

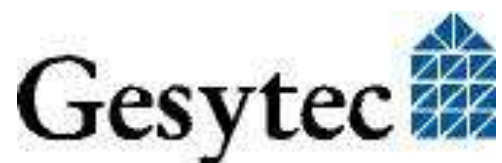


## **Mini PCIe Socket Interface User Manual**

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## This manual ...

... provides you with all the information which you will require to use the Easylon® Mini PCIe Socket Interface.

However, this manual will neither explain aspects of Echelon's® LONWORKS® technology, nor Echelon's Microprocessor Interface Program (MIP) used on this network interface card. The drivers of the Mini PCIe Socket Interface have been developed in compliance with the driver specifications of the Echelon Corporation. Details of these are as well not described in this documentation. For further information on the LONWORKS technology please refer to the extensive documentation provided by Echelon.

After a general presentation of the Easylon Mini PCIe Socket Interface in Chapter 1, Chapter 2 describes the necessary steps to install the module.

Chapter 3 gives the technical specifications of the device and Chapter 4 provides some programming instruction for operation under Windows CE. Tips and tricks concerning the operation can be found in Chapter 5.

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The Easylon Mini PCIe Socket Interface incorporates the MIP program by Echelon Corporation. The aforesaid company holds all rights relating to this software.

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# 1

# Product Information

This manual describes the Easylon Mini PCIe Socket Interface



**Figure 1-1 Easylon Mini PCIe Socket Interface FTX and EIA-485**

## 1.1 Variants

The following variants of the Easylon Mini PCIe Socket Interface are described in this documentation.

| Order Code | Transceiver | Neuron Firmware | Remark                     |
|------------|-------------|-----------------|----------------------------|
| P.P20A03   | EIA-485     | MIP             | extended temperature range |
| P.P10506-3 | FTX         | MIP             | extended temperature range |

**Table 1-1 Variants and order-codes**

## 1.2 Scope of Delivery

- Easylon Mini PCIe Socket Interface module with Echelon MIP firmware
- Technical brief information
- Installation and documentation CD with
  - 32 bit driver for Windows<sup>1</sup> 2000 / XP / Vista / 7 / 8 / Server 2003 / 2008 / 2008R2 / 2012
  - 64 bit driver for Windows XP / Vista/ 7 / 8 / Server 2003 / 2008 / 2008R2 / 2012
  - Easylon RNI Software for remote LONWORKS access
  - EasyCheck diagnosis utility for Easylon interfaces
  - Documentation in Adobe Acrobat .PDF format

<sup>1</sup> A Linux driver is available in source code on demand

### 1.3 Overview

The Easylon Mini PCIe Socket Interface realizes a LonWorks-USB interface in the design of a PCIe "Full-Mini Card with bottom side keep outs (F2)". It can be used in devices offering a Mini PCIe socket of the following type:

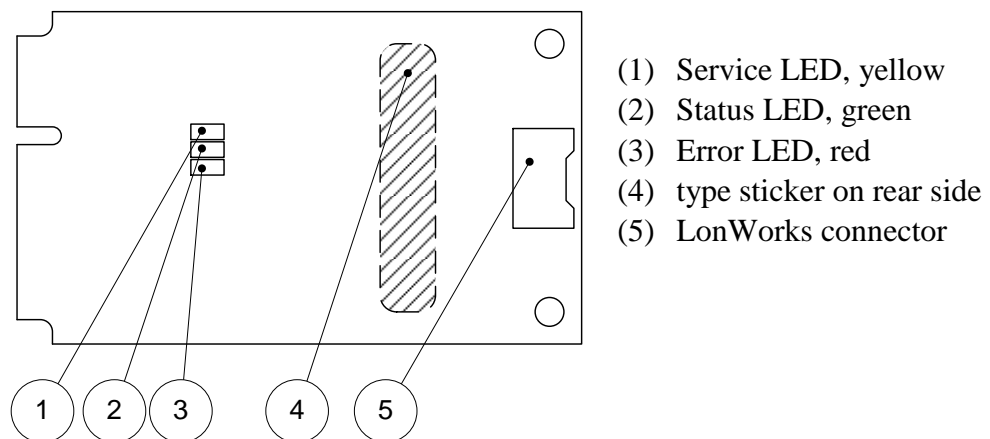
- Full-Mini-Only Socket (connector A)
- Dual-Use Socket (connector A)
- Dual Head-to-Head-Socket (connector A)

The module uses the USB interface of the Mini PCIe slot and thus implements a LON USB interface.

The module of 51 x 30 mm features a Neuron FT5000 processor and an FT-X2 transceiver running MIP firmware to connect to the LonWorks network. Alternatively a version with EIA-485 transceiver and Neuron 5000 is available. Service and traffic LED signals are available via the socket connector; a service button has to be connected externally. Status, error and service LEDs are on board. In the FTX version the LON interface is galvanically separated from the Mini PCI Express ground. The module has been designed for an extended temperature range of -40 to +85 °C.

