



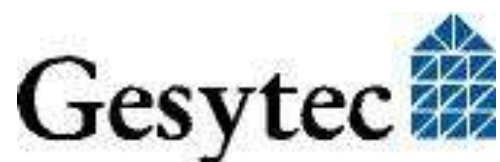
PCIe Interface+ **User Manual**

For interfaces from version LVX4.xxx, P.Vxx8xx-3

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Dok. ID: LVX4/UserDoc//LVX_Manual-EN-v3.0.docx,
Version v3.0 , 07/08/2014



This manual ...

... provides you with all the information which you will require to use the Easyton[®] PCIe Interface⁺ card.

However, this manual will neither explain aspects of Echelon's[®] LONWORKS[®] technology, nor details of the ISO/IEC 14908 standard on which this product is based, nor Echelon's Microprocessor Interface Program (MIP). Details concerning the Easyton Interface network driver, which has been designed in accordance with the driver specifications of the Echelon Corporation are not part of this documentation. For further information on the LONWORKS technology please refer to the extensive documentation provided by Echelon. Especially Echelon's "LONWORKS Host Application Programmer's Guide" will be required if applications are to be developed using Gesytec's Easyton Interfaces as a network interface.

After a general presentation of the Easyton PCIe Interface⁺ in Chapter 1, Chapter 2 describes the necessary steps to install the card.

Chapter 3 contains a general technical description.

Chapter 4 provides some information on the usage of the Interface⁺ as virtual network node (MIP).

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1

Product Information

This manual describes the Easylon PCIe Interface⁺ cards for PCI express X1 to X16 slots:

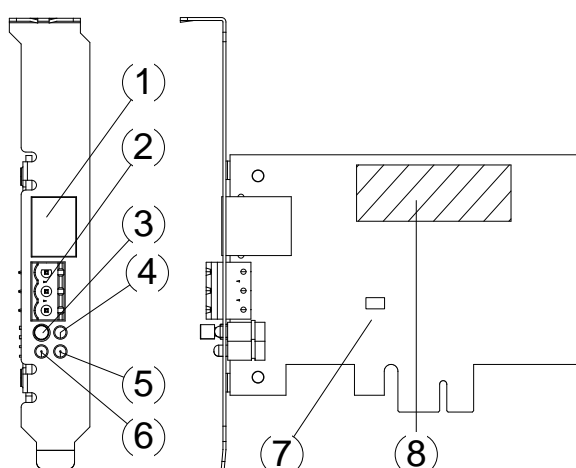


FTX version



EIA-485 version

Figure 1-1 Easylon PCIe Interface⁺, FTX and EIA-485 variants



- (1) RJ45
- (2) Screw-plug terminal pin1 top
- (3) Service button
- (4) Traffic LED, yellow;
- (5) Error LED, red
- (6) Status LED, green
- (7) Power LED, green/orange
- (6) Type sticker on rear side

Figure 1-2 Easylon PCIe Interface⁺, elements

1.1 Variants

The following variants of the Easylon PCIe Interface+ are currently available and described in this documentation. Each variant is identifiable by a type code sticker on the rear of the card.

| Order code | Type code | Network Interface | Slot bracket |
|------------|-----------|-------------------|----------------------------------|
| P.V10803-3 | LVX4.DAA | RS485 | Standard height plus low profile |
| P.V20803-3 | LVX4.DAA | RS485 | Standard height |
| P.V30803-3 | LVX4.DAB | RS485 | Low profile |
| P.V10806-3 | LVX4.FAA | FT-X2 | Standard height plus low profile |
| P.V20806-3 | LVX4.FAA | FT-X2 | Standard height |
| P.V30806-3 | LVX4.FAB | FT-X2 | Low profile |

Table 1-1 Variants, order-codes and type identifiers

1.2 Scope of Delivery

- PC plug-in card
- Mounting instruction
- Installation and documentation CD¹ with
 - Network drivers for 32 bit and 64 bit versions of Windows² XP, Vista, 7, 8, Server 2003, Server 2008, Server 2008 R2, 2012
 - Easylon RNI Software for remote LON access
 - EasyCheck utility for Easylon Interfaces
 - WLDV32.DLL
 - This documentation

1.3 Overview

The Easylon PCIe Interface+ is a network interface link between a PCIexpress bus computer and a control network according to LONWORKS specifications. It complies with the specifications of the ISO/IEC 14908 standard. The interface board is available for TP/FT or EIA-485 LON networks.

