



Common denominator

Common components have helped ABB adopt the IEC 61850 substation communication standard in record time

MARTIN OSTERTAG – With the advent of the IEC 61850 standard in 2002, and its growing success in substation automation and later in several other industries, ABB was faced with the challenge of adapting a variety of its products to the new technology in a relatively short time. This was successfully accomplished in part due to the development of common components designed for use in a wide variety of ABB products.

1 Interoperability demonstration between major vendors at the IEEE PSRC meeting in Sun Valley in the United States in 2003



2 Use of common components in a variety of ABB products

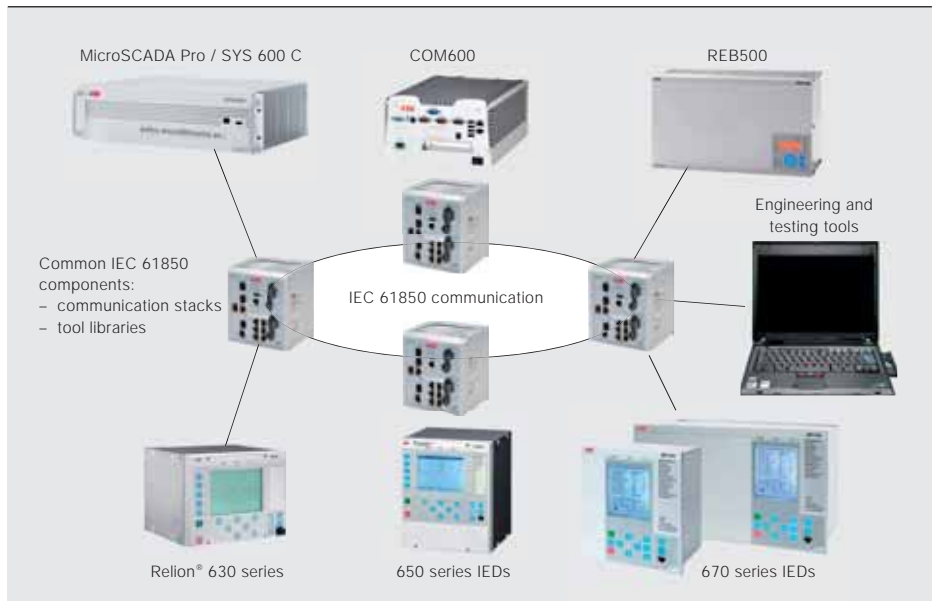


ABB was heavily involved in the process of creating the IEC 61850 standard. As the standardization was in progress, and in order to enable a fast time-to-market, the standard was already being implemented in products in parallel to the standard's finalization between 2002 and 2004. In order to support the standardization, interoperability tests were arranged for these early implementations. As ABB believed that the standard would be a success, it realized that a wide variety of products would need to support it. The company thus decided to implement reusable components right from the beginning. The results of these activities were reported back to the IEC organization that used them to improve the clarity and quality of the standard. In addition, they were presented to the public at the IEEE PSRC meeting in Sun Valley, USA in 2003 → 1 and at the Hannover Fair in April 2004.

At that time, ABB outlined a clear stepwise strategy for the introduction of IEC 61850 into its solutions in its very own internal IEC 61850 application guideline. This guideline defines the mandatory subset of IEC 61850 services that is supported by all ABB devices, it adds additional ABB internal convention, and clarifies and details certain sections where the standard leaves room for interpretation.

Already in its fourth edition, the guideline serves as a good introduction to the soon-to-be-available second edition of the IEC 61850 standard and defines the stepwise transition from the first edition to the second.

Based on the principles defined in the application guideline, ABB started to develop reusable components for a variety of products and tools in its portfolio. Two important components are the communication stack and a set of libraries that handles IEC 61850 object models and configurations → 2.