**Note** Due to the usage of the Neuron FT5000 or Neuron 5000 with MIP firmware this module is not suited for LNS based applications.

The driver for the Easylon Mini PCIe Socket Interface is compliant with Echelon's driver interface. Applications using the driver interface directly can use the interface without problems. The Easylon Mini PCIe Socket Interface is compatible with Gesytec's WLDV32.DLL.



- (1) Service LED, yellow
- (2) Status LED, green
- (3) Error LED, red
- (4) type sticker on rear side
- (5) LonWorks connector

**Figure 1-2 Module components**

### Service LED

The service LED (Figure 1-2, (1)) signals the card status. The following signals are defined for the service LED:

| <b>Service LED</b> | <b>Status</b>   | <b>Remarks</b>  |
|--------------------|---|---|
| Flash (1 Hz)       | No Neuron communication   | Error   |
| Blink (1/2 Hz)     | Driver installed, node is "unconfigured"                              | Configure the node.   |
| Permanently ON     | Node is „applicationless“ and „unconfigured“.                         |   |
| Permanently OFF    | Installation ok<br>or<br>USB not connected<br>or<br>driver not loaded | Normal operation<br><br>check USB side<br><br>check Windows device manager for driver |

**Table 1-2 Service LED**

# 2

# Installation

Please check the delivered items. You must find the Easylon Mini PCIe Socket Interface and an installation CD, containing drivers and this documentation.

## 2.1 Hardware Installation

Please refer also to the manual describing the device into which you want to insert the Easylon Mini PCIe Socket Interface. Turn off power, open the device and mount the module in a suitable Mini PCIe socket. Please observe the following chapter “Pin Assignment”. Restart the PC after the module has been installed and insert the Drivers & Documentation CD in order to get the appropriate driver (cf. chapter 2.2).

### 2.1.1 Pin Assignment

#### 2.1.1.1 Mini PCIe Connector

The Mini PCIe connector is used according to the standard.

| Pin | Name              | Mini PCIe Socket Interface | Pin | Name       | Mini PCIe Socket Interface |
|-----|-------------------|----------------------------|-----|------------|----------------------------|
| 51  | Reserved          | nc                         | 52  | +3.3Vaux   | Supply                     |
| 49  | Reserved          | nc                         | 50  | GND        | GND                        |
| 47  | Reserved          | nc                         | 48  | +1.5V      | nc                         |
| 45  | Reserved          | nc                         | 46  | LED_WPAN#  | LED LON TX                 |
| 43  | GND               | GND                        | 44  | LED_WLAN#  | LED LON RX                 |
| 41  | +3.3Vaux          | Supply                     | 42  | LED_WWAN#  | LED Service + button       |
| 39  | +3.3Vaux          | Supply                     | 40  | GND        | GND                        |
| 37  | GND               | GND                        | 38  | USB_D+     | USB 2.0                    |
| 35  | GND               | GND                        | 36  | USB_D-     | USB 2.0                    |
| 33  | PETp0             | nc                         | 34  | GND        | GND                        |
| 31  | PETn0             | nc                         | 32  | SMB_DATA   | nc                         |
| 29  | GND               | GND                        | 30  | SMB_CLK    | nc                         |
| 27  | GND               | GND                        | 28  | +1.5V      | nc                         |
| 25  | PERp0             | nc                         | 26  | GND        | GND                        |
| 23  | PERn0             | nc                         | 24  | +3.3Vaux   | Supply                     |
| 21  | GND               | GND                        | 22  | PERST#     | System reset input         |
| 19  | Reserved (UIM_C4) | nc                         | 20  | W_DISABLE# | nc                         |
| 17  | Reserved (UIM_C8) | nc                         | 18  | GND        | GND                        |
|     |                   | Mechanical                 | Key |            |                            |
| 15  | GND               | GND                        | 16  | UIM_VPP    | nc                         |
| 13  | REFCLK+           | nc                         | 14  | UIM_RESET  | nc                         |
| 11  | REFCLK-           | nc                         | 12  | UIM_CLK    | nc                         |
| 9   | GND               | GND                        | 10  | UIM_DATA   | nc                         |
| 7   | CLKREQ#           | nc                         | 8   | UIM_PWR    | nc                         |
| 5   | COEX2             | nc                         | 6   | 1.5V       | nc                         |
| 3   | COEX1             | nc                         | 4   | GND        | GND                        |
| 1   | WAKE#             | nc                         | 2   | 3.3Vaux    | Supply                     |

**Table 2-1 Pin assignment of Mini PCIe connector**

**External LED outputs and service button input**

Outputs 42, 44, 46 are active low Open Drain and can switch a maximum of 9 mA as per standard.

**Attention:** The external LEDs have to be supplied by the same 3.3 V source as the module. This is very important to avoid any latch up problems Pin 42 (LED\_WWAN) has got an additional internal pullup resistor against 3.3 V.



Pin 42 (LED\_WWAN) is output for an LED and LON service button input at the same time. Der button is connected to pin 42 and GND. Closing it will release the service message.

