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Using serial XPL Rail devices with a virtual COM Port

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1 Revisions

Revision	Release Date	Changes
1	September 28, 2016	Initial release

2 Introduction

The I2SE XPL Rail serial devices like XPL Rail 4M – 48500 and XPL Rail 4M – 23200 provide a physical serial port and make this port available via powerline network.

The powerline network is usually connected to the customers local area network (LAN) by using a commercially available powerline-to-ethernet adapter.

This application note describes how to use such a serial port from your PC using a virtual COM port driver. Your user application that normally works with a local COM port will work out-of-the-box with such a remote COM port.

3 Preparing the XPL Rail device

It is assumed that you already installed your XPL Rail device and it is possible to reach the web frontend of the XPL Rail device from your local web browser. Please read the user manual for further instructions.

3.1 Physical configuration

In the first step, you have to decide or choose whether your connected serial devices operate at a fixed baudrate, or whether it should be possible to change the baudrate of the serial port via PC. Change the DIP switches at the XPL Rail device accordingly.

3.2 Channel configuration

Go to the „Channel configuration“ page in your XPL Rail device’s web frontend. Select „Telnet (with RFC2217)“ from the „Server protocol“ drop-down box. Use the default port number 5000 or choose a custom port number. However, remember this port number for later configuration of the Virtual COM port driver at your PC. Confirm your settings with *Save all* button.



The screenshot displays the web interface for configuring an XPL Rail device. The header shows 'XPL Rail I2XPLR4-48500' and 'xplr4-48500-0053' with the I2SE logo. The navigation menu includes 'Home', 'Channel Configuration', 'Network Configuration', and 'Maintenance'. The main content area is titled 'Physical serial channel configuration' and contains a form with the following fields:

- Label: COM1
- Type: RS-485
- Baudrate: 115200
- Port configuration: 8/N/1
- Allow remote configuration
- Server protocol: Telnet (with RFC2217)
- Port number: 5000 (Default: 5000)
- Idle timeout: 60 (s)
- Assign virtual channel
- Virtual channel ID: 1

At the bottom of the form are 'Load all' and 'Save all' buttons. The footer contains 'Copyright © 2015 I2SE GmbH' and the URL 'http://www.i2se.com/'.

Figure 1: Example configuration of XPL Rail

3.3 Network configuration

Please also keep in mind, that when using DHCP for network configuration the IP address of your XPL Rail could change after a restart, power outage and/or if your network is running out of free IP addresses.

The easiest way to address this topic, is to use a static IP address. However, it is also possible that your router offers to always assign the same IP address to your XPL Rail device and/or you want to use a custom internal domain name system (DNS) within your company network to resolve hostnames to IP addresses.

4 Virtual COM port driver for Windows™ systems

There are several commercial virtual COM port drivers/applications available which work with XPL Rail devices. Usually, these packages offer graphical installation and configuration frontends.

The following section uses the com0com project, an open-source application which can be used free of charge.

4.1 Choose com0com driver package

Com0com by default comes with a test-signed kernel-mode driver only, that means that Windows is not going to load this driver normally. You have to enable test signing first. Enabling test signing will impair computer security and Windows will indicate this mode with additional strings in the right bottom corner of the desktop.

If this is not a problem, then proceed with Downloading and preparations for the original com0com driver (subsubsection 4.1.1).

If you don't like this, you could use a com0com package which is signed by a 3rd party developer. You have to decide whether you trust this package. If so, please proceed with Downloading signed 3rd-party com0com driver (subsubsection 4.1.2).

4.1.1 Downloading and preparations for the original com0com driver

Go to <https://sourceforge.net/projects/com0com/files/com0com> and download the latest com0com ZIP archive. For com0com there is a common package that bundles both drivers for i386 (32-bit) and x64 (64-bit) Windows platforms.

As noted above, enable the test signing by entering the following command in a command shell prompt:

```
bcdedit.exe -set TESTSIGNING ON
```

It is necessary to reboot your computer now.

After reboot, initially extract the ZIP archive into a temporary directory and start the installer (setup.exe). The screenshots of the following section will guide you through the installation.