¹ Not included in delivery of P.V2080x und P.V3080x.

² A Linux driver is available in source code on demand.

As an Easylon Interface⁺ the network interface provides up to eight logical driver interfaces thus realizing the parallel access of several applications to the network either in MIP or LNS compatible mode.

The Easylon PCIe Interface+ is provided with a service button and LED. The card is equipped with two connectors, either of which can be used:

- RJ45
- 3 pin screw-plug terminal

1.3.1 VNI (Virtual Network Interface)

With VNI Echelon defined a transparent mode of operation for LonWorks interfaces. In this mode LonTalk packets are not preprocessed on the interface device, but the PC realized the complete network access. Thus the applications running on the PC receives and sends the messages. VNI interfaces overcome several limitations of the conventional interfaces using MIP or NSI firmware. For instance they offer an increased performance. Easylon Interfaces⁺ are compatible with the Echelon VNI interfaces and can be used with LNS based software such as LonMaker for Windows without problems.

1.3.2 MIP

The Neuron Chip used on the conventional network interface requires a firmware to realize the interface functionality. The de facto standard was the MIP firmware. Many applications still use the functionality of this firmware, which realizes layers 3–5 of the LonTalk protocol, namely network, transport and session.

Using the drivers of the Easylon VNI Interfaces (Interface⁺) up to 8 logical MIP interfaces can be used with one interface card, i.e. an Easylon VNI Interface replaces 8 standard MIP interface cards.

2

Installation

Installation of the Easylon PCIe Interface⁺ is carried out in two steps:

1. Insertion of the card into the PC
2. Installation of the network driver

2.1 Insertion of the Card

When inserting the Easylon PCIe Interface⁺ card in your computer, please be sure to observe all the computer manufacturer's instructions regarding the insertion of additional interface cards.

The Easylon PCIe Interface⁺ card is to be inserted into a vacant 32-Bit PCI Express slot while the computer is switched off.

The address and the interrupt are automatically assigned by the computer's PCI BIOS.

Please refer to section 0 for information regarding the connector pin assignments for connection to the LON network.

2.2 Driver Installation

Drivers for different operating systems are available for the Easylon PCIe Interface. Currently these are Windows 2000, XP, Vista, 7 and 8 and the Windows Server OS 2003, 2008, 2008 R2 and 2012. The drivers support both, the 32 and the 64 bit version of these operating systems. Latest driver versions you can download via the Easylon Support pages of our web site: www.gesytec.com Installation is described in the following sections:

Windows operating systems chapter 2.2.1

16-bit driver under 32-bit Windows chapter 2.2.2

This section also describes in short the diagnosis utility "EasyCheck" which can be installed separately from CD.

The “Driver and Documentation” CD will lead you to the installation of drivers for different operating systems (OS). However, all setups can as well be started manually for each OS and the respective interface card directly from the CD.

2.2.1 Driver for Windows Operating System (WDM Drivers)

This section describes installation and setup of the Easylon Interface card drivers for the Windows operating system from Windows XP onwards.

The setup program is using the same WDM driver (Windows Driver Model) for all operating systems.

Note: For installation you can either use the Windows assistant or the program FastUpd.exe for manual installation. The latter is especially helpful if you are running Windows 7 and later or have to install several instances of the driver.

