Substation Automation Using IEC 61850

Course description

This course covers the IEC 61850 standard in depth and looks at the standard from numerous perspectives. The concepts presented in the standard are new to many people that are exposed to it and the learning curve can often be quite steep.

The purpose of the course is to allow system engineers, design engineers, commissioning and maintenance personnel to have a working knowledge of the standard and the associated concepts and technologies.

Practical Sessions

The nature of the course is such that the bulk of the learning experience is conveyed with practical applications and sessions. The delegate is expected to bring along a laptop with administrative rights for installing software in order to benefit fully from the practical sessions.

Course prerequisites

Industrial networking and TCP/IP

Duration: 4 days

Contents

Introduction to Substation Automation and IEC 61850

Concepts involved in automating power distribution and transmission networks

Short overview of technical developments in related industries

New techniques in protection using intelligent relays

Utility problems - aging infrastructure, reduced technical staff, increased asset utilization

Substation Automation – Untapped Value

Local intelligence and Intelligent Electronic Devices (IEDs)

Limitations of conventional RTU systems

Review of the various communication protocols used for power systems

Communication requirements for substations

Suitability of different protocols for substation communications

Standardisation of communication in substations: goals and status

What is IEC 61850?

Development of IEC 61850

How is IEC 61850 different from current protocols in use today?

Structure of the Specification

Other important referenced standards

Is IEC 61850 a viable architecture for the future?

Benefits of IEC 61850

Review of object oriented terminology

The IEC 61850 data model overview

The message specification and data message structure

Communications model and message generation

Comprehensive review of the standard

Concept of layer 8 as data

IEC61850 Profile

IEC 61850 Application Services

Abstract Services

Data Models

Common Data Classes

Building of Data Models

Applied Data Models

MMS Overview - Manufacturing Message

Specification structure

Mapping Abstracting Concepts to MMS

ASN.1 fundamentals

Peer-to-Peer communications

Abstract Communication Service Interface (ACSI)

GSSE and GOOSE Messaging

Configuration – Device level and substation level

Substation Configuration Language and XML

Practical IEC 61850 Issues

System design and integration

Interoperability and interchangeability

Performance issues

Interfacing legacy devices (OPC/DDE/Native drivers)

Time Synchronization – GPS, IRIG-B, SNTP

IEC 61850 applications

What is Involved in Migrating to IEC 61850?

HMI interfaces

IT vs. Substation Engineering Responsibilities

Operating System Considerations

Using gateways to implement electronic perimeters in substations

Security Issues

Managing IED Passwords

Firewalls

Authentication and Authorization

Virus Monitoring & Protection

Software Management Issues

SCADA/EMS Connections

Remote access and corporate network connectivity