

KINECTRICS IEC 61850 SERVICES

MAKING THE MOST OF NEW OPPORTUNITIES TO ENHANCE RELIABILITY



**Achieve significant savings
and eliminate labour
intensive cabling with in-
house integration and a
“plug and work” approach
using IEC 61850.**

For the power industry, “plug-and-play” means simplified engineering and in-house integration. It is also another term for scalability, flexibility for easy maintenance, lower cost, choice and, expansion. But, it does not mean “plug and energize”. Interoperability testing is crucial and should be conducted before full scope in-house integration and field installation. It should be part of site-commissioning testing, to check all virtual point-to-point logical connections, verify that all functions operate as they should, and confirm that all distributed functions will interact as they were designed—especially if GOOSE tripping over a LAN is part of the scheme.

IEC 61850 services from Kinectrics’ advanced Interoperability testing Lab can help utilities achieve these important savings. Our new facility includes interactive Intelligent Electronic Devices (IEDs) IEDs and systems from major vendors such as ABB, AREVA, Cooper Power Systems, GE, SEL, Siemens & RuggedCOM.

SUBSTATION AUTOMATION SYSTEM DESIGN

IEC 61850 based Architecture Design

- Pros and cons of typical Ethernet architectures
- Suitability for applications in a substation environment
- Power industry standard N-1 security criteria
- Redundancy and interoperability
- Migration path for architecture to accommodate full scope deployment from pure station bus applications to combined station bus and process bus applications

**Practical Training
for IEC 61850**
Kinectrics also offers practical
hands-on training for IEC 61850—
specifically designed to meet
individual client needs.

IEC 61850 IED and System Integration

The simplified cabling and in-house integration of IEC 61850 based substation automation systems is a departure from the traditional approach. Much of the detailed DC schematics-related design is now replaced by a simple GOOSE table, which eliminates the labor-intensive cabling engineering and replaces it with a plug-and-work solution. Interoperability testing on point-to-point virtual logic connections must be conducted to ensure correct operation of the substation automation system.

Many phases are involved in the integration of IEC 61850 based substations. Horizontal integration involves IEDs publishing and subscribing to GOOSE messages at the bay level. Across the bays to the station level, for example, a data manager or data concentrator collects data from all substation IEDs, a typical application that requires vertical integration.

A system integrator collects the IED Capability Description (ICD) files usually containing the GOOSE publications from all IEDs in the substation. These configuration files must be provided by the vendor, either created by vendor-based proprietary configuration tools or, supplied in a template ICD form—the specific ICD file that must contain the published GOOSE messages if dynamic dataset is supported.

Proof-of-Concept Interoperability Testing

While conformance tests help vendors discover childhood diseases of a product during the development phases, interoperability testing provides the end-user with confidence that the system will interoperate as it should. Interoperability testing can be either a proof-of-concept test in the lab or, be conducted as part of a site acceptance test. The former is usually conducted by the substation design engineers, or system integrators, before in-house integration and field deployment of the project. The latter is part of the site commissioning testing to ensure data will flow on an optical fiber LAN as designed. Point-to-point checking of all virtual connections over the substation LAN is vital to the correct operation of the substation automation system and the reliability of the entire power system.

Proof-of-concept interoperability testing verifies the communication interfaces associated with the IEDs under test. The test usually is conducted in house to verify whether the specific IEDs are able to interoperate with each other.

CONSULTING SERVICES

Kinectrics IEC 61850 consulting services include:

- Substation automation system security
- Custom naming system for IEC 61850 based substation automation systems
- Network and traffic management
- Operational and non-operational data management
- Migration strategy, integration with legacy IEDs & systems
- Maintenance strategy
- Substation automation system life cycle management

IEC 61850 Testing

- **Proof of Concept Interoperability Testing**
- **Functionality Testing**
- **Site Commissioning Testing**
- **IEC 61850-3 Environmental Testing**

PROTECTION AND CONTROL SCHEMES – DETAILED DESIGN AND IMPLEMENTATION

Advanced Protection and Control Schemes

- Short circuit calculation and co-ordination studies
- DC schematics and AC three-line diagrams
- Protection and control logic design
- Settings calculations and relay programming
- Data point mapping and integration
- Detailed control function design includes transformer tap changer, interlocking logic design etc.

On-site Interoperability Testing and Commissioning Services

Kinectrics site-commissioning services include site interoperability testing for IEC 61850 based substation automation systems:

- Conduct secondary inject test
- Verify transfer and inter-tripping schemes
- Examine all point-to-point data mappings including virtual point-to-point communications
- Test pick-up settings, time delays and zone reaches
- Check scaling factors
- Ensure correct operation of all protection and control schemes

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