### 2.1.1.2 LON Connector

| PIN | MNEMO | Description |
|-----|-------|-------------|
| 1   | RT +  | LON data +  |
| 2   | GND   | ground      |
| 3   | RT -  | LON data -  |

**Table 2-2 Pin assignment of 3pin LON connector, FTX version**

| PIN | MNEMO | Description                                |
|-----|-------|--|
| 1   | RT +  | LON data +                                 |
| 2   | GND   | Connected to ground of Mini PCIe connector |
| 3   | RT -  | LON data -                                 |

**Table 2-3 Pin assignment of 3pin LON connector, EIA-485 variant**

The LON connector is a 90° multi-pin connector, 1 row, 3pin, 1.25 mm;

Manufacturer: PanelMate Molex 0537800370

Supplier e.g. Digikey: WM7601DKR-ND

A LON connection cable is not part of the delivery. For cable assembly the following parts are required:

| Description                                   | Manufacturer                | Supplier e.g.      |
|---|-----------------------------|--------------------|
| Connector casing straight, 1 row 3pin, 1.25mm | PanelMate Molex: 51146-0300 | Digikey: WM5401-ND |
| Crimp kontakt 28-30 AWG gold for 1.25mm       | PanelMate Molex: 0506418141 | Digikey: WM5506-ND |
| Crimping tool for 1.25mm connector system     | Molex: 0638117900           | Digikey: WM9805-ND |

## 2.2 Driver Installation

Drivers for different operating systems are available for the Easylon Mini PCIe Socket 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](http://www.gesytec.com).

A Linux driver is available in source code on request.

Installation for different operating systems is described in the following sections.

|                                    |               |
|------------------------------------|---------------|
| Windows operating systems          | section 2.2.1 |
| Windows CE                         | section 2.2.4 |
| 16-Bit driver under 32-bit Windows | section 2.2.2 |

This section also describes in short the diagnosis utility „EasyCheck“ which can be installed separately from 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 XP onwards.

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

**Note:** For installation you can either use the Windows assistant or the program FastUpd.exe for manual installation, which is much more straightforward (cf. chapter 2.2.1.2).  
The latter is especially helpful if you are running Windows 7 and later or have to install several instances of the driver.

### 2.2.1.1 Installation

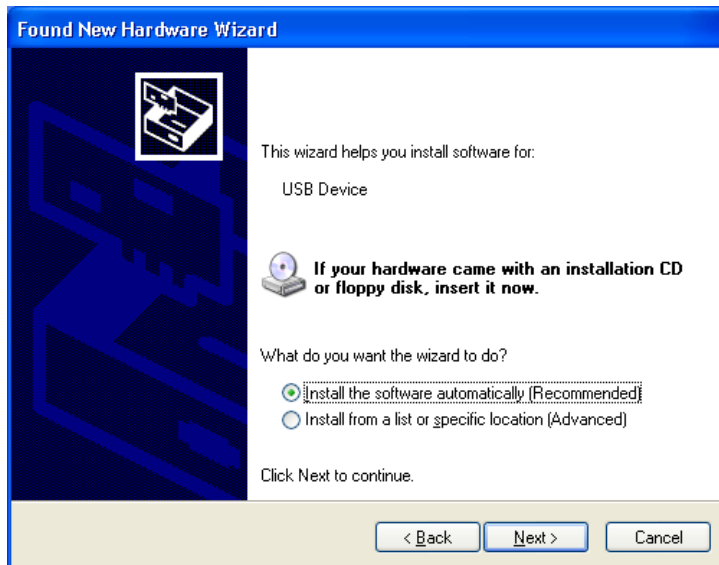
Insert the “Drivers & Documentation” CD into the drive of your PC with the module plugged into the desired socket.

The PC will show that a new USB device has been found. Windows will automatically start the hardware wizard.

