

openPOWERLINK

PROTOCOL
STACK
SOURCE CODE

Ethernet POWERLINK offers outstanding real-time performance and timing precision on standard Ethernet networks. It is by far the fastest software-only real-time industrial ethernet system available on the market.



For more information and assistance contact: sales@systec-electronic.com

openPOWERLINK - Open Source Ethernet POWERLINK from SYSTEC

The openPOWERLINK Protocol Stack from SYS TEC provides all functions and services required for implementing controlled nodes (CN) and managing nodes (MN) according to the Ethernet POWERLINK specification EPSG DS301 V1.1.0. For instant startup, openPOWERLINK is available as LiveCD for Windows and Linux!

The complete openPOWERLINK protocol stack is available as a generic source code version released under BSD license that allows for using openPOWERLINK on various target and operating systems without extra fees or license cost. The software provides all mandatory functions defined in the POWERLINK specification as well as various optional functionality.

Together with the source code also

comes a ready-to-use kernel module and a demo application to run the stack on our reference system under Linux. This provides a good entry point for a quick and easy start of your own application development.

To ensure a maximum degree of interoperability, our openPOWERLINK implementation has gone through extensive testing with other POWERLINK devices of various suppliers.

All hardware-specific and time-critical functionality of the openPOWERLINK software was designed and optimized to guarantee fast response time of real-time events on the Ethernet-bus. Therefore, the access and the handling of the Ethernet controller is encapsulated within a separate driver module.

You can download the openPOWERLINK source code free of charge from:

<http://openpowerlink.sourceforge.net>

openPOWERLINK LiveCD

Free download:

www.systec-electronic.com/openpowerlink_livecd

Based on our openPOWERLINK protocol stack, the SYS TEC openPOWERLINK LiveCD is a ready-to-run managing node on a bootable CD. Simply connect one or more controlled nodes to a PC with a Realtek RTL81139-based network card and boot from the LiveCD. Follow the steps shown on the screen and you will have your own POWERLINK network up and running in 5 minutes. The LiveCD does not need installation. It provides full openPOWERLINK functionality without altering your harddisk. An ISO image of the LiveCD is available for free download.

Features

- Fully EPSG DS 301 V1.1.0-compliant scope of functions
- Modular and performance-optimized software structure
- Comprehensive configuration and scaling options
- Simplified API to the user application
- Implemented in ANSI-C
- Operating system independent
- Ask us for target platform-specific porting, we provide professional services and support

SYS TEC products and services are available worldwide through our partners and distributors.

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openPOWERLINK Protocol Stack A Functional Survey

Ethernet POWERLINK API layer

The openPOWERLINK API layer defines a simplified application programmer's interface (API) to perform tasks required to operate the stack (e.g. initialization). openPOWERLINK features a straightforward and highly-efficient event-based information flow, using call-back functions to inform the application about events that have occurred. Those events include NMT state changes, node state changes, object dictionary accesses, finishing of SDO transfers, EPL stack errors and others.

Communication Abstraction layer

The openPOWERLINK protocol stack is divided into a hard-realtime task that processes cyclic events and a low-priority task that is responsible for asynchronous events like SDO processing. The communication between these tasks is encapsulated in the event-based Communication Abstraction layer. To run openPOWERLINK on a new platform, you only need to adapt the Communication Abstraction layer itself, while the rest of the stack sources are kept untouched. This allows easy porting and optimization to new target platforms. For example, it is possible to use the highly-optimized means for an interprocess communication of the underlying operating system.

Process Data Object (PDO)

Process Data Objects are used to exchange data between nodes in the POWERLINK network. When integrating the device into the network, data that is transmitted and received has to be mapped to PDOs in the Object Dictionary. This PDO mapping can be changed dynamically by the application or via SDO transfers. POWERLINK transmits PDOs cyclically. Further options exist to fine-tune the PDO communication.

Object Dictionary and Service Data Object (SDO)

Every openPOWERLINK device is configured via its Object Dictionary. This can be done at compile time using appropriate default values and at run time using SDO transfers to alter Object Dictionary entries. The stack supports SDO via UDP and asynchronous EPL frames (so-called "ASnd frames"). It uses a standard UDP/IP stack for SDO communication via UDP, e.g. the one supplied by your operating system or a separate stand-alone UDP/IP stack. Here, a virtual Ethernet driver provides the means to control communication over the POWERLINK network. Besides SDO via UDP, the application may also use other UDP or TCP based network services, such as a web server or FTP.

The openPOWERLINK stack will inform the application on read and/or write access to Object Dictionary entries by means of the corresponding call-back function. Thus, the application may reject the access before it is actually performed or it may trigger any user-specific action.

Managing Nodes

The openPOWERLINK source code supports the implementation of managing nodes (MN). The managing node is enabled at runtime by setting the node-ID to 240. If started as managing node, the device performs the bootup process according to the EPL specification EPSG DS 301 V1.1.0 including the support of configuration and monitoring of mandatory and optional controlled nodes. The Configuration Manager configures each controlled node according to a supplied device configuration file.

openPOWERLINK Development Kit



Accelerate your Ethernet POWERLINK development with a pre-configured SYS TEC openPOWERLINK Development Kit. It contains all hardware and software components required for trouble-free entry into Ethernet POWERLINK. Based on our ECU core-5484 single board computer with pre-programmed Linux-OS, the Development Kit also includes a fully functional EPL stack with a MN as well as a CN application for your reference. The development board features the typical POWERLINK hub to support simple daisy chain connections between the nodes. Our openPOWERLINK Development Kit is accompanied by the openPOWERLINK LiveCD, a number of sample applications, comprehensive documentation and debug tools. This saves time and money when you get started with real-time Industrial Ethernet and makes it extremely easy to evaluate POWERLINK for your application.

Customized Services & Professional Support

Based on our Know-how regarding the stack, we are an ideal partner for all requirements. As the designer of the openPOWERLINK protocol stack, we provide professional services and support, i.e. for OS-specific adaptations or the development of customized extensions. Our services range from consulting, specification, hardware and software development up to prototyping and serial production in our own production facility - ALL FROM ONE SOURCE!

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www.systemec-electronic.com