Finally de-installation of the driver is explained

2.2.1.1 Installation using the Windows Assistant

After the Easylon Interface has been mounted Windows will recognize the new device and start the hardware assistant.

If Windows should not find the driver on the “Drivers and Documentation” CD or the driver should be elsewhere, please select the appropriate drive and select the setup file “LvXLvu.inf” and the driver “Gesytex LvXWdm Driver PCI-E” from the “LvXLvu” directory.

2.2.1.2 Manual Installation and Update

The easiest way to install the driver is to ignore the hardware assistant and run

FastUpd.exe or **FastUpd64.exe**³

from the „LvXLvu“ folder of the CD-ROM.

The same program you will use to update an existing driver.

2.2.1.3 Driver Instances

The driver consists of a basic part for the interface hardware “LVX_{x-y}”⁴ and of up to eight logical VNI drivers „LVX_{x-y}-Vniz“ and up to eight logical MIP drivers „LVX_{x-y}-Mipz“. These driver instances can be used like independent network interfaces.

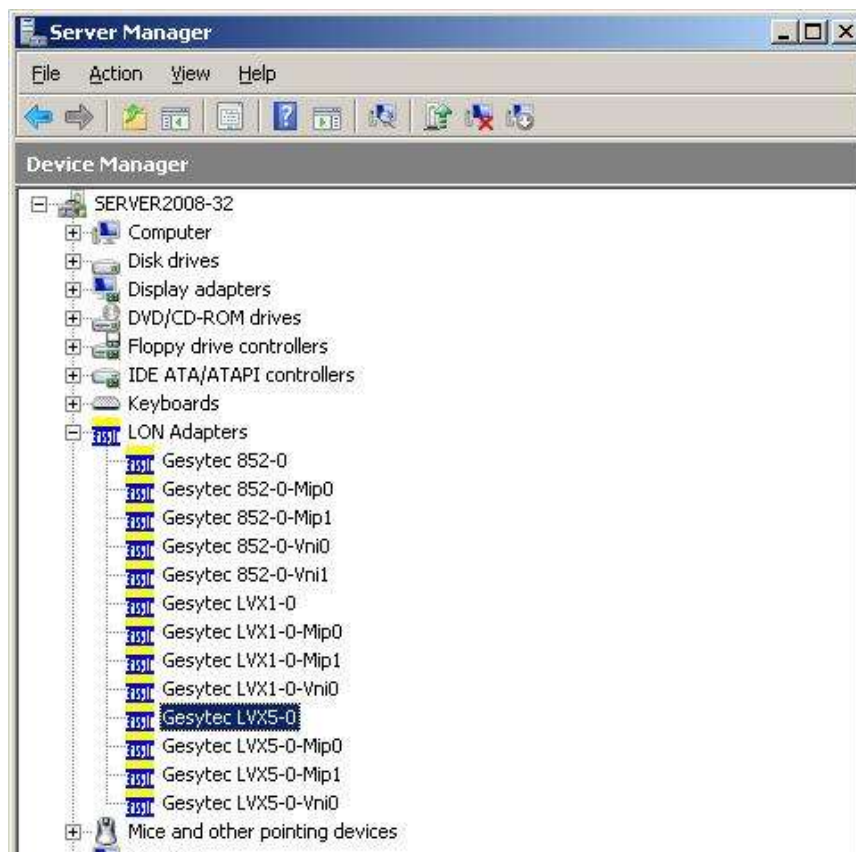
³ For 64-bit systems

⁴ *x-y* are the PCI Express Bus number und slot number

For each logical driver instance an individual node-id (unique identification corresponding to the Neuron-ID) is used. VNI and MIP drivers with identical last digit z will be assigned the same node-id. There is a maximum of 8 node-ids available for each interface device.