### Windows systems up to and including XP

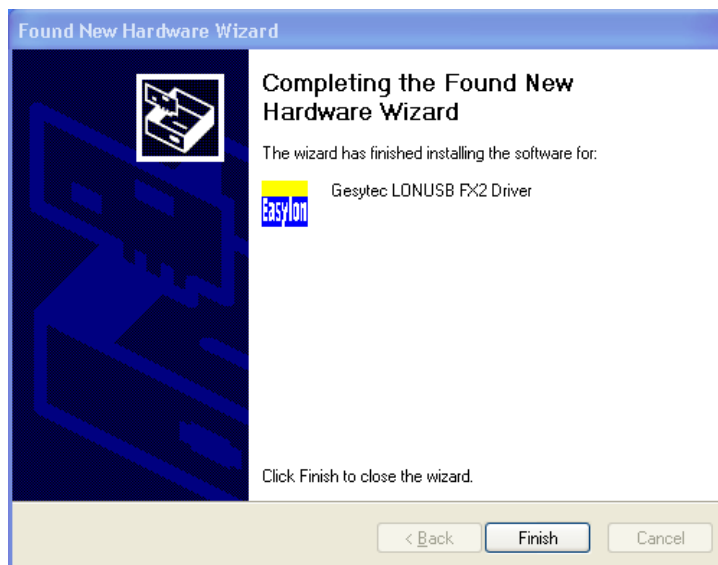
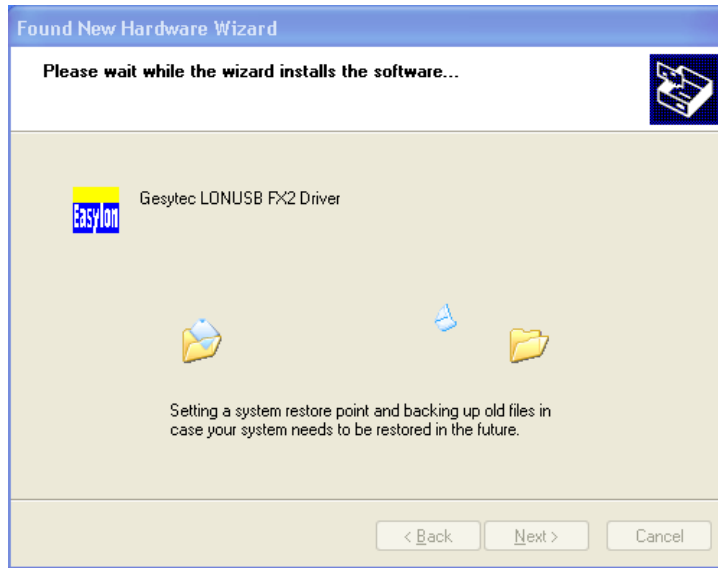


Choose not to browse Windows Update and click the **Next>** button to start the driver installation using this assistant or **Cancel** and install manually (cf. chapter 2.2.1.2).



Having decided for automatic installation please continue by clicking the **Next>** button.

The installation process is shown.



After the installation has been finished, the above message is shown. Click the **Finish>** button to terminate the installation procedure.

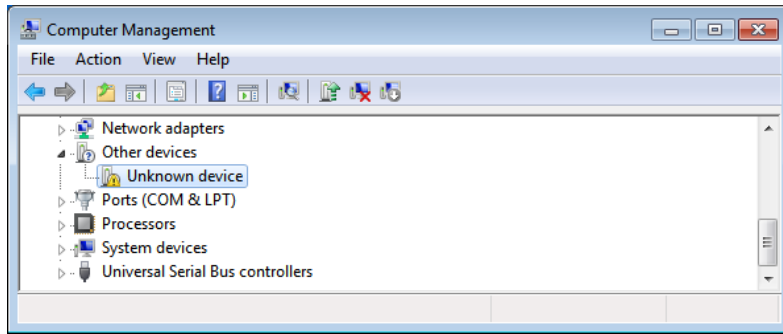
It is possible, that you get be asked to restart the computer.

### Windows 7

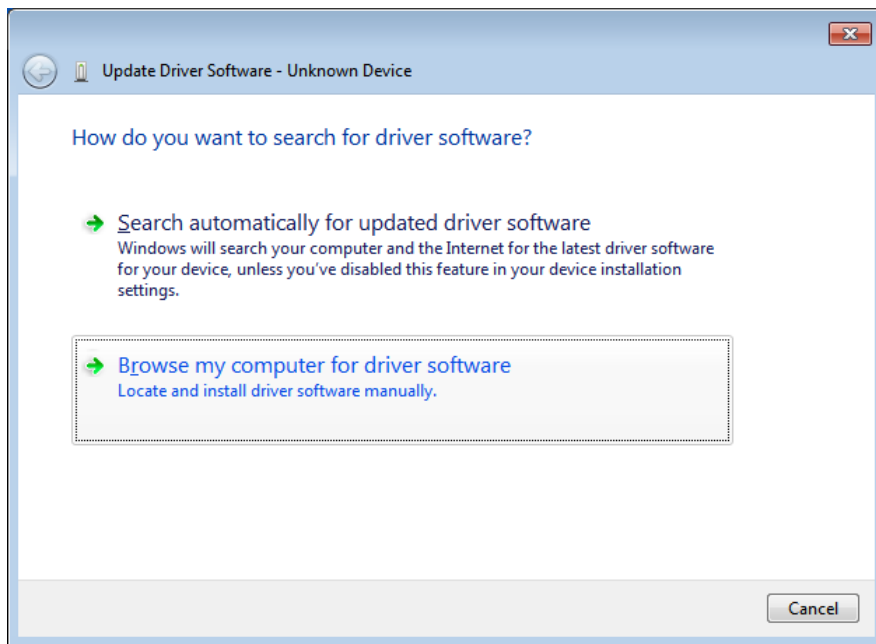
Windows 7 systems directly start looking for a driver at Windows Update and therefore ignore the CD. Consequently the installation using the assistant will fail and manual settings are required.