4.1.2 Downloading signed 3rd-party com0com driver

You have to choose your right architecture:

- https://storage.googleapis.com/google-code-archive-downloads/v2/code.google.com/powersdr-iq/setup_com0com_W7_x64_signed.exe
- https://storage.googleapis.com/google-code-archive-downloads/v2/code.google.com/powersdr-iq/setup_com0com_W7_x86_signed.exe

After download completed, simply run the installer. The screenshots of the following section will guide you through the installation.

4.2 Installation of com0com driver

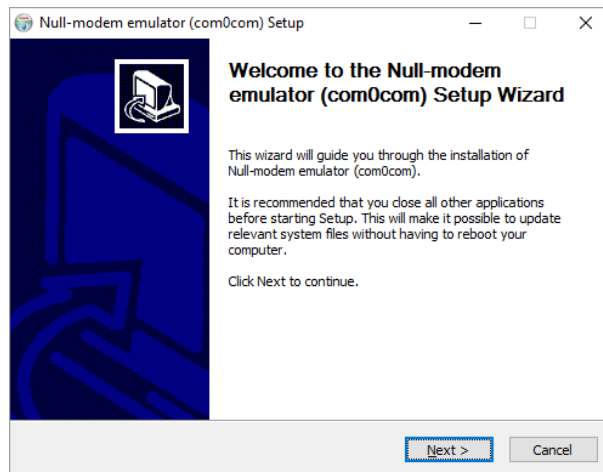


Figure 2: Installer start screen

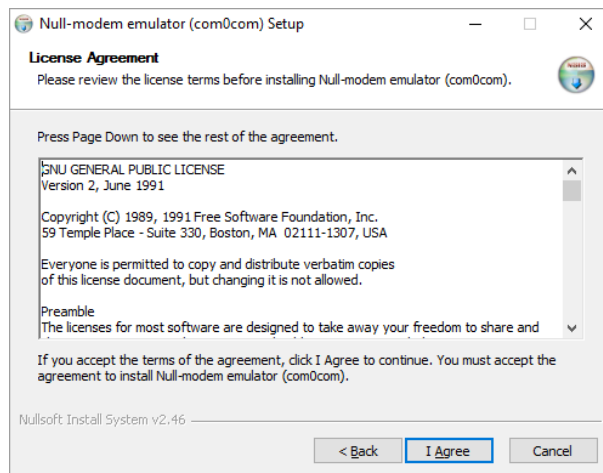


Figure 3: Accept the license

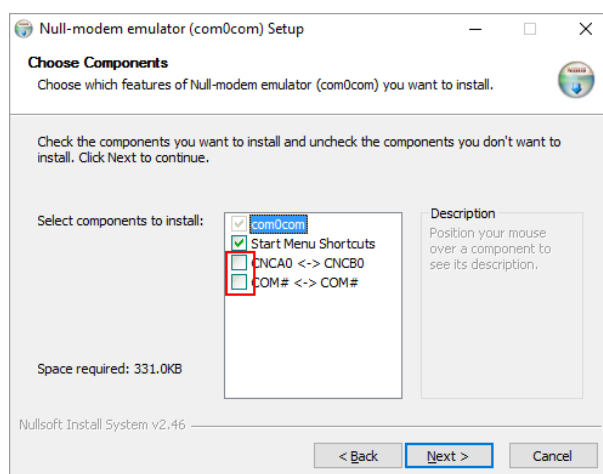


Figure 4: Don't install the default COM port pairs to keep your setup clean

