

Users Manual

Opticon Ethernet Converter

RS232 <-> Ethernet



OPTICON

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1 Introduction

The Opticon Ethernet Converter box makes it possible to connect your Opticon Handheld terminals to the Ethernet and the Internet.

Using the integrated TCP/IP stack it is possible to transmit and receive files from your Opticon Handheld terminal to any local or remote FTP-server, send and receive emails or simply synchronize time using NTP.

Alternatively it is also possible to use the Ethernet Converter box as a virtual COM-port over the Ethernet to transmit serial data to a remote PC as if your scanner or terminal is connected to a very long serial cable.

1.1 Detailed view



1.2 Supported Opticon Handheld Terminals

The Ethernet Converter box has been designed as replacement for applications of Opticon Handheld terminal that make use of TCP/IP dialup connections by 56k modems and GPRS/GSM modems without having to change the software of the application itself.

Currently the following Opticon Handheld terminals are supported:

- OPL97xx
- PHL1700
- PHL1300
- PHL2700
- OPH1003

To be able to use the TCP/IP capabilities of the Ethernet Converter box you'll need to the following TCP/IP libraries for these terminals:

- OPL97xx: LMAV020Y or higher (or LNAV020Y for IrDA)
- PHL1700: CMWV020Y or higher
- PHL1300: CMWV020Y or higher (or CQWV020Y for IrDA)
- PHL2700: CMWV020Y or higher (or CQWV020Y for IrDA)
- OPH1003: XMAV020Y or higher

Notes

- Older versions of the TCP/IP libraries will also work, so it is not necessary to rebuild existing applications, however they will work with a slower communication speed!
- It is recommended to use the latest TCP/IP library available at all times (= currently v.0300)
- The TCP/IP libraries and further info can be found on the 'C-development kit for Opticon Handheld Terminal'

1.3 Handling Instructions

Temperature conditions

- Do not use in freezing areas.
- Do not use in area's with temperatures higher than 40°C
- Avoid contact with water.

Shock

- Do not expose the scanner to strong impact, do not throw or drop the box from great heights.
- Do not present mechanical shocks to the product.
- Do not leave the bar code data collector in an area where static charge is accumulated or near devices where electromagnetic emission is generated.

Maintenance

- There are no user-serviceable parts inside the scanner. So do not try to take it apart.
- In case of serious malfunction, please consult your local dealer or Opticon.

Recycling & Disposal instructions

- The icon on the product or package indicates that the product should not be thrown in the home waste bin. The product must be recycled as an electronic product. For proper treatment of end-of-life products consult the section for Environmental care on www.opticon.com.

2 Getting Started

2.1 Connecting the cables and power supply

2.1.1 Power supply

Insert the included 6.0V power supply in the power connector. If the converter box is powered the orange power indicator will be on and the green 'run' LED will be blinking.

2.1.2 RS232 Cable

If you want to connect an Opticon Handheld terminal or a simple RS232 barcode reader to the Opticon Ethernet Converter you can use the standard RS232 cable that was included with your Opticon terminal or scanner.

Note:

If you want to replace an existing Internet solution with analog or GSM modems by Opticon Ethernet Converters, it is possible that you need to add/remove a Null-modem to/from the cable that's currently connected to the modem or replace the current cable by a standard RS232 cable.

2.1.3 Ethernet cable

Connect an Ethernet cable between your local network and the Ethernet Converter box. If an Ethernet signal is detected, the orange (link) LED on the connector will be turned on. If any data is received, the green (data) LED on the connector will blink.

2.2 Configuration of the Ethernet Converter box

Two different kinds of settings can be configured in the Ethernet Converter

- Serial settings Changing the baud rate (default is 115200bps)
- Network settings Configuring the local IP, DNS server, Gateway, Subnet mask and DHCP

If the Ethernet network has a DHCP server (DHCP is enabled by default) configuring is often not even necessary since all required network settings and local IP-address are all received automatically.

If the Ethernet network does not have a DHCP server, you will have to disable DHCP and set the local IP, DNS server, Gateway and Subnet mask manually.

In total there are 3 different methods to configure the Ethernet Converter. All 3 will be described on the following pages.

