



**SuperSwitch™**



## Host Cable Adapter User Manual

OSS-PCIe-HIB5-x8



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## Overview of SuperSwitch™

SuperSwitch is an extension of the Max Express Expansion System to allow communication between processors over the PCI Express bus at speeds of 10Gb/s. SuperSwitch offers several significant advantages over other high speed networking technologies such as 10Gb Ethernet:

- Lower cost
- Higher performance
- Available in more form factors

SuperSwitch configurations allow for communication to a combination of processors as well as external stand-alone PCI Express devices or expansion systems. SuperSwitch also provides a simple way to network between various computer architectures such as CPCI, laptops, desktop systems or PICMG passive backplane architectures.

## SuperSwitch Technology

SuperSwitch consists of two or more host interface boards (HIBs) and a software driver package called ExpressNet. Each system uses a HIB, which is connected by cables either to another HIB or through a PCI Express switch to several HIBs. The HIBs use a PCIe non-transparent bridge to map the memory on each system into the memory space of the others. This allows high speed direct memory access between the systems.

The ExpressNet software sets up one CPU as the root complex, which initializes the ExpressNet network and handles the fabric management. It provides standard network services like TCP/IP between the connected systems and also Direct Data Transfer (DDT) between user level applications. DDT implements a high speed, low latency shared memory that can be used in a customized communications scheme appropriate to the application.

## SuperSwitch Configurations

SuperSwitch is available in three base configurations:

### **SuperSwitch 1 (2 ports)**

Communication between 2 Host Interface Boards

### **SuperSwitch 2 (3-5 ports)**

These ports can all be processors, or they can be any combination of processors, or end points such as a PCIe device, SHB-ELB, Host Cable Adapter, ECA, CPCI HEB or PCIe ELB.

### **SuperSwitch 3 (6-8 ports)**

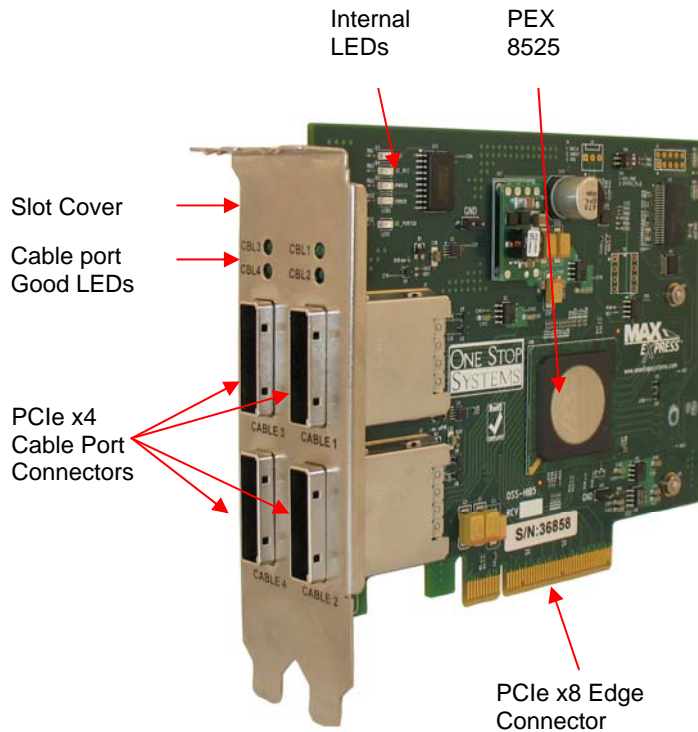
A HIB in the host system communicates through an external 1U 8 port PCI Express switch to be any combination of processors, or end points such as a PCIe device, SHB-ELB, Host Cable Adapter, ECA, CPCI HEB or PCIe ELB

## Description

The Host Cable Adapter (Part # OSS-PCIe-HIB5-x8) is a PCIe x8 board that provides 2 or 4 (with optional mezzanine card) downstream PCIe x4 links for SuperSwitch 2 configurations using ExpressNet software.

