Nanjing Nari-Relays Electric Co., Ltd.

IEC 61850 Compatible IED and Complete System Solution

Introduction

Substation automation protocol and system architecture typically provided basic functionality for power system automation. The information and service were limited by the technical limitations available for implementation.

With the deregulation of power industrial, more and more utilities require more advancing, interoperable and future compatible system to fulfill the changing requirement, improve efficiency and achieve long-term return on investment.
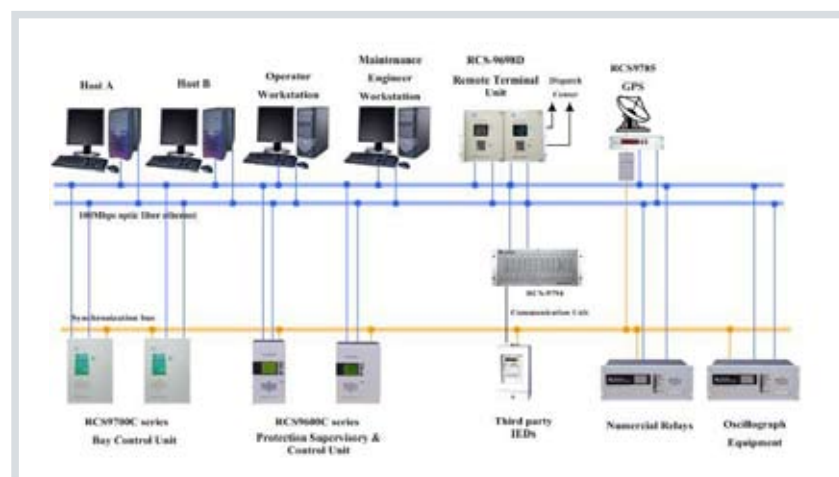
The IEC 61850 standard is the result of years of work by electric utilities and vendors of electronic equipment to produce standardized communications systems. IEC 61850 is a series of standards describing client/server and peer-to-peer communications, substation design and configuration, testing, environmental and project standards.

The IEC 61850 Standard provides an internationally recognized method targeted for interoperability between IED from different venders. With the open architecture, it supports functions allocation freely. IEC 61850 has built-in capability for high-speed control and data sharing over the network, eliminating most dedicated control wiring as well as dedicated communications channels between substations. It is also easy to follow the future communication technology, which should save the long-term upgrade investment for the customer.

NR protection relays, bay control units and substation automation systems are completely compatible with IEC 61850. NR IEDs are certificated by KEMA for level A IEC 61850 conformance test. There are more than 20 IEC 61850 substations which have been executed till 2007. We also provide solutions that allow the migration from the conventional substation automation system to the new standard.

IEC 61850 System scheme diagram

■ RCS–FAMILY Products Based on IEC 61850

· RCS-900 Series Protection
· RCS-9700 Software Package
· RCS-9700 Series Bay Control Unit
· RCS-9600 Series Protection, Monitoring & Control Unit
· RCS-9698G/H Communication Control Unit
· RCS-9794A Protocol Converter (Gateway)

■ IEC 61850 Communication Profiles

NR's IEDs can support IEC 61850 server services over TCP/IP communication protocol stacks. The TCP/IP profile requires the RCS-900 series to have an IP address to establish communication.

Buffered/unbuffered reporting

IEC61850 buffered and unbuffered reporting control blocks locate in LLN0. They can be configured to transmit information of protection trip information (in the Protection logical nodes), binary status values (in GGIO) and analog measured/calculated values (in MMXU, MMTR and MSQI). The reporting control blocks can be configured in CID files and then sent to the IED via an IEC61850 client.

File transfer

MMS file services are supported to allow the transfer of oscillography, event record or other files from NR's IEDs.

Timestamps

The timestamp values associated with all IEC61850 data items represent the time of the last(latest) change of either the value or quality flags of the data item.

Logical node name prefixes

IEC61850 specifies that each logical node can have a name with a total length of 11 characters. Complete names are of the form xxxxxxPTOC1, where the xxxxxx character string is configurable.

GOOSE services

NR's products support IEC61850 Generic Object Oriented Substation Event (GOOSE) communication. All GOOSE messages contain IEC61850 data collected into a dataset. It is this dataset that is transferred using GOOSE message services. The GOOSE related dataset is configured in the CID file and it is recommended to use the fixed GOOSE for the implementations which require GOOSE data transfer between RCS-900 series relays.

■ Reference List of RCS–9700 Automation System with IEC 61850 Protocol

By the end of July 2007, NR has supplied more than TWENTY (20) substations worldwide with RCS-9700 Automation System with IEC 61850.

· 220kV Huting substation, the first 220kV substation complied with IEC 61850 in China, which was put into service in 2006.
· 220kV Dianjun substation in China, which was put into service in 2006.
· 200kV Zhijiang substation in China, which was put into service in 2007.
· 220kV Xiangdu substation in China, which was put into service in 2007.
· 220kV Tuoluokou substation in China, which was put into service in 2007.
· 220kV Huqiu substation in China, which was put into service in 2007.
· 220kV Xinguang substation in China, which was put into service in 2006.
· 220kV Luming substation in China, which was put into service in 2007.
· Subah substation and Poli substation, the former is the first substation complied with IEC 61850 in Malaysia.