You can either follow the steps described in 2.2.1.2 “Manual Installation and Update” or proceed as follows:

Open the Device Manager (e.g. via the control panel).



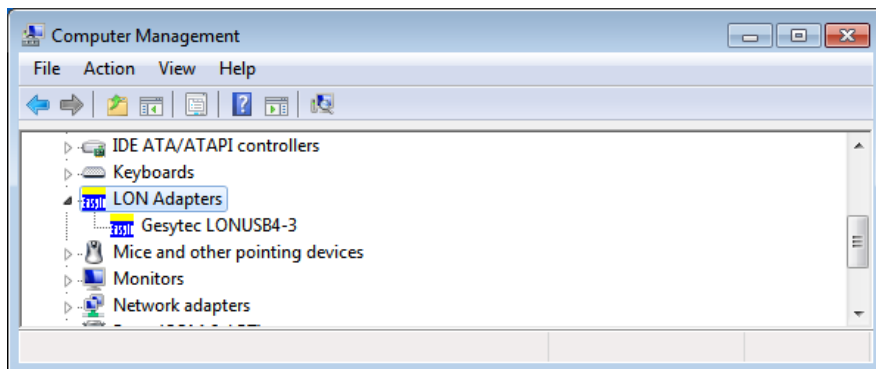
Right click on the entry for the unknown device and select “Update Drivers”.



Select „Browse my computer ....“ And indicate the drive with the “Drivers & Documentation” CD. Finally give permission for the Gesytec driver setup.

### Final Steps

After successful completion of the installation the device manager will show the interface under „LON Adapters“.



Here you will find a „Gesytec LONUSB x-y...“ entry, with x designating the number of the USB host controller and y the port. If hubs have been cascaded the respective port numbers are given as well.

If, after the installation the green LED does not blink an error has occurred in the Easylon Mini PCIe Socket Interface installation. In that case, please disconnect the module from the PC and reconnect after a short period of not less than 10 s.

During the installation and at each Neuron reset the red LED is shortly flashing.

The device is now ready to access the LONWORKS network.

### 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**

from the “Driver/LonUsb” folder of the CD-ROM.

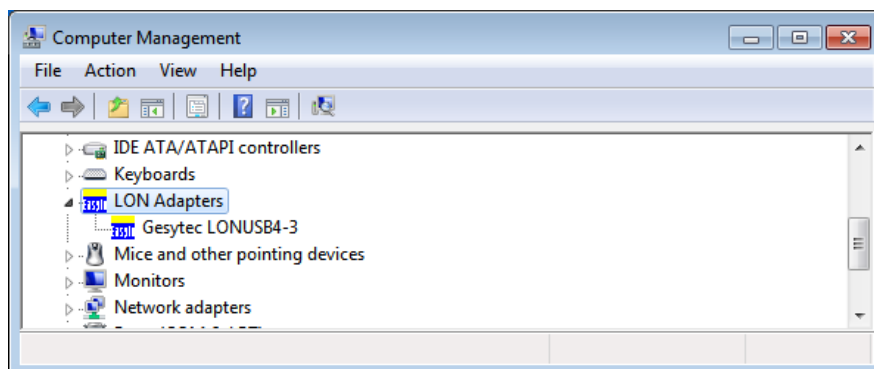
If the “Drivers & Documentation” CD interface has opened in your browser you may access the driver setup as well via “Products” “Easylon Mini PCIe Socket Interface” and selecting the button for the operating system.

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

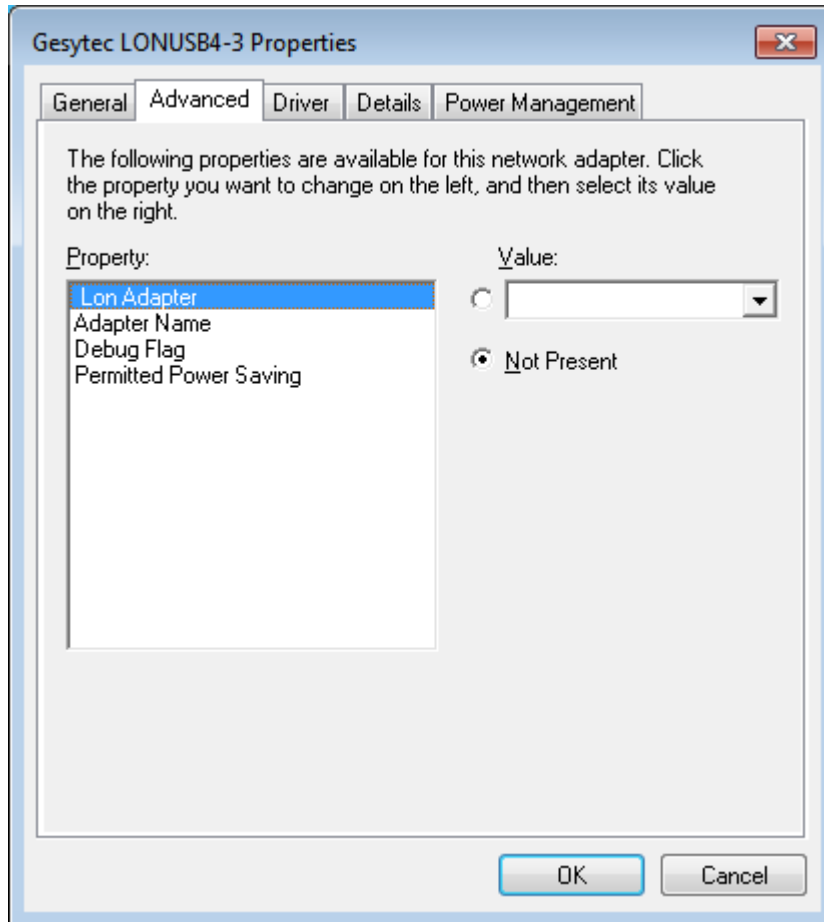
A new version will be installed on the PC within a few seconds. In order to update the firmware in the device as well, you must disconnect the Mini PCIe Socket Interface and reconnect it again.