2.2.1 Method 1: Using the System menu via RS232

Connect your Ethernet Converter box to the serial port of a PC or Laptop and open an RS232 monitor (i.e. Hyperterminal or Appload) using the following serial settings:

- **115200 baud (8 data bits, no parity, 1 stop bit)**

Enter the system menu by powering up the Ethernet box with the set-up button pressed. After that, the following menu will be shown:

```
1: Show current settings.
2: Change Board Host Name.
3: Change default IP address.
4: Change default gateway address.
5: Change default subnet mask.
6: Change default DNS server address.
7: Enable DHCP.
8: Disable DHCP.
0: Save & Quit
```

Enter a menu choice (1-0):

While being in the system menu, pressing the corresponding numbers will give the following results:

1: Show current settings

```
Settings of the OSE Ethernet-to-RS232 Converter Box
Version: HACV0010
MAC Address: 00-12-6A-xx-xx-xx
Local IP Address: 169.254.254.254
Gateway Address: 169.254.254.1
Subnet mask: 255.255.0.0
DNS server address: 169.169.169.2
DHCP: Enabled
Baudrate: 115200
```

2: Change Board Host Name

```
Host Name (OSE_ETHERNETBOX): <enter new host name>
```

3: Change default IP address

```
Default IP Address (169.254.254.254): <enter IP address>
```

4: Change default gateway address

```
Default Gateway Address (169.254.254.1): <enter IP address>
```

5: Change default subnet mask

```
Default Subnet Mask (255.255.0.0): <enter IP Mask>
```

6: Change default DNS server address

```
Default DNS Server Address (169.169.169.2): <enter IP address>
```

7: Enable DHCP

```
DHCP Enabled.
```

8: Disable DHCP

```
DHCP Disabled.
```

0: Save & Quit

```
Now running application...
```

Pressing of set-up button for 4 seconds

```
All settings have been restored to default. Press '0' to cancel, remove power to confirm.
```

2.2.2 Method 2: Using AT-commands via RS232

It is also possible to configure the Ethernet box by sending modem (AT-)commands via RS232. You can send these commands manually via an RS232 monitor (i.e. Hyperterminal or Apload) or for a quicker setup you can also connect an (RS232) barcode reader and scan configuration barcodes.

The following AT-commands can be send to configure the Ethernet box.

Option	Command	Example + barcode
Default host name	AT+NAME<string 1-16>	 AT+NAME Test Board3
Default IP-address	AT+IP<address>	 AT+IP 192.168.0.150
Default Gateway IP	AT+GATE<address>	 AT+GATE 192.168.0.1
Default DNS server IP	AT+DNS<address>	 AT+DNS 192.168.0.213
Default subnet IP mask	AT+MASK<address>	 AT+MASK 255.255.255.0
Disable/enable DHCP	AT+DHCP<boolean>	 AT+DHCP 0  AT+DHCP 1
Baudrate	AT+BAUD<baudrate>	 AT+BAUD 9600

Important notes:

- All commands must be terminated with a carriage return <CR>
- Make sure you send the commands at the correct baud rate (default is 115200bps)
- The review the current settings use the following command: 'AT?'
- If a command is accepted the Ethernet box will respond with <CR><LF>OK<CR><LF>
- If a command is not accepted the Ethernet box will respond with <CR><LF>ERROR<CR><LF>

