

CASE STUDY : Legacy Upgrade of Power Meter to IEC 61850 using Kalkitech SYNC OEM

CLIENT NAME : CCK, Brazil

PROJECT TITLE : Implementation of IEC 61850 in vendor device using SYNC OEM

ABSTRACT/OVERVIEW

CCK is a major power meter manufacturer for the Brazil and MERCOSUL markets with experience in numerous large scale implementations spread over two decades. CCK wanted to tap the burgeoning segment around IEC 61850 enabled devices, and wanted to incorporate IEC 61850 protocol in their power meters.

The mandate was to create an integrated IEC61850 enabled device on the existing product platform. At the same time, this has to be implemented at minimal development costs and more importantly, in a very short time-frame for faster go-to-market. The proposed solution was to integrate and install the Kalkitech SYNC OEM embedded module in the device, that converts the Modbus protocol native to the device to IEC 61850. The project of integrating the SYNC OEM to the existing power meter was executed and successfully implemented in a short time-frame of one month.

IMPLEMENTATION DETAILS

Country : Brazil
Year of implementation : 2011
Duration of the project : 1 month

INTRODUCTION

About CCK

CCK is one of the largest indigenous power meter manufacturers for the Brazil market, with more than 4000 customers across various segments and industries. Started in 1991, CCK has grown over the years to have a wide range of industrial meters including power quality meters, as well as numerous energy management software and other tools.

About CCK's market

CCK primary markets are in Brazil and other Latin American countries, which are seeing renewed focus in numerous large scale substation automation projects. Majority of the multi-billion dollar projects are planned using the IEC 61850 protocol as the backbone for fast communications, and also on the back of proven substation level implementations in Europe and Asia. Interoperable standards IEC 61850 ensure greater flexibility in driven by ability to use IEDs and primary equipments of various companies, and still guarantee the availability and performance requirements, while bringing down costs. CCK, being a local player, has an inherent advantage in lower taxation rates and is ideally positioned to exploit the upcoming large scale investments in substation automation and modernization.

CLIENT REQUIREMENTS

CCK has been continuously involved in the latest communication and technological developments in the Transmission and Distribution sector, but cannot invest heavily (compared to the larger players) in new technologies like IEC 61850 for expanding its market reach. With the recent developments in the Latin American markets for IEC 61850 based substation solutions, CCK and other companies have a great opportunity, if they incorporate IEC 61850 solutions in their portfolio of products. CCK approached Kalkitech, in implementing IEC 61850 protocols in vendor products, to help them build a high-performance oriented Power meter that is required for the changing markets.

SOLUTIONS

Kalkitech offers numerous implementation options for integrating IEC 61850 in the vendor equipment devices. This can be basically grouped under three categories:

- Internal Source Code Solutions
- Internal Embedded Board Solutions
- External Gateway Solutions

Though source code solutions are the standard route for IEC 61850 implementation, there were few disadvantages in going for this option, where capital and R&D costs, plus the time-to-market primary constraints.

As external gateway was not a viable solution in terms of cost, because of high volumes, the alternate option was considered. The alternate option was to use an embedded board which provides the necessary firmware and intelligence for implementing IEC 61850 quickly and effectively in their existing power meters. The embedded board, (Kalkitech SYNC OEM) provided CCK the flexibility and speed required to showcase their product in-time for the Proof of Concepts to the system integrator and the utilities.

Some of the other salient points on going for an embedded board level implementation compared to in-house protocol implementation include:

Embedded Board Implementation	Protocol Implementation
Prerequisites – No prerequisite on the technical front. However, it has constraints on the mechanical front and present device should accommodate Kalkitech embedded module and add-on board for interfacing.	No need to change any hardware component and does not need any change on the mechanical front. Software implementation needs to have high end memory requirements and performance on IEC61850 side is dependent on performance of the processor used in the device.
Meant for Upgrading the target devices with multiple protocols i.e. the customer can add other protocol with minimal effort	Keeping the cost in mind, it is only advisable to go with Protocol Implementation for a New product rather than upgrade of an old product.
Easy addition of new protocols and updation of existing protocols possible, without any hardware change and implementation effort from customer end	The implementation process has to be repeated for each protocol updates, enhancement etc.
No re-certification cost involved as the enhancement is internal(generally)	Since this is advised for a new product there would be certification cost involved.
IP belongs to Kalkitech	IP will belong to customer
Meant for a medium scale implementation	Meant for large scale implementation
Faster Implementation(possible in less than 1 month time)	Takes minimum 3-4 months for implementation
Less effort on implementation	More effort involved

SYNC OEM S4R1 was selected by the CCK engineers for the implementation of IEC 68150 in their power meter, as it had the necessary performance requirements, as well as the option of more scalability through four Serial ports. This was plugged internally to the device connecting the TTL interface to the device port and Ethernet port was then taken out from the device. The complete integration process, including a minor board design & testing, was completed in a 2 weeks.