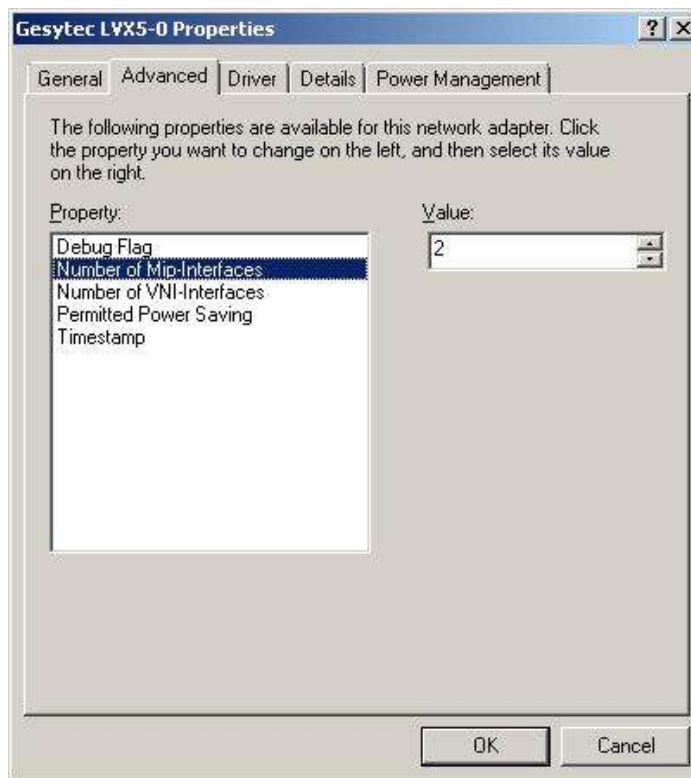
2.2.1.4 Parameter Setting

Settings for the Easylyn Interfaces can be parameterized in the Device Manager. This is especially required if several diver instances are used. Select the respective interface board under “LON Adapters” and modify the settings.



The „Advanced“ TAB allows setting of individual properties.

Parameters for interface device



Debug Flag

This field contains a DWORD in hexadecimal notation of different flags for debug purposes. Usually it is set to 0 (= not existing). By setting the single bits certain debug features can be turned on. Currently bits 1 and 3 are supported:

- Bit 1: Telegrams at the interface between PC and interface hardware are displayed in the debug output.
- Bit 3: CREATE and CLOSE of the driver are displayed in the debug output.

NOTE: The Debug Output can be displayed using, for example, the program DebugView, available at www.sysinternals.com.

Number of Mip-Interfaces

The number of virtual MIP-Interfaces can be set here (0 – 8, default = 2).

Number of VNI-Interfaces

The number of virtual VNI-Interfaces (Interfaces⁺) can be set here (0 – 8, default = 1).

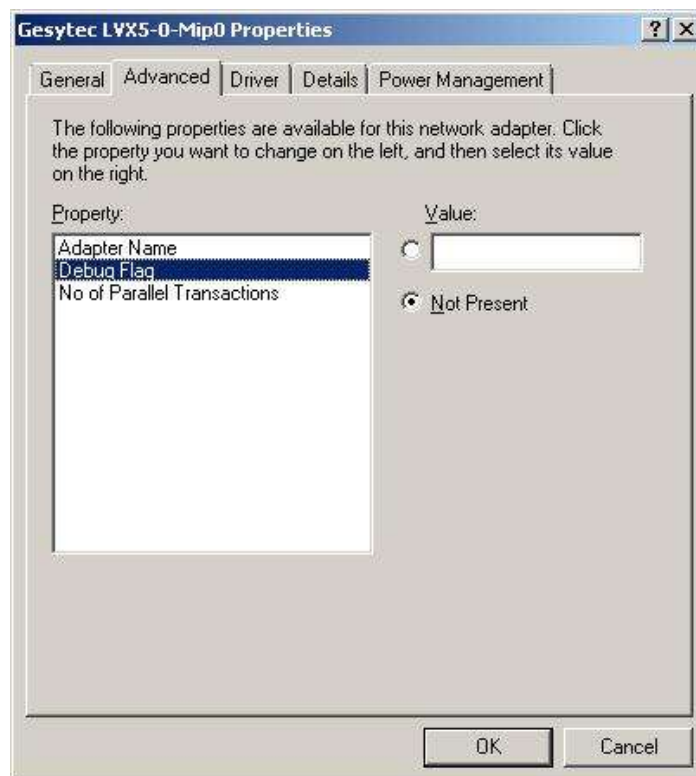
ATTENTION There are 8 node-IDs available for each interface device. These have to be assigned appropriately to the applications using the device either as VNI or as a MIP interface. If, for example, a VNI application is using the instance LVX_x-y-Vni0 with its corresponding node-id, a MIP application must not use the instance LVX_x-y-Mip0.