2.2.3 Method 3: Using the configuration page of the embedded HTML-server

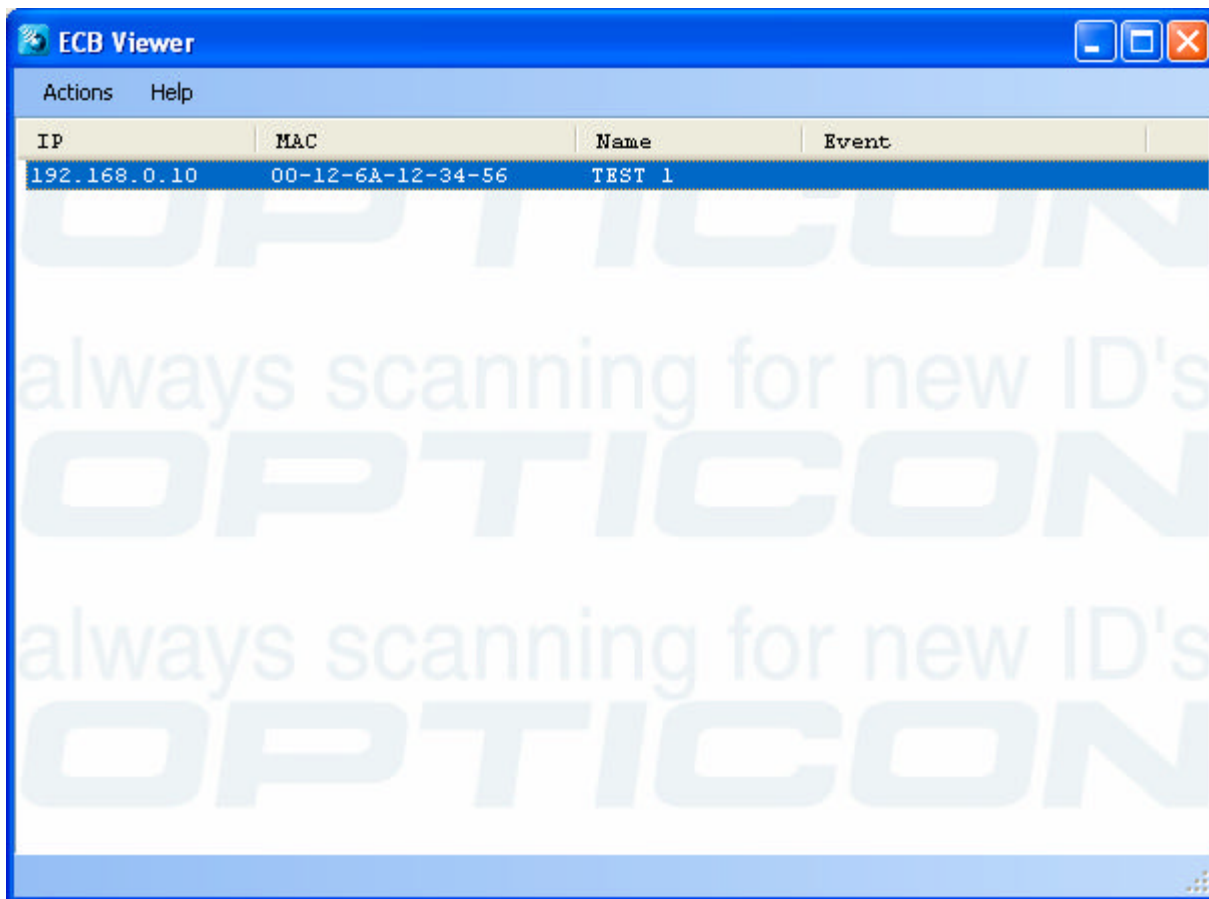
The Ethernet Converter box contains an embedded HTML-server that can be accessed using an Internet Browser.

To access this HTML-server you need to know the IP-address of the Ethernet box first. You can find the local IP address of the Ethernet:

- 1) By using the System menu (see Method 1, only works if DHCP is disabled)
- 2) By serially sending the 'AT?' modem command (see Method 2)
- 3) By using an application that listens to UDP port 30303 (only works if DHCP is enabled!)

