ProtectServer Internal Express 2 (PSI-E2)

Installation Guide

SafeNet

THE
DATA
PROTECTION
COMPANY

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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. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures.

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* Increase the separation between the equipment and receiver.
* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
* Consult the dealer or an experienced radio/TV technician for help.

To ensure FCC compliance only devices also known to comply should be connected to the adapter's serial ports. If such devices do not feature their own cables shielded cables must be used.

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SafeNet, Inc.
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Belcamp, Maryland USA 21017

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	Portugal	800.1302.029
	Singapore	800.863.499
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Revision History

Revision	Date	Reason
A	27 October 2014	Release 5.0
B	07 November 2014	Corrected jumper header illustration.
C	12 August 2015	Release 5.1

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Chapter 1
Introduction

Product Overview

The ProtectServer Internal Express 2 (PSI-E2) is the second-generation intelligent cryptographic services PCI-E adapter, replacing the ProtectServer PSI-E.

When using the ProtectServer, generic processing or high-speed DES and RSA hardware acceleration may be employed. Secure key storage is provided using persistent, tamper protected memory. In addition, multiple adapters may be used in a single host computer in order to improve throughput or to provide redundancy.

About This Manual

This manual is provided as an instructional aid for the installation of a ProtectServer cryptographic services hardware adapter.

Installation of the associated *SafeNet PCI HSM Access Provider* package (PTKpcihsm2) is described in the companion manual, *ProtectServer HSM Access Provider Installation Guide*. The *Safenet PCI HSM Access Provider* package includes the device driver.

Chapter 2 provides the overall installation procedure.

Chapter 3 provides some troubleshooting guidance.

Appendix A is a hardware reference. This provides instructions on how to modify the adapter's printed circuit board when external tamper detectors are to be used. The adapter's serial port specifications are also documented here.

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Chapter 2
ProtectServer Internal Express 2 (PSI-E2) Installation

Installation Summary

To install and commission a PSI-E2 card and its associated software, follow the steps below. Where required, these steps are covered in more detail in the sections that follow.

1.   Check the items received to ensure none are missing. A separate page that lists the items included is provided for this purpose.

2.   Move the battery jumper from the OFF position to the ON position (see "The Battery Jumper Header" on page 4).

3.   If an external tamper detector is to be used, ensure that the external device has a two-conductor cable with a connector suitable to mate with the tamper-detect connector on the ProtectServer adapter (detailed at the beginning of Appendix A).

4.   Install the PSI-E2 card in the host computer system.

5.   Install the PCI HSM Access Provider package that includes the device driver and confirm the correct operation of the adapter and driver installation.

6.   Use the included USB-to-serial cable to attach a serial device Install the smart card reader if provided.

7.   Install the SafeNet application programming interface (API) or net server software supplied with the product.

Adapter Features

The PSI-E2 HSM is a standard PCI-E device that can be fitted into any spare PCI -E slot on the motherboard in formats x4, x8, or x16.

The Card Faceplate

The faceplate of the card provides two ports, as illustrated below:

Micro-D subminiature (MSDM) connector   USB port
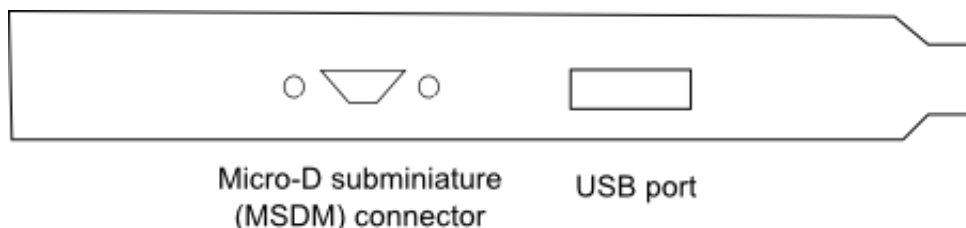
The USB Port

The USB port is used to connect a serial device, such as a smart card reader, to the card using the included USB-to-serial adapter.

The MSDM Connector

The micro-D subminiature (MDSM) connector is not used.

Battery and Jumper Headers

The card is also equipped with a battery and a series of jumper headers located at the rear of the card, as illustrated below:
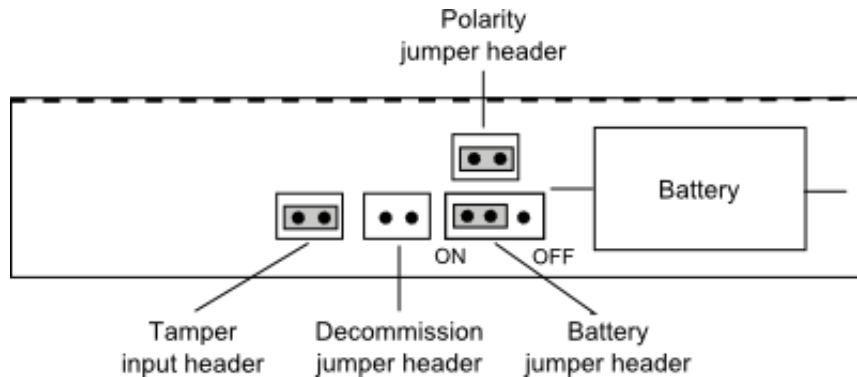
The Battery

The battery mounted directly to the PSI-E2 card and maintains the internal flash memory. Transport mode requires that the battery remain connected.

