CCK was a major power meter manufacturer for the Brazil and MERCOSUL markets with experience in numerous large scale implementations spread over two decades. CCK tapped the burgeoning segment around IEC 61850 enabled devices and incorporated 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 was 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 200 Module series embedded module in the device, that converted 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 was 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 had grown over the years and had 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 were in Brazil and other Latin American countries, which saw renewed focus in numerous large scale substation automation projects. Majority of the multi-billion dollar projects were 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 ensured greater flexibility in driven by ability to use IEDs and
primary equipments of various companies and still guaranteed the availability and performance requirements, while bringing down costs. CCK, being a local player, had an inherent advantage in lower taxation rates and was ideally positioned to exploit the upcoming large scale investments in substation automation and modernization.

**BUSINESS CASE**

CCK was continuously involved in the latest communication and technological developments in the Transmission and Distribution sector, but could not 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 had a great opportunity, if they incorporated IEC 61850 solutions in their portfolio of products. CCK approached Kalkitech, in implementing IEC 61850 protocols in vendor products and helped them build a high-performance oriented Power meter that was required for the changing markets.

**SOLUTION**

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

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

Though source code solutions were 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 provided the necessary firmware and intelligence for implementing IEC 61850 quickly and effectively in their existing power meters. The embedded board, (Kalkitech SYNC 200 module series) 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 included:
<table>
<thead>
<tr>
<th>Embedded Board Implementation</th>
<th>Protocol Implementation</th>
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<tbody>
<tr>
<td>Prerequisites – No prerequisite on the technical front. However, it had constraints on the</td>
<td>Change in any hardware component and any change on the mechanical front was not needed. Software implementation needed high end memory requirements and performance on IEC61850 side was dependent on performance of the processor used in the device.</td>
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<tr>
<td>mechanical front and present device accommodated Kalkitech embedded module and add-on board for interfacing.</td>
<td></td>
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<tr>
<td>Meant for Upgrading the target devices with multiple protocols i.e. the customer could add</td>
<td>Keeping the cost in mind, it was only advisable to go with Protocol Implementation for a New product rather than upgrade of an old product.</td>
</tr>
<tr>
<td>other protocol with minimal effort</td>
<td></td>
</tr>
<tr>
<td>Easy addition of new protocols and updation of existing protocols possible, without any hardware change and implementation effort from customer end</td>
<td>The implementation process repeated for each protocol updates, enhancement.</td>
</tr>
<tr>
<td>No re-certification cost involved as the enhancement was internal (generally)</td>
<td>Since this was advised for a new product there was certification cost involved.</td>
</tr>
<tr>
<td>IP belonged to Kalkitech</td>
<td>IP belonged to customer</td>
</tr>
<tr>
<td>Meant for a medium scale implementation</td>
<td>Meant for large scale implementation</td>
</tr>
<tr>
<td>Faster Implementation (was possible in less than 1 month time)</td>
<td>Took minimum 3-4 months for implementation</td>
</tr>
<tr>
<td>Less effort needed on implementation</td>
<td>More effort involved</td>
</tr>
</tbody>
</table>

SYNC 241 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 and testing, was completed in a 2 weeks.

To facilitate easy development, Kalkitech provided a SYNC 200 Module starter kit containing Development board, SYNC 200 Modules, design details and a support package of 20 hours. This SYNC 200 Module 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 200 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 241 Module, with interfacing circuit board](image-url)
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 SYNC 200 module based solution had the following features:
- CCK devices supported IEC 61850, DNP3.0, IEC104 and DLMS protocols with SYNC 200 module add-on
- CCK devices were preconfigured to have preloaded model specific ICD and supported high end features like reports, GOOSE. The devices were having only master-slave poll based scheme for sending data prior to the OEM upgrade.
- CCK devices supported connectivity to external multiple masters through any of the supported protocols
- CCK devices was made as a part of Ethernet network and supported all functionalities like remote configuration, diagnostics and file transfer functionalities.
- CCK devices claimed IEC 62351 based security for TCP/IP profiles for IEC104 and DNP3.0.

KEY RESULTS

CCK developed an enhanced power meter with IEC 61850 in a short span of a month, and successfully conducted 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 expanded its presence to Europe and Asia as well.

FUTURE ENHANCEMENTS PLANNED

Following were 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 did not have standard mechanism for time synchronization. To make time synchronization between OEM board and CCK device, customization on modbus was achieved to enable the same.

2. Event time stamp was originated from CCK board—Event timestamp was generated from OEM board based on the data reporting time. Custom event queue was implemented on modbus side to exchange all the event information including timestamp.

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