token
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Client 192.168.0.120:52500
failed to establish SSL connection
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : 192.168.0.120 login attempt
failed
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Session 7e33c7bb-54a0-4a92-
a031-4e08fc90cfa5 timed out
2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Session 7e33c7bb-54a0-4a92-
a031-4e08fc90cfa5 logged out

```

These messages indicate problems with the client session.

Unknown Resource

```

2012 Feb 29 12:05:01 myLuna local5 err AdminAPI[1234]: error : 0 : Internal action requested a
non-existent resource

```

This message indicates that the REST framework could not find the resource requested.

Blacklisted Clients

```

2012 Feb 29 12:05:01 myLuna local5 warn AdminAPI[1234]: warning : 0 : Added 192.168.0.120 to the
blacklist
2012 Feb 29 12:05:01 myLuna local5 crit AdminAPI[1234]: critical : 0 : Blacklisted user
192.168.0.120 attempted to connect

```

These messages indicates that the REST server has blacklisted a client. The first indicates the action of adding a client to the black list; the second indicates a subsequent attempt by a blacklisted client to connect.

CHAPTER 4: Other Appliance Logging

hsm information show

Output from the lunash:>**hsm information show** command includes additional log data as shown in the following example.

```
[local_host] lunash:>hsm information show
```

HSM Event Counters:

```
Operation Requests:                21998
Operation Errors:                  1707
Crypto Operation Requests:         0
Crypto Operation Errors:           0
Critical Events:                   0
Non-Critical Events:               34
```

```
Command Result : 0 (Success)
```

sysstatd, **snmp** and **ntls** periodically make calls to the HSM and these calls result in incremented counters for Operation Requests and Operation Errors. **luna-snmp** polls the HSM every minute and increments these two counters by 49 and 1 respectively. **sysstatd** polls the HSM with each rotation of the LCD messages (~15 to 20 seconds) and increments these two counters by 25 and 3 respectively. **ntls** polls the HSM repeatedly and increments the Operation Requests counter by more than 600 per minute.

Crypto Operation Requests and Crypto Operation Errors reflect counts from client application requests to the HSM.

Critical Events are catastrophic failure of the HSM firmware as reported by the HSM itself. An increment in this counter also results in a crash log file and a syslog message (messages) similar to the following example:

```
2012 Feb 22 03:15:13 LunaSA5 local6 crit oamp[2318]: CRIT: Fatal error 0x00300203
2012 Feb 22 03:15:13 LunaSA5 local6 info oamp[2318]: info : 0 : HSM critical event detected.
Dual port dump generated : hsm_dump_20120222031513
```

Non-Critical Events are either ERR or INFO messages. A count the INFO and ERR messages in the following excerpt reflects the 34 reported in the example above.

```
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: ----- HSM Logging started
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Warm boot
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: FW Rev 6.2.1-10
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: File: SOURCE/LUNA2/MAIN_
MOD/main.c
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Date: Jul 29 2011, Time:
16:53:13
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: POWER-UP LOG DUMP START
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Power-up log created
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Appending power-up log...
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: HSM is powered-up
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: HSM time: 0 min
```