### 2.2.1.3 Settings

There are further settings available for the Easylon Mini PCIe Socket Interface which may be helpful in certain operating conditions. They can be found in the Universal Serial Bus Controller section of the device manager. Select the properties of the desired device.



The „Advanced Properties“ offer the following settings:



**Lon Adapter**

This will assign a name „LON1“ ... „LON9“ to the LON USB adapter, which certain application will require. Remember that the name must not be in use by any other device driver. In case of a name conflict the device cannot be started. (Code 10).

**Adapter Name**

Alternatively an arbitrary name can be assigned to the adapter (e.g. floor 7). If both „Lon Adapter“ and „Adapter Name“ are assigned to the same device only the entry for „Lon Adapter“ will be used.

**Debug Flag**

The value comprises a DWORD in hexadecimal notation of different flags for debug purposes. Usually it is set to 0 (not existing). Setting the single bits will turn on special debug features. In the current driver versions bits 0, 1 and 3 are used.

Bit 0: LON telegrams at the interface from and to the application are shown in debug output.

Bit 1: LON telegrams at the interface from and to the USB bus are shown in debug output.

- Bit 2: Reserved for Easylon Watcher.
- Bit 3: CREATE and CLOSE) of the driver are displayed in the debug output.

Note The debug output for instance can be displayed using the DebugView program, which is freely available at [www.sysinternals.com](http://www.sysinternals.com).

### Permitted Power Saving

Usually the LON USB adapter allows a standby mode with applications running (Standby). At certain conditions however, (e.g. LON USB using an external hub under Windows 2000) the current supply to the LON USB adapter will be shortly interrupted during return from the standby mode by the external hub. Under such conditions a standby mode must be turned off (None).

## 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 -Llonusb1-2
```

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

*/Lname*

*name =*

|           |  |
|-----------|--|
| lonusb1-2 | for device LONUSB at USB host controller 1 and with port number 2 at USB root. If several hubs have been cascaded the respective port numbers have to be provided as well. |
|-----------|--|

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 – Quick Interface Diagnosis

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.

The program “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.

### 2.2.4 Windows CE Driver

The Windows CE driver has been designed for x86 processors. Variants for other processors can be realized on request. There are versions for Windows up to CE 6.0.

**Note:** Prior to using the interface please check if your Windows CE system supports USB. For instance you could connect a standard USB device like mouse, keyboard or memory stick.

The Windows CE driver comes is a DLL named lonusb.dll. Like all Windows CE drivers it must be in the Windows directory of your system. The required files can be found on the Driver & Documentation CD under Drivers/Windows CE.

If the driver has to be integrated into the Windows CE image, the simplest way is a respective entry in the platform.bib file. This approach is almost the same for all Windows CE versions.

For correct operation the driver requires registry entries. These can be found in the file lonusb.reg. In order to integrate the driver into a Windows CE image, the contents of this file has to be copied into the file platform.reg.