If the HSM is to be kept in storage (without keys present) it is recommended that you isolate or disconnect the battery to avoid wearing it down, thus extending its lifespan. You can use the **ctconf** command to test the condition of the battery. If the Battery Status indication does not report as GOOD, backup the HSM keys before powering down the PC to avoid losing the keys.

Note: Disconnecting the battery deletes all key material on the HSM. Ensure that you back up you HSM before disconnecting the power. The keys are not deleted immediately. Capacitors continue to supply power for approximately 30 seconds after battery disconnect.

The Battery Jumper Header

The battery jumper is a three-pin jumper that is used to engage or disengage the battery.

The battery is in the ON position when a jumper is inserted on the center and right pins, as shown above. The card ships with the jumper installed in the OFF position

The battery is in the OFF position when a jumper is inserted on the center and left pins. This setting is not required for normal operation.

CAUTION! Do not change the jumper setting unless instructed by SafeNet support.

The Decommission Jumper Header

Place a jumper on the decommission jumper header to decommission the HSM. Decommissioning deletes all of the key material on the HSM.

The Tamper Input Header

The tamper-input header used to connect an external tamper device to the card. By default it has a jumper in place, across the two pins in the header. If an external tamper detection device is to be used, run a two-wire cable to your chassis-tamper switch or other device that must operate to open the circuit if a tamper event occurs.

The Polarity Jumper Header

The polarity jumper header is used to configure the operating mode of the card. Do not change the jumper setting for this header.

Installing the Adapter

The adapter is a PCI Specification 2.2 compliant device. It may be fitted in any spare PCI -E slot on the motherboard in formats x4, x8, or x16. If you are unsure which is a PCI-E slot, please consult the documentation accompanying your host system motherboard.

If you are using a tamper-detection device, route the cable to it before closing the computer cover.

PCI HSM Access Provider Installation

After successful installation of the adapter, the next steps are to:

1.   Install the *SafeNet PSI-E2 HSM Access Provider* package (PTKpcihsm2).

2.   Confirm the correct operation of the adapter and driver package.

These steps are covered in the *ProtectServer HSM Access Provider Installation Guide* for both Windows and Unix/Linux systems.

Smart Card Reader Installation

The ProtectServer offers functionality supporting the use of smart cards. To make use of these features, a SafeNet-supplied smart card reader must be used. Smart card readers, other than those supplied by SafeNet, are not supported.

To install the smart card reader, use the included USB-to-serial cable to connect it to the USB port on the card faceplate.

The card reader qualified with the ProtectServer product also requires connection to a PS/2 port for its power. Many newer servers have USB ports, but do not provide a PS/2 connection.

The options are:

- Connect a PS/2-to-USB adapter cable between the card reader and a USB port on your computer.

- If you prefer to not expose USB ports on your crypto server (for security reasons), then connect a PS/2-to-USB adapter cable between the card reader and a standalone powered USB hub.

Again, the USB connection is for power only. No data transfer occurs.

Completing Installation

Following the PCI HSM Access Provider installation, to make use of the ProtectServer, you will need to install the supplied SafeNet API or net server software.

Please refer to the installation instructions in the appropriate manual, such as the *ProtectToolkit C Installation Guide*.

Chapter 3
Troubleshooting

Overview

The most common problem encountered with installing the ProtectServer is that the device driver is not loaded or functioning correctly.

Should you encounter any difficulties, first check that you have followed all the installation instructions in this manual and the *Hardware Security Module Access Provider Install & Configuration Guide*. The information provided below may be of further assistance. If you still cannot resolve the issue, please contact your supplier or SafeNet Support. See the *Preface* for further information.

Known Issues

Problem

The MSI (Microsoft Installer) application does not complete installation, or is left in an unstable state.

Solution

This fault can occur if there are no free IRQs that can be assigned to the device. Make sure the device is assigned an IRQ. The IRQs assigned to devices are usually displayed when a system is powered up.

Problem

The system locks up after installation of the PCI HSM Access Provider device driver package. This may happen if a prior version of the device driver exists on the system.

Solution

1. Power down and remove the adapter.

2. Power up.

3. Uninstall all versions (old and new) of the PCI HSM Access Provider / device driver package.

4. Power down and re-install the adapter.

5. Power up and reinstall the PCI HSM Access Provider package.

Problem

Following re-installation of a previously removed adapter or the addition of another adapter, the device driver cannot find the device or an adapter is not responding.

Solution

Confirm that the adapter(s) are firmly seated in the PCI slot, then uninstall the PCI HSM Access Provider package. Following this, perform a fresh install of the PCI HSM Access Provider package.

Problem

When operating multiple adapters under Windows 2000 or later, the adapters run slowly or even stall. Some commands may work correctly on one adapter, but not the other.

Solution

This problem may be resolved by resetting the configuration data in the host system BIOS.