```

(YYYY:MM:DD:hh:mm:ss = 0000:01:01:00:00:05.04)
2014 Aug 21 07:18:14 local_host local6 err oamp[2100]: ERR: RTC: lost all power
2014 Aug 21 07:18:14 local_host local6 err oamp[2100]: ERR: RTC: zeroized on power loss
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: RTC: re-configuring...passed.
Clock restarted.
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Zeroizing HSM after
decommission...LOG(INFO): POWER-UP LOG DUMP END
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Erasing power-up log
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: HSM time: 0 min
(YYYY:MM:DD:hh:mm:ss = 0000:01:01:00:00:53.21)
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: MM_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: PM_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: I2C_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: RTC_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: NVRAM_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: CGX Ver: 0xC0020802 HA Mode:
0x00000000 KeyStatus: 0x10000000 0x0000006D ES Flags: 0x00000002
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: CGX_Init OK
2014 Aug 21 07:18:14 local_host local6 err oamp[2100]: ERR: MTK: security function was
zeroized for unknown reason
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: MTK_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: sxl_init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: PE1746_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: RN_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: OH_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: CA_AlgorithmSelfTest(): HW
disabled, skipping all self tests
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: CA_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: UM_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: SM_Init OK
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Supported callback I/O v.1
2014 Aug 21 07:18:14 local_host local6 info oamp[2100]: INFO: Supported callback protocol
v.1

```

CHAPTER 5: Client Logging

To this point, the logs described apply to the SafeNet Luna Network HSM appliance. The SafeNet Luna HSM client also generates log files. This section describes client-side logging, specifically, logs generated by the following facilities:

- > cklog
- > HA log

cklog

A future version of *Syslog and SNMP Monitoring Guide* will identify and describe these messages.

HA log

A future version of *Syslog and SNMP Monitoring Guide* will identify and describe these messages.

CHAPTER 6: SNMP Traps

Simple Network Management Protocol provides a procedure to collect information from devices in a network. SafeNet Luna Network HSM appliances support SNMP through queries (e.g., “walking” managed information base trees) and through asynchronous notification of events (i.e., traps). This version of *Syslog and SNMP Monitoring Guide* describes the support for traps in SafeNet Luna Network HSM appliances.

For the purpose of making the examples that follow easier to describe, assume that your name is Pete. While it may not be evident just yet, the subject of traps and the preceding text that describes syslog messages are related. On the appliance is the Luna SNMP Trap Agent or **Ista**. When you configure and enable traps, Ista runs as a background process and uses the named pipe feature of the system logging facility (rsyslog) to receive messages directed to log files. Thus, Ista receives a copy of all log messages. Using some of the rules for interpreting log messages described in ["Interpreting Logs" on page 15](#), Ista generates traps for significant events.

NOTE Luna SA uses a version of rsyslogd that supports logging output to named pipes (fifos). While the man pages for rsyslog states that "this is handy for debugging," nothing restricts the feature for other uses and Thales Group has leveraged it for SNMP trap generation. Ista creates the fifo the first time the process starts up.

This chapter contains the following sections:

- > ["Configuring and Enabling Traps on SafeNet Luna Network HSM" below](#)
- > ["Configuring Trap Notification" on the next page](#)
- > ["Testing Trap Events on SafeNet Luna Network HSM" on page 89](#)
- > ["SafeNet Luna Network HSM Appliance Trap Events" on page 89](#)
- > ["Appliance MIB Overview" on page 89](#)
- > ["Sub-System Log Reference" on page 90](#)
- > ["Caveats" on page 94](#)

Configuring and Enabling Traps on SafeNet Luna Network HSM

Use the following procedure to configure and enable traps on a SafeNet Luna Network HSM appliance.

To configure and enable traps on SafeNet Luna Network HSM:

1. Add an SNMP user to the system (see ["sysconf snmp user add" on page 1](#)).

```
lunash:>sysconf snmp user add -secname <secname> -authpassword <password> -authprotocol  
<protocol> -privpassword <password> -privprotocol <protocol>
```

```
lunash:>sysconf snmp user add -secName pete -authPassword PASSWORD -authProtocol SHA -  
privPassword PASSWORD -privProtocol AES
```

- Set the SNMP trap parameters for the user created in the preceding step (see "[sysconf snmp trap set](#)" on page 1).

```
lunash:> sysconf snmp trap set -host <hostname/IP> [-secname <secname>] [-engineid <engineID>]
[-authprotocol <protocol>] [-authpwd <password>] [-privprotocol <protocol>] [-privpwd <password>]

lunash:>sysconf snmp trap set -h 192.168.0.100 -secName pete -e 1234567890 -authpr SHA -authpw
PASSWORD -privPr AES -privPw PASSWORD
```

- Enable or disable SNMP traps (see "[sysconf snmp trap enable](#)" on page 1 and "[sysconf snmp trap disable](#)" on page 1).

