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Embedding ideas

State of the art communication software libraries for the smart grids

JPEmbedded offers off-the-shelf communication software libraries for energy market devices. Besides the best-selling IEC 61850 library, we provide the implementations of the ICCP/TASE.2, and IEC 60870-5 standards. All libraries offer platform independent architecture, which fosters porting and decreases the time it takes for the device to reach the market. Our products are highly configurable in terms of the scope of functionality, resources used, and maintain a very low memory footprint. These are the primary reasons why JPEmbedded's solutions are the first choice for embedded applications. We also implement customized projects for energy market players.

Most important features of JPEmbedded's librarires includes:

• Platform independent architecture
• Works with or without an operating system
• Highly configurable and easy customization
• Small memory footprint
• Royalty-free licensing
• Source code access
• Object oriented C++ implementation

IEC 61850 Library

IEC 61850 is an international standard describing data model and communication services for power grid devices, also known as intelligent electronic devices (IEDs). The main protocols specified by the standard are MMS (Manufacturing Message Specification), GOOSE (Generic Object Oriented Substation Event), and SV (Sampled Values). Besides generic functionality of power systems, IEC 61850 defines profiles like 61850-7-420 for distributed energy resources (DER) or hydroelectric power plants which are defined in IEC 61850-7-420.

IEC 61850 library by JPEmbedded is a platform independent solution, easy to integrate on any device with or without operating system. Other advantages of our product are its high configurability in terms of functionality and resources used, and very low memory footprint. Depending on data model and functionality of the specific device, memory usage could be as low as 240kB of Flash and 150kB of RAM. The library supports the 2nd edition of the standard.

The main components of the solution are: the IEC 61850 core library, hardware abstraction layer (HAL), configuration module and user application. The core library implements a bulk of the functionalities specified by the standard. It handles data model initialization, access to APIs, data sets, control blocks and the control model. Hardware Abstraction Layer (aka 'driver') provides the abstraction of the hardware platform and operating system (if used). The configuration file sets up the library to meet the needs of a specific device or application, while user application realizes the logic specific to a given device. Implemented features: MMS server, object oriented data model, data sets, reporting (buffered & unbuffered), GOOSE (subscriber & publisher), sampled values (subscriber & publisher), Control Model and logging.

Compliance of JPEmbedded's library with EN 61850 standard has been confirmed by a certificate issued by Instytut Energetyki in Gdańsk. The certification process was implemented by The European Regional Development Fund.
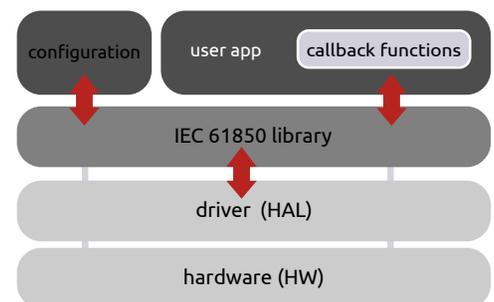

IEC 61850 library architecture
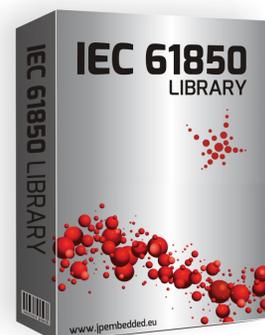
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ICCP/TASE.2 Library

Inter-Control Center Communications Protocol (ICCP) also known as TASE.2 is the standard that defines communication between control centers, utilities and power pools. Since TASE.2 and IEC 61850 both use the MMS communication protocol, a significant part of the source code is shared by both products. The library architecture is comprised of a core component, which implements functionality defined by the standard and platform abstraction layer (aka 'driver'). Using this approach, the library can easily be ported to different platforms. Currently, Windows (7, 8, 10) and Linux are supported. The library design is object oriented, C++ was used for implementation, but C or Java language API could be provided if requested by the customer. JPEmbedded's solution supports both the server and client side of communication. An encrypted secure channel based on TLS protocol in accordance with the IEC 62351 standard is also an option.
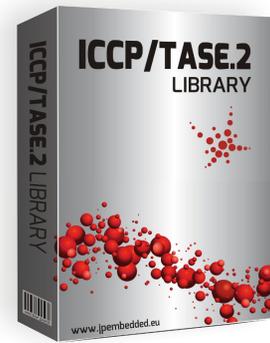
IEC 60870-5-103 Library

The IEC 60870-5-103 is a companion standard for power system control and associated communications. The standard enables interoperability between protection equipment and devices of a control system in a substation. 103 defines communication for serial, unbalanced links only. The standard was introduced by the IEC in 1997.

JPEmbedded's implementation of IEC 60870-5-103 includes both server and client-side functionality. The library is platform independent and can be integrated on different targets, including bare-metal. The library is implemented in C++.
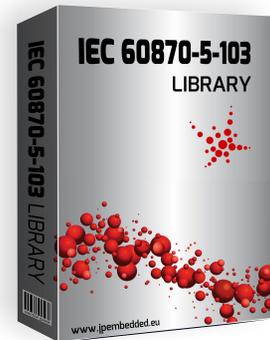
IEC 60870-5-104 Library

The IEC 60870-5-104 is an international standard, released in 2000 by the IEC. The standard enables communication between a control station and substation via TCP/IP network. The application layer is based on the IEC 60870-5-101, and the communication on the client-server model.

Implementation of the 104 library offered by JPEmbedded includes server-side functionality. It is implemented in C++ in a way that allows it to be easily integrated into various hardware platforms with or without any OS. High configurability allows decreasing the size of the client's executable, as only the selected subset of ASDUs enters the binary.
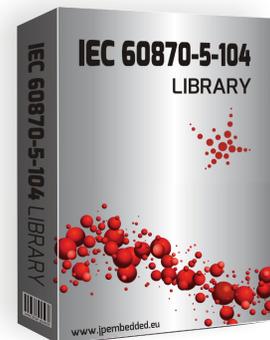
Request a free evaluation!

To request a FREE EVALUATION version of any of our libraries, please send an e-mail containing information about the target platform microcontroller and operating system.

At JPEmbedded we believe that the modern changes in the way electricity is transmitted and distributed will have a positive impact on our lives and on our planet. Changing and modernization of energy systems, decentralization of power generation, energy storage and prosumers are only a few examples of the challenges facing the energy market nowadays. Our mission and main interest is the development of state of the art software and hardware products to be a part of the transformation of energy market.

For more information, licensing details, price quotation requests, please contact JPEmbedded: sales@jpembedded.eu, +48 601 088 970.

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