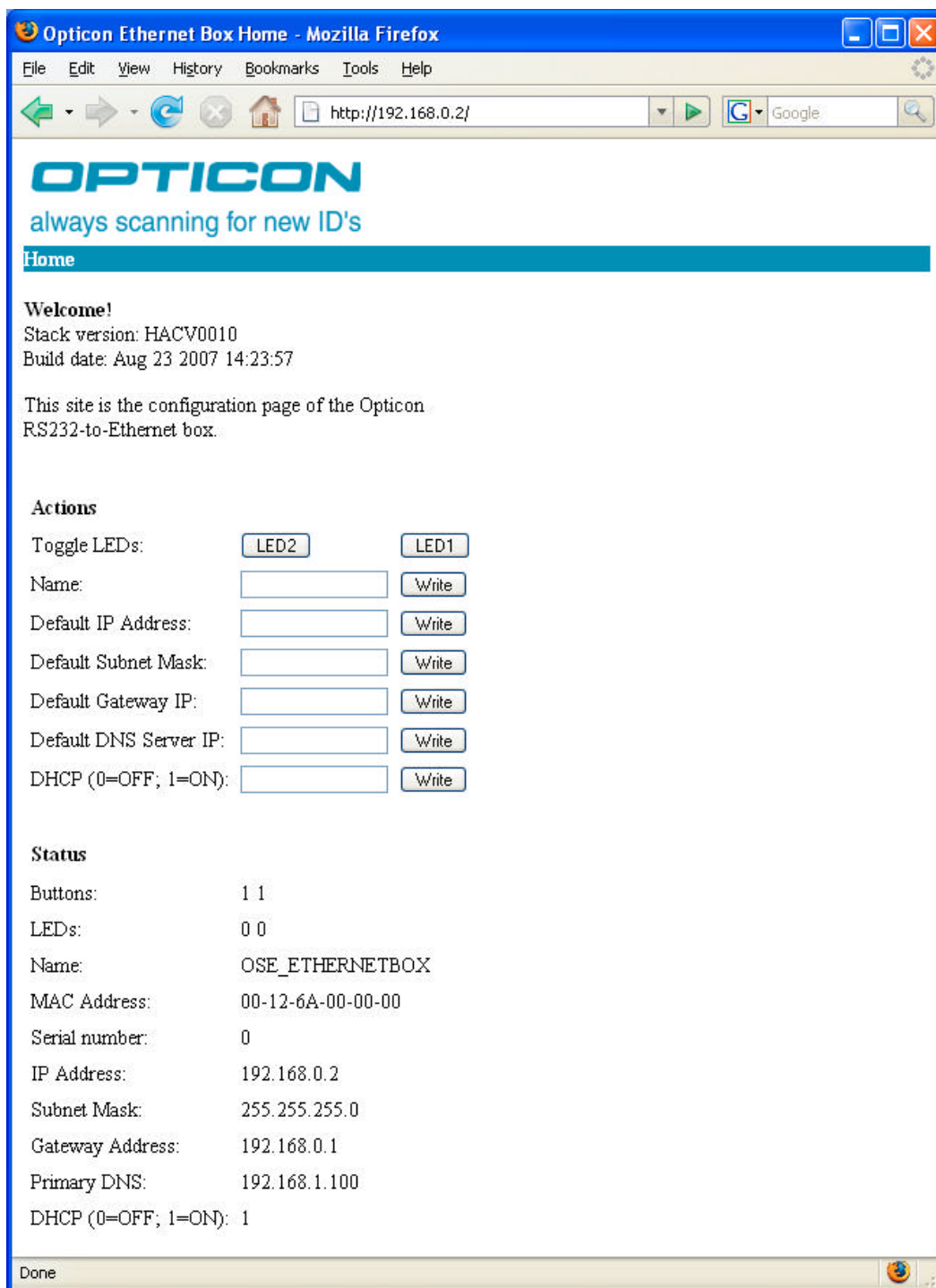
An example of such an application is the program 'ECB Viewer'. This program can be downloaded at www.opticon.com at the '**support > download software**' section.

If DHCP is enabled, a power-up event of an Ethernet box will be shown in this application including its IP-address and MAC-Address.



Screenshot of 'ECB Viewer'

After retrieving the IP-address (i.e. 192.168.0.2), you can type the address in your Internet browser to see the following configuration screen or simply double click on the desired Ethernet converter box in 'ECB Viewer'.



To change a configuration value, simply type the desired value in the correct text input field and press the 'Write' button next to it. After pressing the 'Write' button the current setting should immediately be updated at the bottom half of the screen.

Important note:

- *Most configurations require the Ethernet box to be restarted before becoming active!*

2.3 Establishing a TCP/IP connection with Opticon handheld terminals

Writing an application for the Ethernet converter box is (almost) identical to writing an application with the TCP/IP library that makes use of a dialup modem.

For more information about writing applications with the TCP/IP library and example applications, please refer to the manuals of the '**TCP/IP library for Opticon Handheld terminals**'.