```
lunash:>sysconf snmp traps enable
lunash:>sysconf snmp traps disable
```

- Restart the system logging service (see "[service restart](#)" on page 1).

```
lunash:>service restart syslog
```

- Enable SNMP traps once again.

```
lunash:>sysconf snmp traps enable
```

Configuring Trap Notification

Once you have traps configured and enabled on a SafeNet Luna Network HSM appliance, you can test that you can successfully receive a trap notification. The description that follows explains how to configure a CentOS Linux virtual machine to test trap notifications. Although your test environment is likely different, these instructions should provide enough information to assist you in your efforts.

To configure trap notification:

- You need an SNMP trap daemon to receive trap notifications if you follow the test process used herein. Use **yum** to install net-snmp:

```
>yum install net-snmp
```

If you intend to do development, you should also install:

```
>yum install net-snmp-utils
```

```
>yum install net-snmp-devel
```

- Create a trap handler to determine what to do with trap notifications. Consider the shell script example from the net-snmp tutorial to create a trap handler. Here is the URL for the tutorial:

<http://www.net-snmp.org/tutorial/tutorial-5/commands/snmptrap.html>

Here is an example shell script trap handler. You can cut-and-paste this text into a file that you save as **/etc/snmp/traps** to align with subsequent instructions.

```
#!/bin/sh

read host
read ip
vars=
count=1

while read oid val
```

```
do
count=${count+1}
  if [ "$vars" = "" ]
  then
    vars="$oid = $val"
  else
    vars="$vars, $oid = $val"
  fi
done

echo a $1 trap from host=$host at IP $ip vars=$vars>>/var/log/messages
```

3. Configure the **snmptrapd.conf** file.

- a. Navigate to **/etc/snmp** to locate **snmptrapd.conf**.
- b. Use your favorite editor to modify this file. Cut and paste in the following lines after the commented-out **traphandle**. Note that the example assumes that you are using **pete** for the SNMP user and that it only supports three of the SNMP trap types of **Ista**.

```
traphandle SAFENET-APPLIANCE-MIB::fanAttentionNotify /etc/snmp/traps Fan
traphandle SAFENET-APPLIANCE-MIB::powerSupplyAttentionNotify /etc/snmp/traps PSU
traphandle SAFENET-APPLIANCE-MIB::motherboardAttentionNotify /etc/snmp/traps Motherboard

#####
# SECTION: Runtime options
#
#   Runtime options

disableAuthorization no

createUser -e 1234567890 pete SHA "PASSWORD" AES "PASSWORD"
authUser log,execute,net pete
```

4. Copy the required MIBs to **/usr/share/snmp/mibs**.

- a. The following Thales Group MIBs are provided with the SafeNet Luna HSM Client installation package, in the **snmp** directory:

```
CHRYSALIS-UTSP-MIB.txt
SAFENET-APPLIANCE-MIB.txt
SAFENET-GLOBAL-MIB.txt
SAFENET-HSM-MIB.txt
```

- b. The Thales Group MIBs depend on the following standard MIBs, which are included in a standard **net-snmp** installation:

```
SNMPv2-SMI.txt
SNMPv2-TC.txt
```

5. On your Linux virtual machine, **iptables** may block SNMP trap packets by default. Perform the following steps to overcome this restriction:

- a. Stop **iptables**.

```
>/etc/init.d/iptables stop
```

or, if your platform uses **systemd**, then stop with

```
>systemctl stop firewalld
```

- b. Edit **/etc/sysconfig/iptables** and add the following two lines before the first **REJECT** directive in the file:

```
##### Allow SNMP trap packets.
-A INPUT -p udp --dport 162 -j ACCEPT
```

You do not need to include the comment. For reference, the first REJECT directive in the file on the example VM is:

```
-A INPUT -j REJECT --reject-with icmp-host-prohibited
```

Note that the order of specification is important.

- c. Start iptables.