It can also be used as a standalone PCI Express expansion board to connect to 4 downstream PCIe devices with no software required.

Front bezels with 2 or 4 PCIe x4 cable connectors are available depending on the configuration. The four port version of the HIB5 requires two physical PCI Express slots.



## Unpacking Instructions

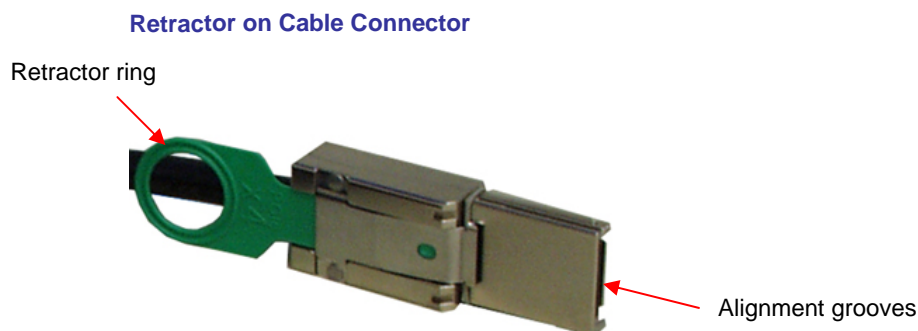
1. If the carton is damaged when you receive it, request that the carrier's agent be present when you unpack and inspect the equipment.
2. After unpacking, verify that all items listed in the packing list are present.
3. Inspect the equipment for shipping damage.
4. Save all packing material for storage or return shipment of the equipment.
5. For repairs or replacement of equipment damaged during shipment, contact One Stop Systems, Inc. to obtain a Return Materials Authorization (RMA) number and further shipping instructions.

## Installation and Removal

1. Power down the system.
2. Open the chassis according to your system documentation.
3. Let the power supply cool down, if necessary.
4. Remove the Host Cable Adapter from the protective bag, observing proper ESD safety procedures.

## Installing the Host Cable Adapter:

1. Insert the Host Cable Adapter into a PCIe x8 or x16 add-in card slot. Make sure that the card is well seated, and tighten the screw.
2. Attach the cable by first pulling back on the retractor ring. With the keyed slot aligned with the key ridge of the Host Cable Adapter slot cover, insert the cable connector into the cable port connector on the board until the cable locks in place.
3. The connectors on either end of the PCIe x4 cable are identical. Each connector is equipped with a retractor to allow the connector to be locked into place.



4. Attach the other end of the cable to the cable port connector of the HIB2, HIB4, or PCI Express switch depending on your SuperSwitch configuration.

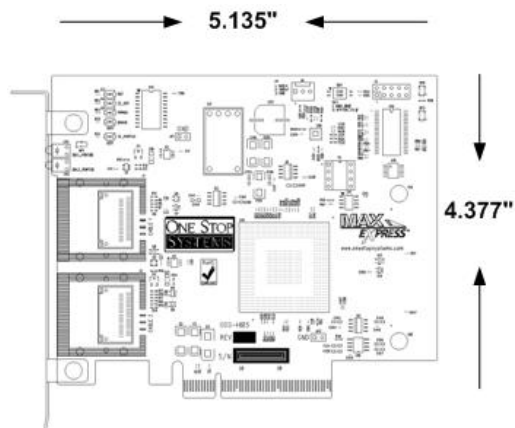
## Removing the Host Cable Adapter:

1. Remove the cable by pulling on the green retractor ring which releases the locking mechanism.
2. Loosen and remove the screw before removing the Host Cable Adapter from the card slot.