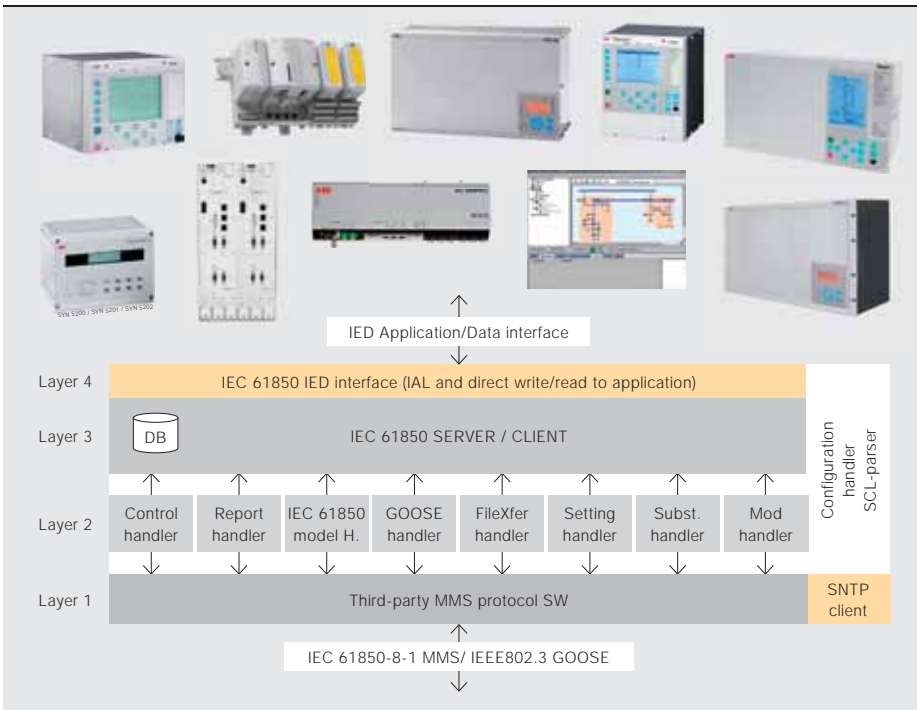
Communication stack

The IEC 61850 communication stack → 3 is effectively a piece of software that implements the communication services for IEC 61850-8-1 manufacturing message

specification (MMS) and generic object oriented substation event (GOOSE) servers and clients. More importantly, it hides the nitty-gritty details from the more application oriented research and development found in ABB's products, thereby allowing developers to concentrate on providing application value to customers. Currently, the communication stack is in-

Currently, the IEC 61850 communication stack is integrated into more than 12 ABB products or product families, with a growing number of host platforms set to follow suit.

tegrated into more than 12 ABB products or product families, with a growing number of host platforms set to follow suit as IEC 61850 continues to be accepted by other industries. The benefits of the IEC 61850 stack include portabili-



ty, and it runs on different real-time operating systems as well as under Windows for PC-based products and tools.

For the upcoming edition 2 of the IEC 61850 communication standard, common components will continue to play an important role in supporting a market-driven, phased upgrade and migration strategy for ABB’s product and tool portfolio.

File handling and object modeling

Each product to be integrated into an IEC 61850-based system needs to have its functionality defined in a standardized way that enables it to communicate with, and process information from other products in the system. This is where the

XML-based substation configuration language (SCL) comes into play. In addition, the communication stack, which is a reusable component, needs configuration information to enable such communication to take place.

Configuration tools rely on a software component that interprets and generates both SCL and stack configuration files. This component allows the tools to work on an object-oriented data model rather than parsing and interpreting raw files. In addition, it helps to avoid syntax and semantic errors and contributes to the high quality of ABB’s products.

Benefits of ABB’s approach

The main benefits of such a component include:

- The ability to carry out maintenance and improvements in one place, allowing all products to benefit
- The uniform implementation of functionality, which is crucial for interoperability between devices from ABB and third-parties
- Detailed testing and experience in the field. Because it is integrated into a variety of products, its functionality is tested way beyond what can be achieved for product-specific implementations.

Success factors for component reuse

ABB’s experience in the development of common components for IEC 61850

- Always be a step ahead of the products and tools that will use the components. In other words anticipate upcoming or future IEC 61850 specific communication requirements that component users might not even be aware of at the time they are implemented in the product.
- Fast reaction and premium support during the integration phase of the products research and development. In other words, the component research and development team must have a very “service provider” oriented mindset in that requests and problems from product research and development teams must be dealt with relatively quickly.
- Version traceability. Keep track of the distributed versions and version dependencies, ie, which version of a product contains which version of the component.
- Backward compatibility of the component is very important. If substation primary equipment can have a life expectancy of between 30 and 40 years, it is an absolute certainty that the substation automation system will be extended and upgraded at least once during this time. As a consequence, different versions of products and tools need to co-exist in the same system. This puts certain requirements on the definition of the component’s software interfaces and the way functionality is implemented.
- The proper clustering of functionality in a way that keeps the level of detail component users need to know about IEC 61850 at an appropriate level. This in turn allows the product engineers to focus more on application modeling and concept development.

shows several important aspects that need to be observed to successfully capitalize on component development → 4.

For the upcoming edition 2 of the IEC 61850 substation communication standard, common components will continue to play an important role in supporting a market-driven, phased upgrade and migration strategy for ABB’s product and tool portfolio. Close links to IEC working groups combined with implementation in parallel to standardization will allow ABB to maintain and strengthen its front-row position in IEC 61850 technology.

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