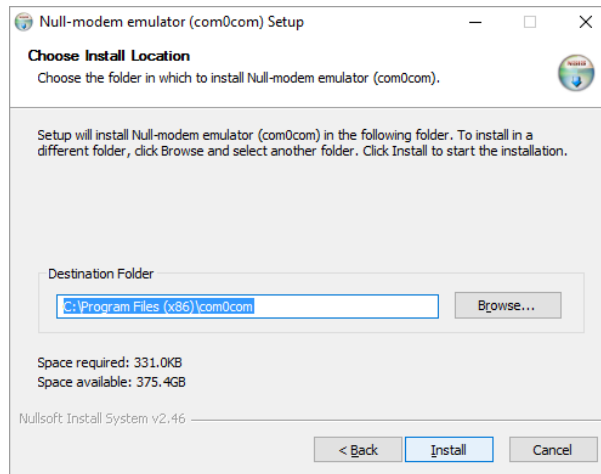


Figure 5: Choose install directory

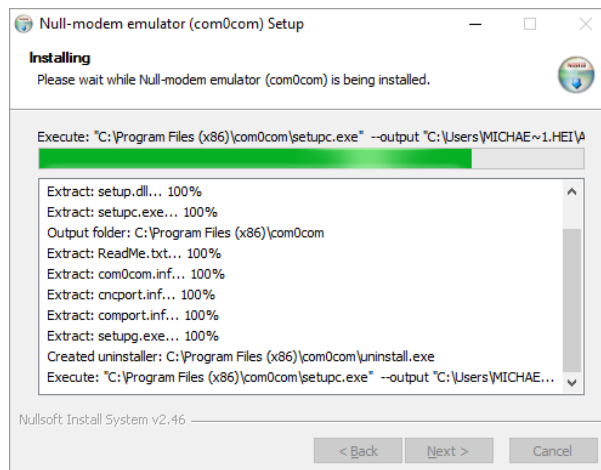


Figure 6: Installer progress

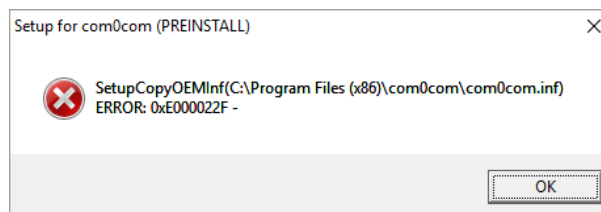


Figure 7: When using the unsigned package, confirm the error message.

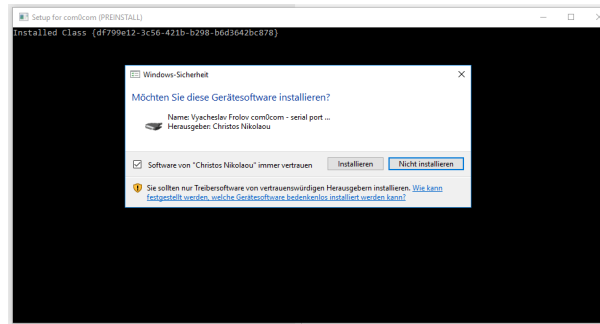


Figure 8: When using the signed package, confirm that you are trusting the publisher.

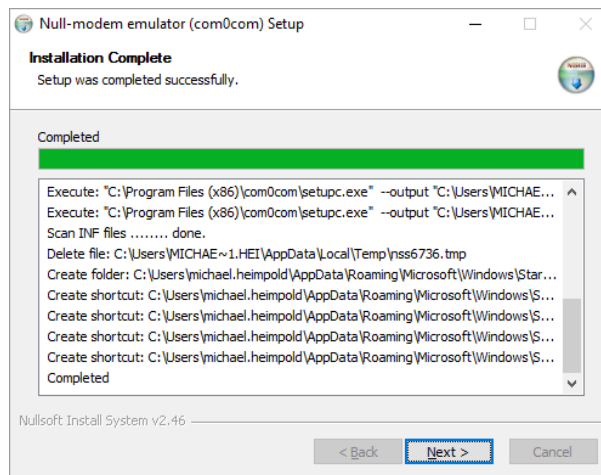


Figure 9: Installer progress

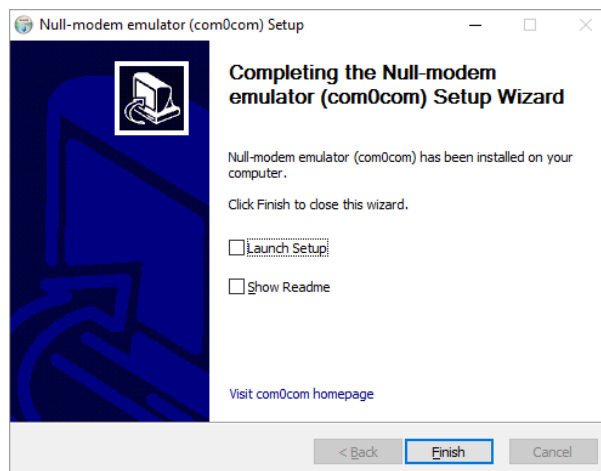


Figure 10: Installer finished

4.3 Downloading hub4com driver

Go to <https://sourceforge.net/projects/com0com/files/hub4com> and download the latest hub4com ZIP archive. Hub4com is only available in a 32-bit version, however, it also works on 64-bit platforms.