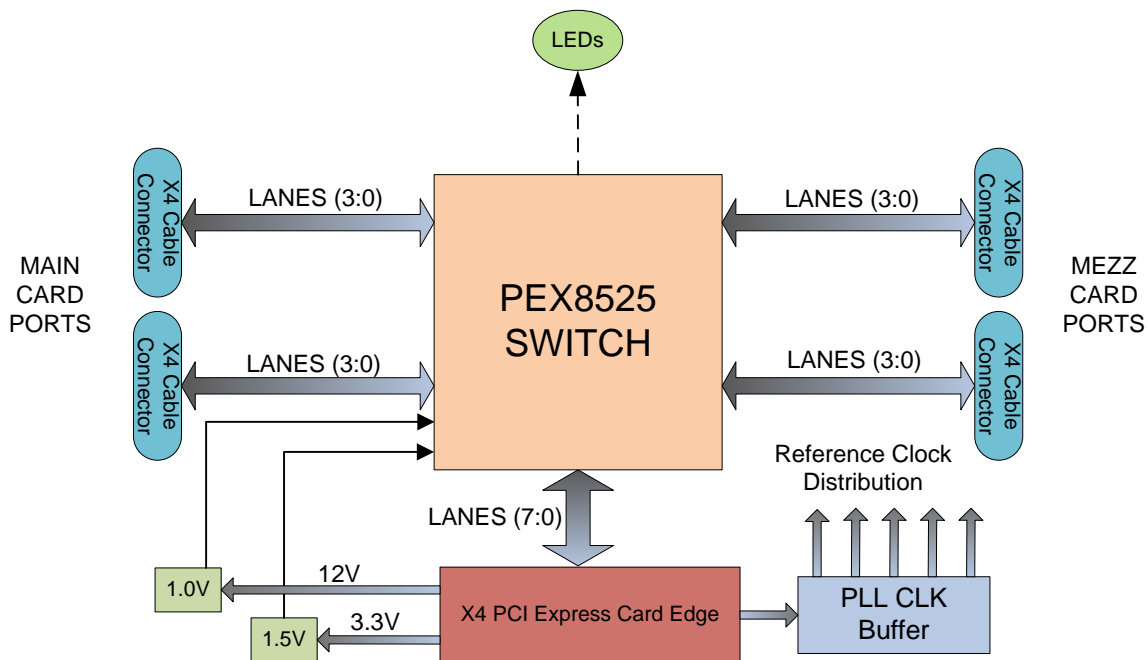
## Specifications

Electrical/Mechanical Specifications	
Form Factor:	PCIe x8 add-in card
Dimensions (H x L):	4.3773 x 5.135 inches (101.6 x 130.4 mm)
Front Panel Connectors:	Two or four PCIe x4 cable connectors
Front Panel Indicators:	Cable Port Status LEDs (one for each connector)
Power Consumption (designed to meet the following conditions)	
	6.5W maximum (3.2W @ 3.3V, 3.3W @ 12V)
Operating Environment (designed to meet the following conditions)	
Temperature Range:	0° to 50°C (32° to 122°F)
Relative Humidity:	10 to 90% non-condensing
Shock:	30g acceleration peak (11ms pulse)
Vibration:	5-17 Hz 0.5" double amplitude displacement; 7-2000Hz, 1.5g acceleration.
PCI Express Switches	
	PLX PEX8525
Agency Compliance Designed to meet, but not tested	
	UL60950, FCC Class B, CE safety and emissions

## Dimensions

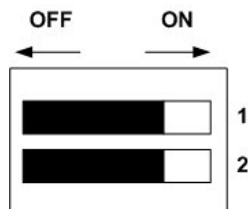


## Block Diagram



## Switches

The Host Cable Adapter contains one x2 dip switch. Both switches are factory configured to the "ON" position for proper operation. These switches should not be changed. .



## LEDs

There is one “port good” LED for each downstream cable connector located on the front panel. When lit, this LED indicates that the port is functioning properly. Status LEDs for individual lanes on each port are not provided on this board.