VNI application (e.g. LNS) usually generate a node-id of their own, which will then be additional to the 8 standard node-ids provided by the interface device.

Permitted Power Saving

Usually the Easylon Interfaces allow the standby mode as well as the hibernate mode with applications running. However, in certain operating conditions problems may arise if the PC, with a LON application running, automatically changes to hibernate or standby mode. This can be turned off by selecting „None“.

Parameters for logical instance



Adapter Name

An arbitrary name can be chosen freely (e.g. building 7).

NOTE

This name must not be used by any other instance. If the name is already in use, the device will not start (code 10).

Debug Flag

This field contains a DWORD in hexadecimal notation of different flags for debug purposes. Usually it is set to 0 (= not existing). By setting the single bits certain debug features can be turned on. Currently bits 0, 1 and 3 are supported:

- Bit 0: LON telegrams at the interface from and to the application are displayed in the debug output.
- Bit 1: Telegrams at the interface between PC and interface hardware are displayed in the debug output.
- Bit 3: CREATE and CLOSE) of the driver are displayed in the debug output.

No of Parallel Transactions

By default the Easylon MIP driver will handle 16 parallel transactions. This feature can be turned off by setting the value to 1.

2.2.1.5 De installation

WDM drivers are de installed using the “Device Manager”. Among “LON Adapters” select the “Gesyttec LVXx-yy” driver and right click for „de-install“.

2.2.2 Windows and 16 Bit Applications

The Windows driver for the 32 bit Windows versions also provides a 16 bit interface. (Unfortunately Microsoft does not support this in the 64 bit versions.) To use it, the following entry has to be made in the file „config.nt“, usually found in the windows\system32 directory:

```
Device=%SystemRoot%\system32\lpxdos.exe – Llvx5-0-Mip0
```

The 32 bit LON device used is specified by the optional –L or /L parameter:

/Lname

name =

lvx5-0-Mip0

for device LVX with PCIe-bus number 5, PCI device number 0 and instance 0

Note: Two subsequent “l” characters have to be entered, one indicating the parameter -L, the second as first character of the name: -Llxxxx

The 16 bit LON device used is specified by the following optional parameter:

/Dn

with *n = 1...9* for LON1 to LON9

Without this parameter, the interface will be assigned the first unused name starting with “LON1”.

2.2.3 EasyCheck – Test Utility for Windows Drivers

In addition to the drivers, the test utility “EasyCheck” can be installed in the respective program directory (default: : \Easylon\Lpx). The program checks interface and software environment and displays information, from which can be concluded on the reasons for problems in connection with the interface.

EasyCheck runs an analysis of the system’s software. It will open the selected interface, check the driver version and display it. By sending a “query status” command the communication with the hardware is tested. Using the “read memory” command the utility will show if the device is running MIP or NSI firmware. Properly installed Easylon Interfaces will send a corresponding answer.

3 Technical Description

3.1 Network Interface

Easydon Interface+ cards are using an FPGA for accessing the control network. The programming is loaded at start up. 512 kbytes RAM are available to the FPGA as network buffer for transmit and receive. For use in protocol analysis each packet received is transmitted to the application with timestamp of 1 ms accuracy. The FPGA is connected to the computer bus.