```
>/etc/init.d/iptables start
```

or, if your platform uses systemd, then restart the service with

```
>systemctl start firewalld
```

6. SELinux may be enabled on your Linux virtual machine. You need to disable SELinux to start the snmptrapd in a subsequent step. To disable SELinux, type the following at a terminal prompt:

```
echo 0 >/selinux/enforce
```

7. Test the SNMP trap daemon.

- a. Start the SNMP trap daemon in debug mode to see the packets are received:

```
>snmptrapd -Dusm -d -f -Le
```

NOTE If you choose not to start snmptrapd in debug mode, you must start snmptrapd twice (i.e., start, stop, start). This first invocation constructs the snmptrapd.conf file on the appliance; the second invocation opens and uses this configuration file.

- b. Generate a trap on the appliance (see ["Testing Trap Events on SafeNet Luna Network HSM" on the next page](#)) and receive the trap packet and a message logged to **/var/log/messages**.

- c. Stop the daemon and start it again, this time as a service:

```
>service snmptrapd start
```

- d. Generate a trap on the appliance and note a message written to **/var/log/messages** as an indication of a successful trap notification.

NOTE Either the `snmptrap` command on the appliance or `snmptrapd` appears to compress multiple spaces to a single space. If you attempt to do exact pattern matching in a script, keep this point in mind. By way of an example, the following appliance message:

```
2014 Apr 3 15:47:30 myLUT daemon notice ipmievd: ***TEST : SEQNO_10000 : Fan
sensor Fan1A . Lower Critical going low (Reading
2000 .1t Threshold 2000 RPM)
```

results in a traplog message:

```
a Fan trap from host=<UNKNOWN> at IP UDP: [xxx.xxx.xxx.xxxx]:47478->
[xxx.xxx.xxx.xxx]:162 vars=system.sysUpTime.sysUpTimeInstance =
0:0:28:12.33,
.iso.org.dod.internet.snmpV2.snmpModules.snmpMIB.snmpMIBObjects.snmpTrap.snmpTrapO
ID.0 =
enterprises.safenet-inc.safenetRoot.luna.appliance.ssTraps.fanAttentionNotify,
enterprises.safenet-inc.safenetRoot.luna.appliance.ssTraps.ssLogReference =
[myLUT:xxx.xxx.xxx.xxx / messages / 2014 Apr 3 15:47:30 / ipmievd / 1]
```

Only a single space separates “Apr” and ‘3’ in the latter message, while two spaces do so in the former message.

Testing Trap Events on SafeNet Luna Network HSM

In all likelihood, your SafeNet Luna Network HSM appliance is in a rack in a secure room somewhere relatively far away from where you sit. If locally available, you can generate traps by disconnecting power to one of the two supplies. Short of this action, you have no way to initiate the events that result in traps. That leaves you with little to develop and test a monitoring facility for SNMP traps.

To test that you have configured everything successfully to generate and receive trap notifications, Thales Group added a LunaSH command for this purpose:

```
lunash:>sysconf snmp trap test
```

The command takes several parameters (see ["sysconf snmp trap test" on page 1](#) for details).

NOTE This command writes a test message to the applicable system log file. The command neither checks nor reports the status of `Ista`. If `Ista` is not running, the appliance does not generate a trap. Before running `lunash:>sysconf snmp trap test`, ensure that you have started `Ista` using `lunash:>sysconf snmp trap enable`.

SafeNet Luna Network HSM Appliance Trap Events

To avoid covert channel attacks via SNMP traps, the SafeNet Luna Network HSM appliance generates categories of traps. Contained within the trap notification is sufficient information for an administrator to query the SafeNet Luna Network HSM appliance for the specific event that led to the trap.

Appliance MIB Overview

The `SAFENET-APPLIANCE-MIB.txt` file defines the management information base for SafeNet Luna Network HSM appliance traps. Here is a segment of the MIB:

```

ssTrapsOBJECT IDENTIFIER ::= { appliance 2 }
ssLogReference OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..256))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates the log record pertaining to the sub-system trap."
    ::= { ssTraps 1 }
fanAttentionNotify NOTIFICATION-TYPE
    OBJECTS { ssLogReference }
    STATUS current
    DESCRIPTION "Notify that a fan needs attention."
    ::= { ssTraps 2}

```

`fanAttentionNotify` is the notification type for a fan-related event. Corresponding `<subsystem>AttentionNotify` notification types define the other sub-systems for which a SafeNet Luna Network HSM appliance reports significant events.

The relevant information reported by a notification is the `ssLogReference` object. Specifically, this object provides: the hostname and IP address of the appliance; the log file that contains the event; the date and time of the event; the process that reported the event in the log; and a boolean value that indicates whether the event is an assert (1) or de-assert condition. With these data, an administrator can login to the SafeNet Luna Network HSM appliance and query the appropriate log file for the details of the trap event.

Sub-System Log Reference

An example might help to explain the sub-system log reference object of the appliance MIB. Assume a power supply fails. Via the intelligent platform monitoring interface, the `ipmievd` process learns of this failure and generates a log message. `ipmievd` sends the message to the `rsyslogd` process. In addition to writing a record to the messages log file, `rsyslogd` writes the record to the named pipe at which `Ista` is listening. `Ista` determines that this event is trap-worthy. The agent formats the necessary parameters and uses the `net-snmp snmpttrap` command to send a notification for a `SAFENET-APPLIANCE-MIB::powerSupplyAttentionNotify` notification with a `SAFENET-APPLIANCE-MIB::ssLogReference` object to the configured SNMP V3 user.

See the following subsections for information on these types of traps:

- > ["Fan Failure" on the next page](#)
- > ["Power Supply Failure" on page 92](#)
- > ["Motherboard Failure" on page 92](#)
- > ["Disk Drive Failure" on page 93](#)
- > ["NTLS Failure" on page 93](#)
- > ["Crypto Failure" on page 94](#)

The trap handler receives the notification in a packet that includes the following example segment:

```

SAFENET-APPLIANCE-MIB::powerSupplyAttentionNotify, SAFENET-APPLIANCE-MIB::ssLogReference =
[myLuna:192.168.0.101 / 2012 Feb 29 12:05:01 / messages / ipmievd[1234] / 1]
where

```

- > **myLuna** is the hostname of the SafeNet Luna Network HSM appliance
- > **192.168.0.101** is the IP address of the first Ethernet interface on the appliance
- > **messages** is the log file that contains the event leading to the trap notification

- > **2012 Feb 29 12:05:01** is the date and timestamp recorded in the log file
- > **ipmievd[1234]** is the process that logged the message.
- > **1** is a boolean that indicates whether the trap is for an assertion (1) or de-assertion (0) event.

This information gives you what is needed to identify the specific log entry that led to the trap. If you log into the appliance and look at the messages log file:

```
[myLuna] lunash:>syslog tail -logname messages
you see the following entry:
```

```
2012 Feb 29 12:05:01 myLuna local4 notice ipmievd[1234]: ***TEST : Power Supply sensor PSU2_
Status . - Failure detected Asserted
```

From this log message, you know that the second power supply unit has failed and you can dispatch a technician to investigate.

Note that the Luna appliance tags log messages generated by `lunash:>sysconf snmp trap test` with a `***TEST` designator. This designator allows you to determine legitimate events from test events.

Fan Failure

Ista generates a trap for a fan failure based on the following conditions for the `ipmievd` process and with any of {"Fan1A", "Fan1B", "Fan2A", "Fan2B", "Fan3A", "Fan3B"} in the body of the message:

- > Body of log message contains the text "Lower Critical going low" and the threshold reported represents an assert condition
- > Body of log message contains the text "Lower Non-recoverable going low" and the threshold reported represents an assert condition.

Recall from ["Threshold Events" on page 22](#) that IPMI reports assert and de-assert conditions. A "true" relationship to the `(Reading xxxx < Threshold yyyy RPM)` segment of the log message represents an assert event. A "false" relationship represents a de-assert event.

Fan failures correspond to the `fanAttentionNotify NOTIFICATION-TYPE` of the `SAFENET-APPLIANCE-MIB`.

Note that the Luna administrative shell prohibits the '`<`' and '`>`' characters as parameters. But some traps key off threshold readings that rely on this arithmetic comparator. To enable test log messages of this sort, use a `".lt"` or `".gt"` string in place of the '`<`' or '`>`' character in the formatted LunaSH command.

You can cut-and-paste the following examples in a LunaSH session to create test log messages that generate fan traps (the first, second, fourth and fifth examples create assert events; the third and sixth examples, de-assert events):