The Ethernet converter box accepts almost all AT-modem commands. However there are few additional AT-commands that are different or additional:

ATD... or ATDT...	<p>Establish a connection between an Opticon handheld terminal (with TCP/IP library) and an Ethernet Converter box.</p> <p>Response: <code><CR><LF>CONNECT<CR><LF></code> <code><PPP frame><PPP frame></code></p> <p>Normally the ATD(T)-command should be made by the connect()-function of the TCP/IP library after which the application continues the TCP/IP session.</p>
ATIx	Returns the current software version
AT?	Shows all current settings
ATV0	Normal response codes: i.e. OK / ERROR
ATV2	Barcode reader response codes, in case an Opticon barcode reader is used to configure the Ethernet box with AT-commands. <ESC>B or <ESC>E that will result in a good or bad read sound.
AT+CPIN?	Returns: +CPIN: READY\r\n\r\nOK\r\n for GSM/GPRS modem simulation
AT+DISCOVERY	<p>Returns IP and MAC address of all Ethernet boxes that are connected to the local Ethernet.</p> <p>Example response: <code>Searching...</code> <code>192.168.0.2 00-12-6A-00-12-34 OSE_ETHERNETBOX</code> <code>Done</code></p>
AT+BAUDxxxxx	Configure a baud rate between 4800 and 230400bps (the OK response might be returned at the new baud rate!)
AT+RESET	(Software) Resets the Ethernet-to-RS232 converter box

Note:

- **Disconnect a connection by sending '+++' with a 1-second pause before and after the command.**

2.4 Establishing a (virtual) RS232 connection over Ethernet

Using two Ethernet Converter boxes it is possible to establish a virtual RS232 connection over Ethernet to transmit and receive serial data to and from a remote location as if it's connected to a very long serial cable. Below it will be explained how it works and how it can be used.

2.4.1 Supported protocols

To transmit data over the Ethernet 2 different protocols can be used: UDP (port and TCP. They both have advantages and disadvantages depending on reliability and maximum throughput.

When using UDP, no handshaking is used so data can be lost due to lost packages on the network. It is possible to add an extra protocol like Xmodem, NetO or a simple handshaking mechanism to fix that problem.

When using TCP, handshaking is used, which makes the maximum throughput low, therefore data can be lost due to buffer overflows since the serial throughput is faster than the TCP throughput over the Ethernet.

	UDP	TCP
Maximum throughput (at 115200)	streaming (at 115200 BPS)	< 400 byte blocks with intervals
Handshaking	No	Yes

This means that if you use the virtual RS232 connection for:

- Transmitting / receiving of small data packages (i.e. barcodes) TCP is more reliable.
- Transmitting / receiving large quantities of data UDP is more reliable

Notes:

- *Serial over TCP uses port 31313, serial over UDP uses port 31314*

2.4.2 Finding remote Ethernet Converters

To find other Ethernet Converter boxes the following AT-command is available

AT+DISCOVERY	Returns IP and MAC addresses of all Ethernet boxes that are connected to the local Ethernet. Example of the search result: Searching... 192.168.0.2 00-12-6A-00-12-34 OSE_ETHERNETBOX 192.168.0.14 00-12-6A-00-00-12 OSE_ETHERNETBOX2 Done
--------------	---

2.4.3 Connecting to remote Ethernet Converters

To establish a virtual RS232 connection the following AT-commands are available:

UDP	ATDudp://xxx.xxx.xxx.xxxx or ATDudp://yy-yy-yy-yy-yy-yy	Where xxx.xxx.xxx.xxx is the IP address of the remote Ethernet box or Where yy-yy-yy-yy-yy-yy is the MAC address of the Ethernet box
TCP	ATDt看p://xxx.xxx.xxx.xxxx or ATDt看p://yy-yy-yy-yy-yy-yy	Where xxx.xxx.xxx.xxx is the IP address of the remote Ethernet box or Where yy-yy-yy-yy-yy-yy is the MAC address of the Ethernet box

If the connection was established the Ethernet box will respond with:

`CONNECT xxx.xxx.xxx.xxx (where xxx is the IP-address)`

Note:

- **Disconnect a connection by sending '+++' with a 1-second pause before and after the command.**