

UPGRADING CUSTOMER DEVICE TO MEET IEC 61850 STANDARDS AND GOOSE MESSAGING

Company

A multi-national OEM based in Italy

Region

Europe

Industry

Electronic device manufacturing for the Transmission and Distribution sectors

Kalkitech Solutions

- IEC 61850 protocol implementation in client line of protection relays
- Customization to provide IEC 61850 GOOSE functionality
- Support for IEC 61850 certification from KEMA
- Extensive IEC 61850 training

Kalkitech Products

- SYNC 221 – IEC Upgrade card module
- SYNC 205 – Development Kit



The client needed to quickly incorporate IEC 61850 protocol capability in its existing line of protection relays to meet market needs.

Business Need

The client faced a strong market requirement for IEC 61850 protocol capability in its existing line of protection relays, together with stringent latency and performance requirements to meet IEC 61850 GOOSE standards. The client identified Kalkitech's SYNC 221 as the right solution for meeting market specifications and time-to-market requirements, with minimal or no change to its existing product line.

Solution

Kalkitech's solution consisted of embedding the IEC upgrade card, SYNC 200, into the client device, to provide the IEC 61850 protocol functionality. Substantial customization was carried out to meet the latency

and performance requirements of GOOSE messaging. Kalkitech also provided extensive IEC 61850 training which helped the client quickly obtain IEC 61850 certification from KEMA.

Benefits

Kalkitech's solution provided the client with the following benefits:

- Reduced by 50% the development time/cost required for the client device to be IEC 61850 compliant
- Enabled quick time to market
- Met stringent performance requirements for end application purposes
- Facilitated device certification by an independent agency as IEC 61850 compliant

- Extended the product's lifetime, market reach and application scope

The primary markets for the client's line of products included Europe, Middle East, North Africa, Turkey and Eastern Europe. One of the client's main line of products that sold in large numbers in these markets was protection relays that used the Modbus protocol. However, the IEC 61850 protocol was increasingly gaining acceptance in the substations in these geographies. This new protocol ensured interoperability between various vendor devices in substation automation. Therefore, the client wanted to quickly incorporate the protocol and its advanced functions in its core products.

The client is a global leader in the design, development and production of electro-mechanical and electronic components used in rail transportation and energy industry applications.

Faced with this strong market requirement for IEC 61850 compliant Intelligent Electronic Devices (IEDs), the client chose Kalkitech based on a number of factors including:

- Its strong track record as a leading enabler of IEC 61850 compliant products and solutions
- References from similar IED players in Europe
- Desire to partner with a leading player in customized protocol implementation as it considered the IEC 61850 protocol to be a crucial addition to its products' feature list

Kalkitech's vast experience in assisting multiple OEMs in acquiring KEMA certification also gave the client the confidence to work with Kalkitech.

Implementing the IEC 61850 protocol

The client wanted to bring to market the upgraded IEC-61850 compliant protection relay product range within three to four months. The client evaluated multiple products for this requirement and chose Kalkitech's SYNC 200 for its proven track record of IEC 61850 performance capability and features that align with the customers' requirements. Using this embedded module, the client could achieve the necessary Modbus to IEC 61850 conversion, as well as, obtain the third party certification in time to meet market needs.

Kalkitech's IEC upgrade card, SYNC 221, was embedded into the client device (protection relay) to provide the IEC 61850 functionality. SYNC 200 is a card small enough to be incorporated into the mechanical enclosure of many IEDs including relays. SYNC 200, with GPIO as well as TTL and SPI interfaces, provides multiple connectivity options with the IED base board.

Since the protection relay had native support for Modbus protocol, the SYNC 200 module converted the Modbus



data information to the required IEC 61850 format, with the output from the Ethernet port of the SYNC 200 in IEC 61850 server protocol format.

Kalkitech's SYNC 205 Development Kit was used for initial testing and interface development and included two free units of the IED upgrade card modules, as well as the development board and 20 hours of free remote integration support.

Customization to meet high latency and performance requirements for IEC 61850 GOOSE

The IEC 61850 standard includes Generic Object-Oriented Substation Event (GOOSE) messaging between Intelligent Electronic Devices (IEDs) typically protection relays, over an Ethernet network. GOOSE messages are designed to be vendor independent so that IEDs that fully support IEC 61850 are truly interoperable within the substation network. A GOOSE message is used to exchange data between IEDs, for fast and reliable transmission of substation events such as commands and alarms.

The client device's end application required latency times of less than 40 milliseconds (msec). Achieving latency

of less than 40 msec using the SYNC 200 module was a challenge due to the lead time required for the Modbus to IEC61850 protocol conversion. This meant that the GPIO interface option was the most suitable for interfacing to the base board.

The Kalkitech team provided a customized solution by individually mapping the I/Os as per the customer's specific requirement, and was able to achieve times of around 30-40 msec (which could be further brought down through firmware customization). Subsequent tests showed that times in the 20-30 msec range were achieved in the first iteration itself.

Certification

Kalkitech provided the client team with extensive training in IEC 61850 protocol implementation, enabling the client to quickly get the product certified as conforming to IEC 61850 standard by KEMA, an independent body.

Results

The project was completed within eleven months and included offshore as well as onshore development (1.5 months) and support. A significant amount of time was spent on customization support for GOOSE

and the KEMA certification process. The client was able to market the IEC-61850 compliant product within 4 months, and with GOOSE support by the end of the year.

A typical IEC 61850 product launch (built from scratch) would require a huge investment in R&D, product development and testing infrastructure, as well as certification requirements. By collaborating with Kalkitech, the client was able to reduce the capital costs by more than 50%. The client

was also able to bring to market a IEC 61850 compliant product within six months versus at least a year without Kalkitech's help.

Kalkitech has been involved in various IEC 61850 related activities and actively promotes this standard. Kalkitech has always been in the forefront of interoperability and is one of the first companies to have dedicated products and service offerings specific to IEC 61850.

Kalkitech's SYNC 221 based solution enabled the client to quickly bring to market an IEC 61850 compliant product line with minimal change to existing product design, while reducing development time and cost by 50%

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