EthLinx[1], EthLinx Duo[2]

User Guide

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A Note on Product Models

This guide covers the entire EthLinx family with non-isolated UART. Superscript numbers are used to denote features specific to a model:

- **EthLinx[1]:** 1 Serial Channel
- **EthLinx Duo[2]:** 2 Serial Channels

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1. Introduction

1.1. Welcome

Welcome to the EthLinx! This device is designed to provide a seamless bridge between TCP/IP applications and UART serial communication lines, making it ideal for industrial automation, data logging, manufacture testing and device management.

1.2. Product Overview & Key Features

The EthLinx connects to your computer via a high-speed USB port and appears as a standard network interface. It features one or more independent UART serial ports, each accessible via a dedicated TCP port. An embedded web server allows for easy configuration and status monitoring.

Key Features:

- USB 2.0 Full Speed Interface (12 Mbps)
- 1[1] or 2[2] Independent 3.3V UART Serial Channels
- Enhanced Protection Circuitry (GDT and TVS)
- Wide Baud Rate Support (2400 Bd to 2 MBd)
- Embedded Web Server for Configuration
- Supports 2 Simultaneous TCP Connections per Channel
- Robust Aluminum Enclosure
- Powered via USB Type-C

1.3. Package Contents & System Requirements

Your package includes the EthLinx device, a USB Type-C cable, and one 3-position pluggable terminal block for each serial channel.

System Requirements:

- **Computer:** With an available USB Type-A or Type-C port.
- **Operating System:** Windows Vista or newer (for RNDIS model); Linux/macOS (for CDC-ECM model).
- **Web Browser:** A modern web browser (Chrome, Firefox, Edge).
- **TCP/IP Client Software:** e.g., PuTTY, Tera Term, or custom applications.

2. Getting Started

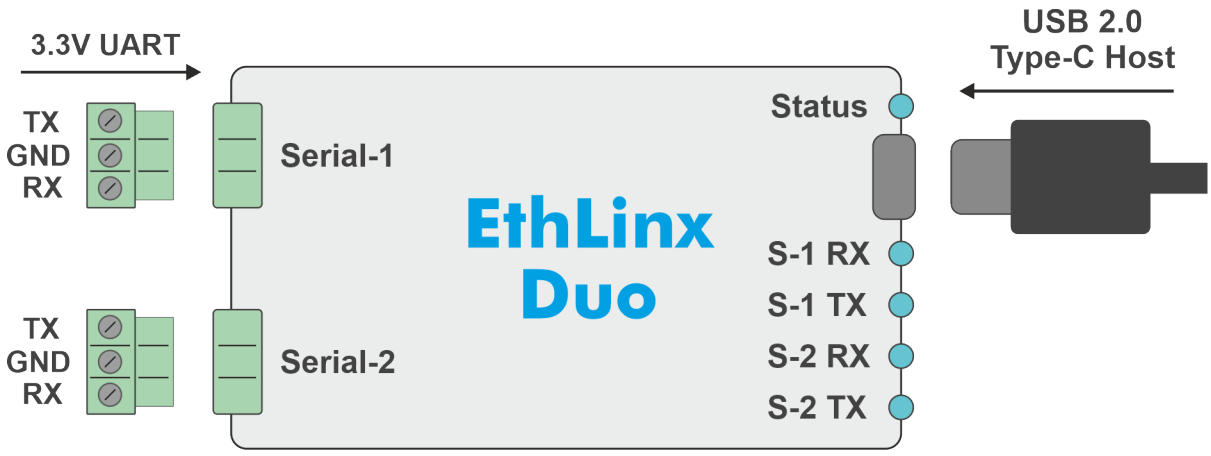

Image 1: Basic Wiring Diagram with serial connections and LED description, EthLinx Duo

2.1. Safety Precautions

- **ESD:** Handle with care, using the grounded enclosure to discharge static potential.
- **Power:** Use only the provided or a recommended high-quality USB Type-C cable.
- **Connections:** Power down the device before wiring the UART lines. Incorrect wiring can cause damage.
- **Servicing:** Do not open the device. Unauthorized modifications will void the warranty.

2.2. Hardware & Software Installation

1. **Connect UART Devices:** Wire your devices to the 3-position terminal blocks (TX, RX, GND) and plug them into the EthLinx.
2. **Connect USB Cable:** Connect the EthLinx to your computer. The device will power on and show a brief LED startup sequence.
3. **Driver Installation:** In most modern operating systems (Windows, Linux), the necessary network drivers will install automatically. Your computer will recognize the device as a new network adapter.

2.3. Accessing the Web Configuration Interface

The device acts as a DHCP server and will automatically provide an IP address to your computer.

1. Open a web browser.
2. Navigate to one of the following addresses:
    - **Static IP:** `http://192.168.222.1`
    - **Hostname:** `http://ethlinx.tech`

You should now see the "Dashboard" of the embedded web server.

3. Operation and Web Interface

3.1. Web Interface Overview

The web interface is the primary tool for configuring and monitoring your device.

- **Dashboard:** The main landing page with quick links.
- **Settings:** Configure all serial port parameters.
- **Status:** View real-time communication statistics.
- **Device Info:** View hardware details and firmware version.

3.2. Settings Page

This page contains a tab for each available serial channel. The configuration options are identical for all channels.