4.4 Installation of hub4com driver

The hub4com ZIP archive contains a directory with several files. Simply extract these files into the com0com directory you have chosen or accepted during installation of the com0com package.

4.5 Create and configure virtual COM port

Open com0com's Setup tool.

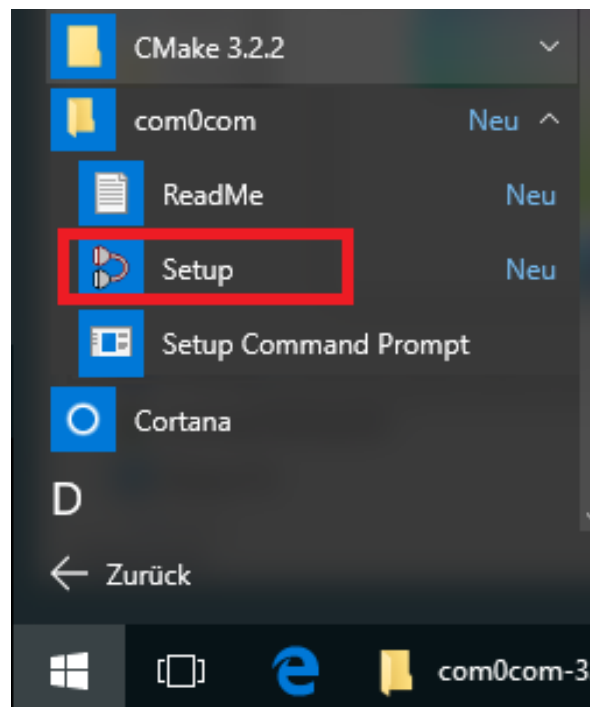


Figure 11: Open com0com Setup

Note: You are not required to adapt the COM port name, however, to better distinguish between the application COM port and the companion COM port (CNCBx), this is recommended.

After this, you have the new COM port (COM2) and a companion COM port (CNCB0) which is used by hub4com later. If you want to create multiple virtual COM ports, repeat these steps and choose different COM port names.

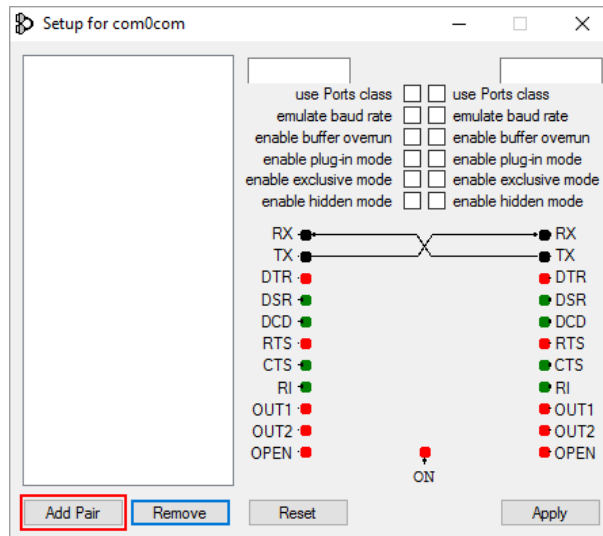


Figure 12: Click "Add Pair".

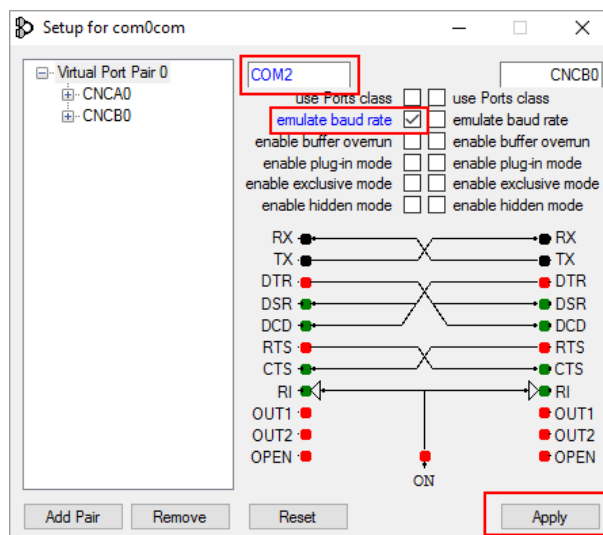


Figure 13: Adapt the COM port name and enable "emulate baud rate". Save your changes with the "Apply" button.