There are 5 surface mounted LEDs. See the below table for their designation, description and function. Note that these LEDs are not visible from outside the chassis when the board is installed. See picture in the description section for location.

LED #	PCB Label	Function	Description
LED1	CE_PORTGD	Card Edge Port Status	When lit, indicates that the PCIe x8 Port on the card edge is functioning properly
LED2	ERROR	PLX PEX8525 Status	When lit, indicates an error in the 8525 chip (reboot host)
D5	PWRGD	Power Good indicator for the board	
D4	CE_RST	Card Edge PCIe reset	
D3	RST	Board Reset	

## Connectors

The Host Cable Adapter has two connectors on it:

1. **PCIe X8 Card Edge Connector** per *PCI Express Card Electromechanical Specification Revision 1.1 (March 28, 2005)*
2. **PCIe X4 Cable connector** per *PCI Express External Cabling Specification Revision 1.0 (January 4, 2007)*

# Addendum A - ExpressNet Linux Driver<sup>1</sup>

## Description

The ExpressNet software package for Linux consists of three major components and their associated include and make files.

- The kernel driver
- A user library
- A demonstration/performance testing program

These are all supplied as source files written in C and packaged in a compressed tar file **expressnettar.bz2**, provided on a CD with your Host Cable Adapter.

## Requirements

The driver requires a 64-bit version of Linux, with Linux kernel version 2.6.20 or greater running on a 64-bit AMD or Intel CPU. However, ExpressNet may work in simple configurations with earlier versions and/or 32-bit versions of Linux. Kernel module dependencies are documented in the **html/readme.html** file contained on the CD.

## Extraction

The files in the **expressnettar.bz2** file all untar into the **opt/ossi/expressnet** directory tree. For most Linux system, to untar it into the standard location, /, you must log in as **root** and execute:

```
cd /; tar xvfj directory_path/expressnettar.bz2
```

In the resulting **/opt/ossi/expressnet** directory you will find:

<b>applications</b>	The directory containing the ExpressNet demonstration program.
<b>documentation</b>	The directory containing documents not found in the html or manpages directory.
<b>driver</b>	The directory containing the ExpressNet Linux driver.
<b>filelist</b>	A list of all ExpressNet files installed in the system that is used to uninstall ExpressNet.
<b>html</b>	The directory containing ExpressNet documentation in web format.
<b>include</b>	The directory containing the ExpressNet include files.
<b>init.d</b>	The directory containing the script which enables the system to control the loading of the driver.
<b>lib</b>	The directory containing the ExpressNet library files.
<b>manpages</b>	The directory containing ExpressNet documentation in manpage format.
<b>pexload</b>	The directory containing the ExpressNet EEPROM programming utility.
<b>INSTALL</b>	A shell script that compiles and installs the driver and library and compiles the demonstration program.
<b>UNINSTALL</b>	A perl script that removes all ExpressNet files on the system.

## Driver Installation

Follow the explanations and instructions in the README documentation in the HTML directory.

## Licensing Agreement

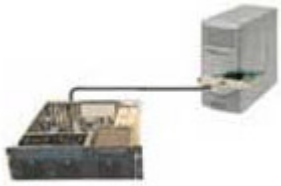
This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License version 3, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. A copy of this license can be found in **documentation/gpl.txt** on the CD.

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<sup>1</sup> The following information was correct at the time this manual was published. Please read the readme.html on the CD for the most up to date requirements and installation procedures.

# Addendum B – SuperSwitch Configurations



## SuperSwitch 1 PCI Express-over-cable solutions for point-to-point communications

- SuperSwitch 1 includes one PCIe x4 host adapter attached via a PCIe x4 cable to a CPCI Express x4 cable adapter,
- PCIe x4 cable adapter or Express Card and ExpressNet software suite.
- Data transfers between two systems occur at 20Gb/s.
- ExpressNet software supports 64 bit CPUs as well as multithreaded environments.
- PCIe cables in 1m, 2m, 3m, 5m and 7m lengths.