Parameter	Description	Options / Range	Default
Channel Label	A user-defined name for this channel.	Text string (up to 64 chars)	Serial-X
Baud Rate	The speed of serial communication, in the standard Baud units.	2400 Bd to 2 MBd	115200 Bd
Data Bits	Number of data bits per frame.	7, 8, 9	8
Parity	Method for error checking.	None, Even, Odd	None
Stop Bits	Number of bits to signal frame end.	1, 2	1

Note: Not all combinations of Data Bits and Parity are valid. For example, the 9-bit data mode requires Parity to be set to 'None'. The web interface will automatically manage valid selections.

After making changes, click the **"Save Settings"** button for that channel. The settings will be stored to a configuration memory so that it persists. Then the new settings get applied to the Serial interface.

3.3. Status Page

This page displays real-time statistics for data transfer (bytes, packets, rates) and bus errors for all channels. The data is fetched upon page load. A **"Clear Statistics"** button is available to reset all counters.

Besides this button there is another one, „**Restart Device**“ which sends a restart command to the device. The device must be responsive.

3.4. Device Info Page

This page displays static information about your device, including Model Name, Product Code, Unique ID, Firmware Version, and Runtime.

4. Advanced Features & Configuration

4.1. Network Configuration Details

- **DHCP Server:** The device runs a DHCP server that assigns the IP `192.168.222.2` to your computer. The device itself is the gateway at `192.168.222.1`.
- **Hostname Access:** The device can be reached at `ethlinx.tech` (via local DNS) or `ethlinx` or `converter` (via NetBIOS).

4.2. N/A

4.3. Multiple TCP Connections (Spy Mode)

Each serial channel supports up to **2 simultaneous TCP connections**. When data is received on the UART port, it is broadcast to **all** the connected TCP clients. This allows one client to be a primary application while other clients act as a passive logger or "spy".

4.4. Interpreting LED Error States

- **Red Blinking LED:** Indicates a bus error. Common causes include baud rate mismatch, data collisions, framing errors, or excessive electrical noise. Check your settings and wiring.
- **Purple Blinking LED:** Indicates that serial data is being received, but no TCP client is connected to that port. The data is being dropped.

4.5. Data Transmission Considerations

The device has a large internal buffer (4096 Bytes) and manages TCP flow control automatically. Your application has to respect standard TCP windowing to ensure reliable data transfer. The device uses an immediate ACK option so that it can always provide a relevant TCP window value.

4.6. Programmatic Control (API)

The device can be fully controlled programmatically via an HTTP API. For detailed information on endpoints and usage, please refer to the separate **EthLinx - API Reference Guide**.

5. Technical Specifications

Feature	Specification
USB Interface	USB 2.0 Full Speed (12 Mbps), Type-C Connector
Serial Channels	1[1] or 2[2] Serial 3.3V UART, Non-Isolated
Baud Rates	2400 Bd to 2 MBd
Serial Parameters	7/8/9 Data Bits; None/Even/Odd Parity; 1/2 Stop Bits
TCP Ports	Serial 1: `11000`[1], Serial 2: `12000`[2]
Max TCP Buffer	4096 Bytes
Power Input	5V DC via USB, Typ. ~80 mA (Idle), Max. ~120 mA (Peak)
Dimensions	80 mm x 50 mm x 20 mm, 67 g
Enclosure	Extruded Aluminum, Black Matte Finish
Operating Temp.	-20°C to +70°C (0°C to +45°C Recommended)
Operating Humidity	5% to 95% RH, non-condensing
Ingress Protection	IP40 (Dry, indoor environment recommended)

6. Troubleshooting

Issue	Suggestion
LEDs are OFF	Check USB cable and port. Try a different, certified high-quality cable.
Cannot access Web UI	Verify the device appears as a network adapter. Ping ***192.168.222.1***. If no success, refer to the „**PC gets no IP**“ Issue.
No Serial Data	Double-check serial settings (baud, etc.), wiring (TX/RX lines, Ground).
Data Corruption	Check for electrical noise sources. Use shielded, twisted-pair cable. Use lower transmission speed, if possible. Check the Ethlinx wire connections, including the Ground.
PC gets no IP	Try disconnecting/reconnecting the USB. On Windows, a computer restart often resolves this. On Linux, try restarting the DHCP client for the interface. Verify the device appears as a network adapter.

7. Regulatory and Warranty Information

This product complies with applicable CE, FCC, RoHS, and WEEE directives. For full details and warranty information, please visit our website. The design aims to meet aspects of IEC 61000-4-2 (ESD), IEC 61000-4-4 (EFT), and IEC 61000-4-5 (Surge).

8. Contact and Support

- **Manufacturer:** NECOSIN Systems s.r.o.
- **Website:** necosin.com
- **Support Email:** support@necosin.com
- **Address:** Nove sady 988/2, 602 00 Brno, Czechia

9. Device Marking

The underside of the device contains information about the product variant:

Product ID	Device Type Explanation
10111033R	**EthLinx** (USB RNDIS Device Class), 1x 3.3V non-isolated UART
10112033R	**EthLinx Duo** (USB RNDIS Device Class), 2x 3.3V non-isolated UART
10111033C	**EthLinx** (USB CDC-ECM Device Class), 1x 3.3V non-isolated UART
10112033C	**EthLinx Duo** (USB CDC-ECM Device Class), 2x 3.3V non-isolated UART

10. Firmware License and Proprietary Notice

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