Simple Fault Diagnosis

Fault Diagnosis Utilities

To carry out simple fault diagnosis, SafeNet hardware maintenance utilities can be used. These are installed as part of the ProtectServer PCI HSM Access Provider installation. There are two utilities: *hsmstate* and *hsmreset*

Further information about these utilities, beyond what is covered in this chapter, can be found in the *Hardware Security Module Access Provider Install & Configuration Guide.*

Fault Diagnosis Procedure

From a command prompt, execute *hsmstate*. The output from the utility should include "... NORMAL mode, Responding".

- If the utility reports "... HALTED due to a failure":
    - o Execute *hsmreset*.
    - o Following the reset, check to see if the *hsmstate* is now reporting NORMAL operation.
- If the utility reports "... waiting for tamper cause to be removed":
- o Check to see that external tamper detectors connected to the board are correctly configured if these are being used.
- o Make sure the adapter is sitting firmly and correctly in the PCI slot.

Chapter 4
Hardware Reference

Adapter Modification for External Tamper Detectors

Provision has been made to allow users to connect additional tamper detection devices using the tamper input header, located on the rear of the card, as illustrated below.
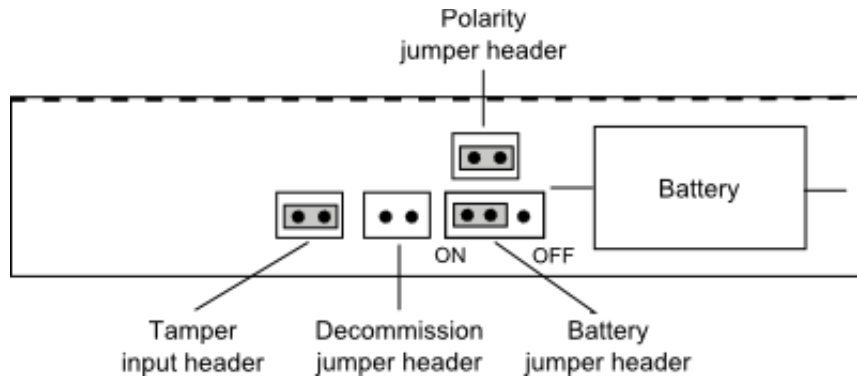
To fit an external tamper detection device, such as a micro switch on the cover of the host system, first remove the default jumper/shunt that bridges the two posts in the ProtectServer adapter's tamper input header. Connect your external tamper device in place of that shunt. You will need the cable end from your tamper-detection device to match the Molex socket on the adapter.

The required insertable shell, or connector housing is Molex part 35507-0200. It must be installed on the end of your tamper-device's two-wire cable, in order to insert into the tamper-detection socket on the ProtectServer adapter.

Crimp a pair of Molex 50212-8100, 2mm WTB crimp terminals to the ends of the wires coming from your tamper switch, and insert the crimped terminal sockets into the Molex connector housing.

Plug the connector end of the assembled cable into the tamper-detect socket on the PSI-E adapter.

In the un-tampered condition, any external device must provide a low impedance path (i.e., short circuit) between the posts of the tamper-detect connector.In the tampered condition, the external device must show an open circuit.

The Battery

The adapter is fitted with a battery, which is used to maintain keys and the correct time on the adapter when the PCI-E connector is un-powered (such as, when the Host computer is shutdown).

The expected lifetime of the battery is 10 years, so it should not require replacement in the normal lifetime of the adapter.

Testing the battery

You can use the utilities provided with the adapter to query the state of the battery, but it reports only "low" or not (see below). For example, if Protect Toolkit C is being used, then the ctconf utility displays the state of the battery (Good/Low). See the Administration Guides for the software you are running for details on how you can check the battery status.

The RealTime Clock and memory retain their data as long as the adapter is in a powered system. The RTC performs a check of battery level daily. If a low-battery warning is detected on a PSI-E2 adapter that has been un-powered/removed from a system, then the data in the memory can be considered suspect. If a low-battery warning is detected on a PSI-E2 adapter that has been continuously powered, then the data in memory can be trusted (for you to make a backup before proceeding with battery replacement).

Port Specifications

The USB-to-serial cable provides an RS232 port with pin outs as shown in *Figure 6*. That port can be used for connecting a smart card reader or some other serial device.
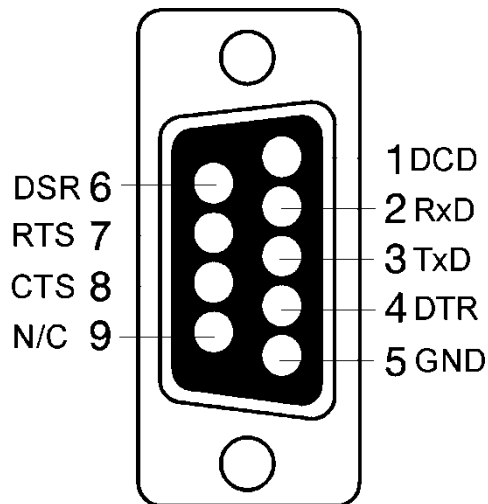

Figure 6 – Adapter serial connector

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