Part #: OSS-SS1-X-XM



## SuperSwitch 2 PCI Express-over-cable networking for 3 to 5 PCs

- SuperSwitch 2 includes connecting up to five processors using one PCIe x4 mezzanine cable adapter, up to four PCIe x4 cable adapters, PCIe cables up to 7 meters and ExpressNet software suite.
- Enables data transfers at speeds up to 20Gb/s.
- ExpressNet software supports 64 bit CPUs as well as multithreaded environments.
- PCIe cables in 1m, 2m, 3m, 5m and 7m lengths.

Part #: OSS-SS2-X-XM



## SuperSwitch 3 PCI Express-over-cable networking for 6 to 8 PCs

- SuperSwitch 3 includes connecting up to eight CPUs or any combination of CPUs and I/O devices, using one 8-port 1U switch, one PCIe x4 host adapter, Express Card or CPCIe host adapter, up to 7 PCIe host cable adapters, up to 8
- PCIe cables and ExpressNet software suite.
- Enables data transfers at speeds up to 20Gb/s.
- ExpressNet software supports 64 bit CPUs as well as multithreaded environments.

Part #: OSS-SS3-X-XM

## Limited Warranty

One Stop Systems warrants this product to be free of defects in material and workmanship for an initial period of two years from date of delivery to the original purchaser from One Stop Systems.

During this period, One Stop Systems will, at its option, repair or replace this product at no additional charge to the purchaser, except as set forth in this warranty agreement.

One Stop Systems will, at its option, repair or replace this product at no additional charge to the purchaser, if the defect is related to the One Stop Systems manufactured product, such as a power supply, backplane, other chassis components or CPUs. One Stop Systems is not liable for any defects in material or workmanship of any peripherals, products or parts, which One Stop Systems does not design or manufacture. However, One Stop Systems will honor the original manufacturer's warranty on these products.

One Stop Systems will analyze the defective component and the customer will be charged in the following instances:

- No problem found: \$75 (U.S. dollars).
- Damage: Parts and labor at \$75 per hour with a \$100 minimum charge (U.S. dollars). Receipt of damaged goods voids the One Stop Systems warranty.

Repair parts and replacement products will be furnished on an exchange basis and will be either new or reconditioned. All replacement parts and products shall become the property of One Stop Systems, if such parts or products are provided under this warranty agreement. In the event a defect is not related to the One Stop Systems manufactured product, One Stop Systems shall repair or replace the defective parts at the purchaser's cost and deliver the defective parts to the purchaser.

This limited warranty shall not apply if the product has been misused, carelessly handled, defaced, modified or altered, or if unauthorized repairs have been attempted by others. The above warranty is the only warranty authorized by One Stop Systems and is in lieu of any implied warranties, including implied warranty of merchantability and fitness for a particular purpose. In no event will One Stop Systems be liable for any such damage as lost business, lost profits, lost savings, downtime or delay, labor, repair or material cost, injury to person or property or any similar or dissimilar consequential loss or damage incurred by the purchaser, even if One Stop Systems has been advised of the possibility of such losses or damages.

In order to obtain warranty service, the product must be delivered to the One Stop Systems facility, or to an authorized One Stop Systems service representative, with all included parts and accessories as originally shipped, along with the proof of purchase and a Returned Merchandise Authorization (RMA) number.

The RMA number is obtained, in advance, from One Stop Systems Customer Service Department and is valid for 30 days. The RMA number must be clearly marked on the exterior of the original shipping container or equivalent. Purchaser will be responsible and liable for any missing or damaged parts. Purchaser agrees to pay for shipping charges one way, and to either insure the product or assume the liability for loss or damage during transit. Ship to:

One Stop Systems  
ATTENTION: RMA REPAIR DEPARTMENT  
RMA ####  
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Escondido, CA 92029

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