

ENABLING LARGE-SCALE SUBSTATION AUTOMATION USING KALKITECH'S DCU, SYNC 3000



Company

Codensa S.A

Website

<http://corporativo.codensa.com.co/en/conocenos/nuestronegocio/Pages/home.aspx>

Region

Latin America

Industry

Electric power distribution

Kalkitech Solutions

- 1 Substation Automation
- 2 Custom implementation of a non-standard protocol

Kalkitech Products

SYNC 3000 – Data Concentrator Unit



Codensa planned to modernize 70 of its high voltage substations and incorporate new technologies, while maintaining compatibility with existing control systems such as Distributed Remote Terminal Units (RTUs).

Business Need

With the goal of improving service quality, Codensa embarked on a huge investment effort to modernize and strengthen its infrastructure to meet its current and future expansion needs. As part of this initiative, Codensa planned to modernize 70 of its high voltage substations and incorporate new technologies, while maintaining compatibility with existing control systems such as Distributed Remote Terminal Units (RTUs). The existing control systems, consisting of distributed RTUs and routers, were nearing the end of their lifecycle and becoming obsolete.

While the Intelligent Energy Devices (IEDs) at the substations communicated with the Data Concentrator Unit (DCU) / gateway downstream using the IEC 61850 protocol, the CISCO router communicating from the DCU to the control center upstream, supported only a customized version of the IEC-60870-5/101 protocols. This customization was a requirement from the parent company Endesa (hence forth referred to as IEC 101 Endesa profile).

Therefore, the client was looking for a DCU gateway that

- Could convert data from the IEC 61850 standard to the IEC 101 Endesa profile.
- Get the data from the various IEC 61850, DNP3 and IEC 101 devices and convert it into IEC 101 Endesa profile to communicate upstream
- Had standby redundancy capability to minimize any downtime.

Besides the above, the client wanted a provider with the expertise to customize the features of the IEC-101 Endesa profile.

The client chose Kalkitech as its products support all the standard protocols including the industry-leading IEC 61850. Moreover, Kalkitech had the technical expertise and experience to do custom implementations of standard protocols (the IEC 101 Endesa profile in this instance) to meet end application requirements.

Codensa, a subsidiary of Spain's Endesa group, is the leading electric power distribution company in Columbia. Based in Bogota, Columbia, Codensa supplies over 2.5 million customers representing 24% of national demand. It operates over 120 substations and over 41,000 km of medium and low voltage networks, supplying power to the entire city of Bogota, the rural area of Cundinamarca, eight municipalities of Boyacá and one in Tolima. The systems have 500/230/115/57/11.4 kV levels in their transmission and distribution substations.

This is the largest implementation of substation automation services in Latin America and marks a huge project win for Kalkitech, which faced stiff competition from larger regional players. Kalkitech partnered with Potentia Y Tecnologias Incorporadas S.A (P.T.I), a regional systems integrator, which provides systems analysis software for electrical equipment used in power systems, telecommunications and automation.

Solution

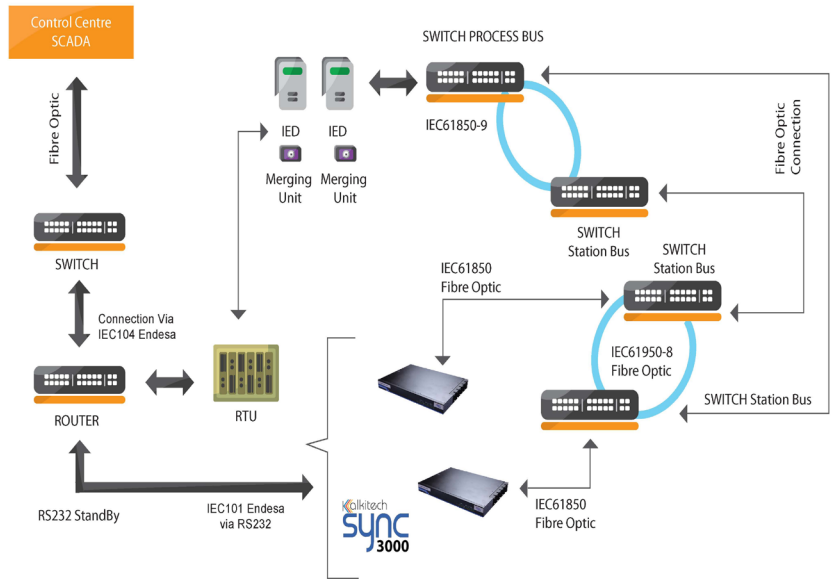
Kalkitech's product, the SYNC 3000* Data Concentrator Unit, was chosen as the DCU to be installed at 70 of the client's substations. This is the largest DCU project in the country and in the continent. This large scale implementation is scheduled to be completed over a three year period, in two phases:

- **Phase 1**
Installation and commissioning of 74 SYNC 3000 units for 37 substations
Customization of the IEC 101 Endesa profile
- **Phase 2**
Installation and commissioning of 66 SYNC 3000 units for 33 substations

Kalkitech's solution addressed the following client requirements:

Comply with the IEC 61850 standard

A Substation Automation (SA) system enables an electric utility to remotely monitor, control and co-ordinate the distribution components installed in a substation. The data communication between the control center and IEDs in remote locations, and among the IEDs, (interoperability) can become an issue in realizing these substation automation functions, as the multi-vendor IEDs support different standard protocols. However, the emergence of the IEC 61850 communication standard has made it easier to have an interoperable solution for existing multi-vendor substations. This project required compliance with the IEC 61850 standard at the substation control level, bay and station level to ensure interoperability with legacy systems as well as systems of the future. Kalkitech's SYNC 3000* DCU was suitable for this purpose as it supports the industry leading IEC 61850 standard.



Convert multiple protocol device data to IEC 101 Endesa profile protocol

The various IED devices at the client's substations supported multiple standard protocols such as IEC 61850, DNP3 and IEC 101. Therefore, the substation DCU had to be capable of converting this device data into the IEC 101 Endesa profile to be able to communicate to the Supervisory Control and Data Acquisition (SCADA) system upstream.

Kalkitech's DCU product, the SYNC 3000, was best suited to address this customer challenge as it

- supported all the required standard protocols
- could be customized to meet the IEC 101 Endesa profile requirements
- was IEC 61850-3 certified for EMI/EMC substation robustness
- supported device and power supply redundancy
- supported a large number of device and data points and communication interfaces

Customization and support for IEC 101 Endesa profile

Various high priority features were implemented, which included the following:

- GI uninterrupted
- GI desired data filter

- Cyclic independent for Measurement, Step Positions and Integrated Totals
- Substation Local/Remote interlock command
- Reduced ASDU frame
- Scaling of measure values
- Command Inversion
- Gateway reporting with end of initialization instead of diagnostic point to report the disconnection of IED

This customization was completed prior to the commissioning of the DCUs.

Benefits

This large scale substation automation implementation formed part of a huge US\$21 million modernization project undertaken by the company to make the utility one of the most advanced in the region. The modernization would result in one of the most advanced/modern Control Centers in Latin America with the core of the company operations being renewed with systems that allow real time infrastructure monitoring, optimize fault response times, thereby improving service quality and reducing maintenance costs considerably.

About Kalkitech

Kalkitech is a leading enabler of substation automation products and solutions that comply with the industry leading IEC 61850 communication standard.

Kalkitech's products have extensive market exposure and are used by more than 700-800 customers in over 65 countries around the world. Additionally, Kalkitech's technical expertise enables it to provide customization of hardware or firmware to meet end application requirements, memory or product

performance requirements. By partnering with regional leaders throughout the world, Kalkitech is able to provide local language support.

About SYNC 3000

Kalkitech's SYNC 3000 rugged Data Concentrators have been extensively

used in heavy duty substation applications across the world. This rack mount product is ideal for new and emerging substation automation requirements such as the Smart Grid, R-APDRP and has enhanced communication security features as well as IEC61850-3 level robustness.

#Adapted from Codensa press release

<http://corporativo.codensa.com.co/EN/PRENSA/COMUNICADOS/Pages/CODENSAPRESENTEDITS1H2013FINANCIALRESULTS.aspx>

* Note: SYNC 3000 is a rack-mounted substation DCU that was used for this particular project. SYNC 2000 can also be alternatively used for the same application as a DIN rail mountable option.

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