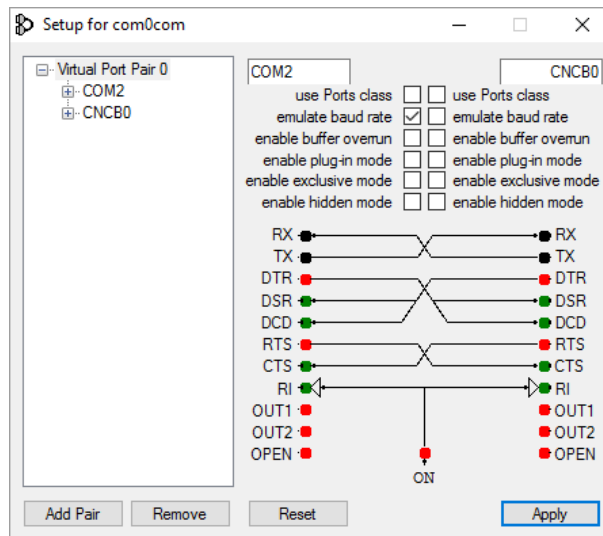


Figure 14: Final state of the COM port pair.

4.6 Run hub4com to connect to your XPL Rail

Go to the com0com directory where you placed the hub4com files. In the following command you have to replace the example values (COM port, IP address/hostname, and the port number) with the actually used ones of your setup and run it.

```
com2tcp-rfc2217 \\.\CNCB0 ip.address.of.xpl.device 5000
```

When using more than one virtual COM port, you also have to adjust the used companion COM port name and run this command for each COM port.

The connection to the XPL device is established as long as this program runs. You might want to add an autostart script, so that the connection is setup after reboot automatically.

5 Linux

For Linux, some programs come with RFC 2217 support built-in, e.g. C-Kermit. C-Kermit is an all-purpose communications software package from the Kermit Project at Columbia University.

For other programs that do not support RFC 2217 out of the box, use socat to emulate a serial like device file:

1. Reconfigure your XPL Rail and select „Raw socket server” from the „Server protocol” drop-down box. That implies that it isn't possible to change baudrate etc. from remote, so also configure these settings in the XPL Rail's web frontend.
2. Run the following command (replace the IP address and port with your own values):

```
socat PTY,link=/dev/ttyR0,raw,group=dialout,mode=660,wait-slave TCP:192.168.178.113:5000
```

3. Open `/dev/ttyR0` in your application. Please note, that socat will terminate once the application closes `/dev/ttyR0`.

6 Programming languages

In Python, you can use [pySerial extension](#) which is already packaged in most Linux distributions to connect to your XPL Rail.

Example script:

```
#!/usr/bin/python
import serial

connection = serial.serial_for_url("rfc2217://192.168.178.113:5000/ign_set_control")
connection.baudrate = 115200
connection.write("foobar")
print(connection)
```

Please note the **ign_set_control** parameter, which is important since the XPL Rail does not support these RFC 22177 protocol sub-commands.

7 Troubleshooting

If you have problems, please check the following points.

On the XPL Rail device's web frontend:

- the start page shows counters for both Rx and Tx bytes: these counters should increase on traffic



Figure 15: Status/start page of XPL Rail's web frontend

- the start page also displays whether a connection is currently established: if there is no IP address and port shown, the Virtual COM port driver is not (yet) connected
- when using DHCP, ensure that the XPL Rail devices always gets the same IP address assigned by your router or the client is using a DNS name which always resolves to the actual IP address
- try to adjust or disable the idle timeout

On your local PC:

- when using a DNS name, ensure that it resolves correctly to the XPL Rail's IP address
- try to ping the device
- use telnet client to connect to the port to see whether the port is reachable

General hints:

- if you have firewalls between your PC and the XPL Rail, try to disable the firewall and check whether it works
- if the vendor of your Ethernet-to-Powerline adapter offers a tool, ensure that you „see“ your XPL Rail device in your powerline network

8 Contact

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