```
; LONUSB - Driver
[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\3596\Default\Default\LonUsb]
    "DLL"="lonusb.dll"
    "Prefix"="LON"
    "DebugFlag"=dword:0
    "ReadTimeout"=dword:FFFFFFFF
```

# 3

## Technical Specifications

|       |   |
|-------|---|
| CPU   | FTX      Neuron FT5000<br>EIA-485   Neuron 5000 |
| Clock | 80 MHz  |

### Mini PCIe Socket Interface

|           |  |
|-----------|--|
| Type      | Full Mini Card, accord. to PCI Express, Mini Card Electromechanical Specification, Rev 1.2 |
| Connector | standard Mini PCI Express connector  |

### LONWORKS Interface

|             |  |
|-------------|--|
| Transceiver | FT-X2, electrically isolated<br>EIA-485, not electrically isolated, 1.25 Mbps max. |
| Connector   | 3 pin connector, 1.25 mm PanelMate, Molex  |

### Power Supply

|                     |   |
|---------------------|---|
| Power supply        | 3,3V ± 9%, externally via Mini PCIe connector |
| Current consumption | < 100 mA, typically                           |

### Operating Conditions

|             |                      |                 |
|-------------|----------------------|-----------------|
| Temperature | operation            | -40 °C – +85 °C |
|             | storage              | -40 °C – +85°C  |
| Humidity    | 90%, no condensation |                 |

### Display and Operation

|                              |                               |
|------------------------------|-------------------------------|
| On board                     | status LED (green)            |
|                              | error LED (red)               |
|                              | Neuron Service LED (yellow)   |
| Externally available signals | Neuron Service LED            |
|                              | LON traffic LED for RX and TX |
| Externally connectable       | Neuron Service push button    |

### Dimensions

|                             |  |
|-----------------------------|--|
| Board (standard dimensions) | 30.00 x 50.95 [mm]                               |
| Heights FTX above board     | 8.18 mm +0,2/-0,08 mm, not compliant to standard |



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# 4 Programming Instructions

## 4.1 Windows CE Application Interface

Note: Some of the functions described below are marked “obsolete”. These functions and control codes are referenced here only for compatibility with older versions of LPCDRV/LG2DRV and should not be used for development of new software.

### 4.1.1 CreateFile

Opens a LON device.

Syntax:

```
ni_handle = CreateFile(szDevName,
    GENERIC_READ|GENERIC_WRITE, 0, NULL, OPEN_EXISTING, 0,
    NULL);
```

| Parameter    | Type   | Description  |
|--------------|--------|--|
| SzDevName    | TCHAR* | Device name, e.g. TEXT("LON1:")                          |
| Return value | Type   | Description  |
| ni_handle    | HANDLE | file handle of the LON device or<br>INVALID_HANDLE_VALUE |

### 4.1.2 CloseHandle

Closes a LON device.

Syntax:

```
CloseHandle(ni_handle);
```

| Parameter | Type   | Description   |
|-----------|--------|---|
| ni_handle | HANDLE | file handle of the LON device that should be closed |

### 4.1.3 ReadFile

This synchronous function reads a telegram according to the application layer format. Synchronous means the function returns only if the NEURON received the telegram or the handle is closed.

The timeout of this blocking call can be changed via registry or via DeviceIoControl. A timeout value of 0 means, that this function returns immediately, if no data are available.

Syntax:

```
ReadFile(ni_handle, pMsg, len, &rLen, NULL);
```

| Parameter | Type   | Description                             |
|-----------|--------|---|
| ni_handle | HANDLE | file handle of the LON device           |
| pMsg      | void*  | pointer to an „explicit message buffer“ |
| len       | DWORD  | length of the buffer [bytes]            |
| rLen      | DWORD  | length of the received telegram [bytes] |

#### 4.1.4 WriteFile

Writes a telegram according to the application layer format. This function returns immediately.

Syntax:

```
WriteFile(ni_handle, pMsg, len, &rLen, NULL);
```

| Parameter | Type   | Description                               |
|-----------|--------|---|
| ni_handle | HANDLE | file handle of the LON device             |
| pMsg      | void*  | pointer to an „explicit message buffer“   |
| len       | DWORD  | length of the buffer [bytes]              |
| rLen      | DWORD  | length of the telegram to be send [bytes] |

Note: The telegram according to the application layer format contains a length information of the buffer itself. That is why we ignore the parameter len in the use of function ReadFile()and WriteFile().  
Note: Use the maximum length (256 bytes) of the buffer while reading a telegram.

#### 4.1.5 GetVersion

Returns the version number of the driver as Unicode string, e.g.

```
TEXT("EasyLyon LonUsb Version 1.00 for WinCE from  
11/05/2002").
```

Syntax:

```
#define IOCTL_LPCDRV_GET_VERSION \
    CTL_CODE( FILE_DEVICE_LPCDRV, 0x900, \
    METHOD_BUFFERED, FILE_READ_ACCESS )

#define IOCTL_GETVERSION 0x43504C01 //obsolete
result = DeviceIoControl(ni_handle,
    IOCTL_LPCDRV_GET_VERSION,
    NULL, 0, szVersion, sizeof(szVersion),
    BytesReturned, NULL);
```

| Parameter | Type   | Description                   |
|-----------|--------|-------------------------------|
| ni_handle | HANDLE | file handle of the LON device |
| szVersion | TCHAR* | Buffer for version string     |

|               |       |  |
|---------------|-------|--|
| BytesReturned | DWORD | length of the string [bytes]<br>= (number of characters + 1) * 2 |
| Return value  | Type  | Description  |
| Result        | BOOL  | FALSE if buffer is too small,<br>else TRUE                       |

#### 4.1.6 ReadFile with Timeout

Reads a telegram according to the application layer format. The `Timeout` parameter determines the functions behavior while the receive buffer is empty:

- Timeout = 0: function returns immediately
- Timeout = n: function waits n milliseconds to receive a telegram.
- Timeout = INFINITE: function works as synchronous function, see also function `ReadFile`.

Syntax:

```
#define IOCTL_LPCDRV_READ_WAIT \
    CTL_CODE( FILE_DEVICE_LPCDRV, 0x908, \
    METHOD_BUFFERED, (FILE_READ_DATA | FILE_WRITE_DATA) )
result = DeviceIoControl(ni_handle, IOCTL_LPCDRV_READ_WAIT,
    &timeout, 4, pMsg, len,
    &rLen, NULL);

#define IOCTL_READ0x43504C02 // obsolete
result = DeviceIoControl(ni_handle, IOCTL_READ,
    pMsg, len, &timeout, 4,
    &rLen, NULL);
```

Note: Using `IOCTL_READ` the Parameters `lpInBuffer` and `lpOutBuffer` as well as `nInBufferSize` and `nOutBufferSize` are permuted as defined in the API Reference of `DeviceIoControl`.

|              |        |  |
|--------------|--------|--|
| Parameter    | Type   | Description  |
| ni_handle    | HANDLE | file handle of the LON device                      |
| timeout      | DWORD  | Timeout [Milliseconds]                             |
| pMsg         | void*  | pointer to an „explicit message buffer“            |
| len          | DWORD  | length of the buffers [bytes]                      |
| Return value | Type   | Description  |
| Result       | BOOL   | TRUE, if telegram was received<br>FALSE at timeout |

### 4.1.7 Set Timeout for ReadFile

Reads a telegram according to the application layer format. The `Timeout` parameter determines the functions behavior while the receive buffer is empty:

- Timeout = 0: function returns immediately
- Timeout = n: function waits n milliseconds to receive a telegram.
- Timeout = INFINITE: function works as synchronous function, see also function `ReadFile`.

Syntax:

```
#define IOCTL_LPCDRV_SET_READ_TIMEOUT \
        CTL_CODE( FILE_DEVICE_LPCDRV, 0x909, \
        METHOD_BUFFERED, FILE_WRITE_DATA)
result = DeviceIoControl(ni_handle, IOCTL_LPCDRV_READ_WAIT,
        &timeout, 4, NULL, 0,
        &rLen, NULL);
```

| Parameter    | Type   | Description  |
|--------------|--------|--|
| ni_handle    | HANDLE | file handle of the LON device                                  |
| timeout      | DWORD  | Timeout [Milliseconds]   |
| Return value | Type   | Description  |
| Result       | BOOL   | TRUE, if timeout was stored,<br>FALSE if an error has occurred |

Note: Undefined IOCTL-Codes will return FALSE and set `LastError` to `ERROR_NOT_SUPPORTED`.

### 4.1.8 Registry entries for Easylon USB Interface

```
; LONUSB - Driver
[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\3596\Default\Default\LonUsb]
    "DLL"="lonusb.dll"
    "Prefix"="LON"
    "DebugFlag"=dword:0
    "ReadTimeout"=dword:FFFFFFFF
```

#### DebugFlag

The value comprises a `DWORD` in hexadecimal notation of different flags for debug purposes. Usually it is set to 0 (not existing). Setting the single bits will turn on special debug features. In the current driver versions bits 0 and 1 are used.

- Bit 0: LON telegrams at the interface from and to the application are shown in debug output.
- Bit 1: LON telegrams at the interface from and to the USB bus are shown in debug output.

### ReadTimeout

The value (in milliseconds) comprises a DWORD in hexadecimal notation to affect the behavior of ReadFile().

A value of INFINITE (= 0xffffffff) makes ReadFile() a blocking call. This is the default behavior, if no parameter is given (like lpdrv, lg2drv).

A timeout value of 0 means, that this function returns immediately, if no data are available.



# 5

## Tips and Tricks

### 5.1 Standby Mode of PC

A PC with Easylon Mini PCIe Socket Interface may be set to standby mode, because the device will be powered during standby. However, it was observed that, at returning from the standby mode, the power supply to the interface is shortly interrupted. Dependent on the system this may reinitialize the device. Active applications, which were using the Easylon Mini PCIe Socket Interface before entering standby mode, will then not be able to communicate with the device any longer.

In such configurations please refer to section Settings and set "Permitted Power Saving" to "None" to disable the standby mode. The LON USB driver will then inhibit the standby mode with applications running.

### 5.2 Hibernation Mode of PC

The Easylon Mini PCIe Socket Interface does not support the hibernation mode. When the PC enters hibernation mode, the USB will not be powered any longer. As this would lead to a loss of the Neuron Chip settings the LON USB driver will inhibit Windows from turning into the hibernation mode with applications running.

### 5.3 Registry Key

The driver of the Easylon Mini PCIe Socket Interface makes an entry in the registry database for each found device, according to Echelon's guidelines. You will find this entry at:

```
\\HKEY_LOCAL_MACHINE\Software\LonWorks\DeviceDrivers.
```

For each Easylon Mini PCIe Socket Interface you will find a key with the device name (Gesyttec LONUSBx-y...) and a character value with the driver name.

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