Eight node-ids are available on the interface for identification within the control network (cf. “Driver Instances”). The interface status is signaled by several LEDs. The Service push button is read by the driver software (cf. Figure 1-2).

3.2 Bus Interface

The PCI Express Bus Interface has been developed according to the “PCI Express Base Specification, r1.1”.

3.3 Connector Pin Assignment

The Easydon PCle Interface+ provides an RJ45 plug (Figure 1-2, (1)) for LON network connection and a 3 pin screw-plug terminal (Figure 1-2, (2)), which can be used alternatively.

| Connector Type | Pin | Signal | Remark |
|--|-----|--------|---------|
| RJ45 | 1 | data | network |
| | 2 | data | network |
| | 3-6 | — | |
| | 7 | shield | shield |
| | 8 | — | |
| Screw-plug terminal (top down) | 1 | shield | shield |
| | 2 | data | network |
| | 3 | data | network |

Table 3-1 Pin assignment of RJ45 and screw-plug network connectors

3.4 Status and Error LEDs

The card provides 3 LEDs in the slot bracket.

Traffic (yellow) signals network traffic

Status (green) blinking in normal operation

Error (red) blinking: firmware is loaded
 on: error ,e.g. after a reset

If both the red and green LEDs are on, the card is not ready for operation.

There is an additional LED on the board (Figure 1-2, (7)), indicating:

Green Power on
 Orange currently in reset

3.5 Technical Specifications

PCIe Interface

Bus interface according to „PCI Express Base Specification, r1.1
 (backwards compatible with PCIe r1.0a);
 1 lane (x1)

Network interface

Type ISO/IEC 14908 compliant control network inter-
 face for PCI-Express, TP/FT orEIA-485

Node ID in EEPROM

Network connector RJ45 and
 3-pin screw-plug terminal, 0.5–2.5 mm²

| | FTX | EIA-485 |
|--------------------------|------------------|--|
| Transceiver | TP/FT with FT-X2 | EIA-485, galvanically separated from system ground |
| Transmission rate [kBps] | 78,125 | 39,62, 78,125, 156,25, 312,5, 625, 1250 |
| Protection | sparc gaps | protective diode |

Power supply

| | |
|--------------|--------------------------|
| Power supply | 3.3 V \pm 10%, from PC |
| Consumption | 1.3 W, typ. |

Display and Operation

LEDs

| | |
|-------------|--|
| front | traffic (yellow), status (green), error (red), power (green / orange) |
| On board | |
| Push button | service |

Dimensions and Operating Conditions

| | | |
|--------------|--|--------------|
| Dimensions | Low Profile PCI Express Add-in Card accord. „PCI Express Card Electromechanical Specification Rev. 1.1” 70 x 95 [mm], w/o connectors | |
| Slot bracket | Low profile | 79,4 mm |
| | Standard height | 121,0 mm |
| Temperature | operation | 0 °C – 60 °C |
| | storage | 0 °C – 60 °C |
| Humidity | according to DIN 40040, class F, no condensation | |

EMC

| | |
|----------|--------------------------------------|
| Immunity | EN 61 000-6-2, (industrial) |
| Emission | EN 55 022 A/B, (home and industrial) |

4

Programming Information

4.1 LONWORKS Network Node

Being an IEC14908 compatible interface device the Easydon Interface+ card can be used as a network node in a LONWORKS network. The Interface+ can realize one or more virtual MIP interfaces. As the external interface file (.xif) required for using the device as a network node can only be created for a specific application an example .xif file is provided. This must be adapted with the XIF editor prior to usage. The file can be found on the “Drivers & Documentation” CD.

| Network Interface | Transmission Rate | XIF –File |
|----------------------------------|-------------------|--------------|
| TP/FT for virtual MIP interfaces | 78 kbps | lolv075f.xif |

Table 4-1 Network access and .xif files

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