To facilitate easy development, Kalkitech provided a OEM starter kit containing Development board, OEM Modules, design details and a support package of 20 hours. This OEM starter kit helped CCK to get acquainted with the various functionalities of the OEM Module, and also provided free support which helped in the clarification on the various aspects of integration, aiding in faster completion.

Kalkitech also assisted CCK in the customization of the configuration tool provided along with the SYNC OEM Modules, EasyConnect, thus ensured consistency with CCK's software and translation to its native languages. The EasyConnect, being a complete plug-and-play package, enabled very quick turnaround time in the configuration of the ICD.

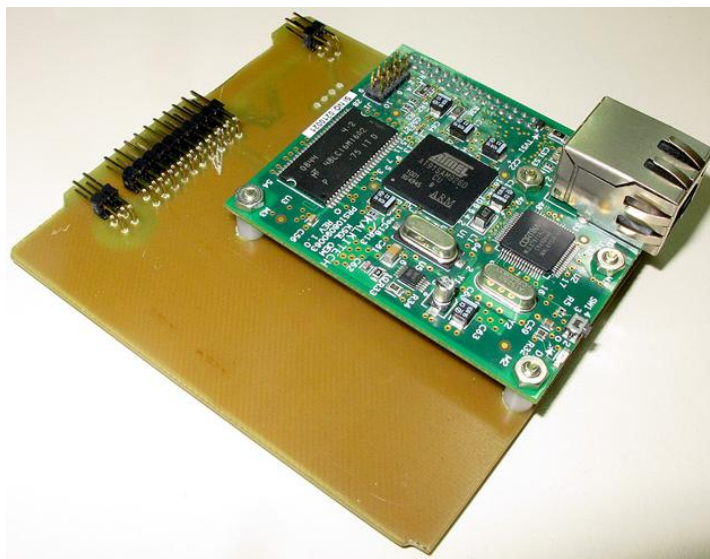


Figure-1 SYNC OEM S4R1 Module, with interfacing circuit board

Why Kalkitech?

The key consideration for CCK was to show a robust proof of concept which needed to be demonstrated in front of the country's main utility within a short time frame. Kalkitech was able to demonstrate and deliver the solution within the expected time frame.

KEY BENEFITS

Kalkitech OEM based solution had the following features:

- CCK devices now support IEC 61850 , DNP3.0 , IEC104 and DLMS protocols with OEM module add-on
- CCK devices were preconfigured to have preloaded model specific ICD and now supports high end features like reports, GOOSE etc. The devices were having only master-slave poll based scheme for sending data prior to the OEM upgrade.
- CCK devices now support connectivity to external multiple masters through any of the supported protocols
- CCK devices can be made as a part of Ethernet network and supports all functionalities like remote configuration, diagnostics and file transfer functionalities.
- CCK devices can now claim IEC 62351 based security for TCP/IP profiles for IEC104 and DNP3.0.

KEY RESULTS

CCK was able to come with an enhanced power meter with IEC 61850 in a short span of a month, and successfully conduct Proof of Concepts with major System Integrators, enabling them to win major orders within a short duration., Certification and other services also provided by Kalkitech enabled CCK to increase its market scope beyond Brazil and is now expanding its presence to Europe and Asia as well.



Figure-2 SYNC OEM S4R1 Module



Figure-3 SYNC OEM S4R1 Module

FUTURE ENHANCEMENTS PLANNED

Future enhancements planned on CCK:

- Following are the future improvements planned on CCK main board to get support for some of the key features.
 1. Time Synchronization from OEM to CCK board– CCK boards had only modbus protocol which does not have standard mechanism for time synchronization. To make time synchronization between OEM board and CCK device, customization on modbus can be achieved to enable the same.
 2. Event time stamp to be originated from CCK board – Presently the event timestamp is generated from OEM board based on the data reporting time. Custom event queue can be implemented on modbus side to exchange all the event information including timestamp.

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