```
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message "Fan
sensor Fan3B . Lower Critical going low (Reading 0 .lt Threshold 2000 RPM)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message "Fan
sensor Fan3B . Lower Critical going low (Reading 2000 .lt Threshold 2000 RPM)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message "Fan
sensor Fan3B . Lower Critical going low (Reading 21000 .lt Threshold 2000 RPM)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message "Fan
sensor Fan3B . Lower Non-recoverable going low (Reading 500 .lt Threshold 1000 RPM)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message "Fan
sensor Fan3B . Lower Non-recoverable going low (Reading 1000 .lt Threshold 1000 RPM)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message "Fan
sensor Fan3B . Lower Non-recoverable going low (Reading 5100 .lt Threshold 1000 RPM)"
```

Power Supply Failure

Ista generates a trap for a power supply failure based on the following conditions for the ipmievd process and with any of {"PSU1_Status", "PSU1_+12V_value", "PSU1 Temp_value", "PSU1 FAN_value", "PSU2_Status", "PSU2_+12V_value", "PSU2 Temp_value", "PSU2 FAN_value", "Power Supply"} in the body of the message:

- > Body of log message contains the text "Failure detected Asserted"
- > Body of log message contains the text "Failure detected Deasserted"
- > Body of log message contains the text "Presence detected Asserted"
- > Body of log message contains the text "Presence detected Deasserted"
- > Body of log message contains the text "- Transition to Power Off"
- > Body of log message contains the text "Lower Non-recoverable going low" and the threshold reported represents an assert condition
- > Body of log message contains the text "Upper Non-recoverable going high" and the threshold reported represents an assert condition.

Power supply failures correspond to the powerSupplyAttentionNotify NOTIFICATION-TYPE of the SAFENET-APPLIANCE-MIB.

Here is text you can use to create power supply traps:

```
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Power Supply sensor PSU2_Status . - Failure detected Asserted"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Power Supply sensor PSU1_Status . - Presence detected Deasserted"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Power Supply sensor - Transition to Power Off"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Voltage sensor PSU2_+12V_value. Upper Non-recoverable going high (Reading 14.538 .gt Threshold
13.392 Volts)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Voltage sensor PSU2_+12V_value. Upper Non-recoverable going high (Reading 12.538 .gt Threshold
13.392 Volts)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Voltage sensor PSU2_+12V_value. Lower Non-recoverable going low (Reading 10.548 .lt Threshold
11.232 Volts)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Voltage sensor PSU2_+12V_value. Lower Non-recoverable going low (Reading 12.548 .lt Threshold
11.232 Volts)"
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"PSU1 Temp_value. Upper Non-recoverable going high (Reading 117 .gt Threshold 115 Degrees)"
```

Motherboard Failure

Ista generates a trap for a motherboard failure based on the following conditions for the ipmievd process and with any of {"CPU", "VRD", "PCH", "Inlet", "CHA DIMM 0", "CHA DIMM 1", "CHA DIMM 2", "CHB DIMM 0", "CHB DIMM 1", "CHB DIMM 2", "RAM TMax", "CPU_VCORE", "VBAT", "3VSB", "3VMMain", "+5V", "+12V"} in the body of the message:

- > Body of log message contains the text "Lower Critical going low" and the threshold reported represents an assert condition

- > Body of log message contains the text “Upper Critical going high” and the threshold reported represents an assert condition
- > Body of log message contains the text “Upper Non-recoverable going high” and the threshold reported represents an assert condition.

Motherboard failures correspond to the motherboardAttentionNotify NOTIFICATION-TYPE of the SAFENET-APPLIANCE-MIB.

Here are examples to generate motherboard traps:

```
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Voltage sensor VBAT          . Lower Critical going low  (Reading 1.63 .lt Threshold 2.80
Volts) "
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Voltage sensor VBAT          . Lower Critical going low  (Reading 3.30 .lt Threshold 2.80
Volts) "
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Temperature sensor CPU      . Upper Critical going high (Reading 75 .gt Threshold 72
Degrees) "
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Temperature sensor CPU      . Upper Critical going high (Reading 70 .gt Threshold 72
Degrees) "
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Temperature sensor CPU      . Upper Non-recoverable going high (Reading 92 .gt Threshold
89 Degrees) "
lunash:>sysconf snmp trap test -logfacility local4 -loglevel notice -process ipmievd -message
"Temperature sensor CPU      . Upper Non-recoverable going high (Reading 85 .gt Threshold
89 Degrees) "
```

Disk Drive Failure

Ista generates a trap for a disk drive failure based on the following conditions for the smartd process:

- > Severity of the message is “crit”.

Disk drive failures correspond to the diskDriveAttentionNotify NOTIFICATION-TYPE of the SAFENET-APPLIANCE-MIB.

Use the following text to create a disk drive trap:

```
lunash:>sysconf snmp trap test -logfacility daemon -loglevel crit -process smartd -message
"Device: /dev/sda, Temperature 45 Celsius reached limit of 44 Celsius (Min/Max 31/49)" -pid
```

NTLS Failure

Ista generates a trap for an NTLS failure based on the following conditions for the NTLS process:

- > Severity of the message is “err”.
- > Severity of the message is “crit”.

NTLS failures correspond to the ntlAttentionNotify NOTIFICATION-TYPE of the SAFENET-APPLIANCE-MIB.

Here are examples to create NTLS traps:

```
lunash:>sysconf snmp trap test -logfacility local5 -loglevel crit -process NTLS -message "error :
0xc0000002 : Unable to create a new connection. " -pid
lunash:>sysconf snmp trap test -logfacility local5 -loglevel crit -process NTLS -message "info : 0
: NTLS CRASH AND BURN! Stack dump saved to /var/log/ntls_bt_2012-02-29_12:05:01" -pid
```

Crypto Failure

For Luna SA 5/6, Ista generates a trap for a crypto failure – the internal HSM for Luna appliances – based on the following conditions:

- > For the kernel process, body of log message contains the text “HSM crashed:”
- > For the sysstatd process, body of log message contains the text “30”

For Luna SA 7, Ista generates a trap for a crypto based on the following conditions:

- > For the kernel process, body of log message contains the text “ALM”

Crypto failures correspond to the cryptoAttentionNotify NOTIFICATION-TYPE of the SAFENET-APPLIANCE-MIB.

Use the following examples to simulate a crypto failure on a Luna SA 5/6 appliance:

```
lunash:>sysconf snmp trap test -logfacility kern -loglevel info -process kernel -message "NOTE:
viper0: hsm log: LOG(CRITICAL) HSM crashed:"
lunash:>sysconf snmp trap test -logfacility user -loglevel info -process sysstatd -message "Luna
System State Server - OOS Errors: 30,100,60!"
```

Use the following examples to simulate a crypto failure on a Luna SA 7 appliance:

```
lunash:>sysconf snmp trap test -logfacility kern -loglevel info -process kernel -message "k7pf0:
[HSM] ALM2007: HSM zeroized"
```

Caveats

With this release of the SafeNet Luna Network HSM appliance, be aware of the following caveats.

1. Thales Group has implemented only a sub-set of possible traps. More will come with subsequent product releases.
2. Enabling traps is an “all-or-nothing” choice. The product does not allow you to configure trap generation for some events at the exclusion of others.
3. NTLS certificate monitoring for expiry is unchanged: the certmonitord process continues to monitor for this event.
4. Only IPMI events (i.e., sensors) support both assert and de-assert events with this release of Ista.