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IEEE Recommended Practice for Implementing an IEC 61850-Based Substation Communications, Protection, Monitoring, and Control System

IEEE Power and Energy Society

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Substations Committee

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Abstract: The steps and procedures a user should undertake to implement an IEC 61850 substation in both a single and multi-vendor equipment environment are outlined in this recommended practice. Intelligent electronic device (IED) specification, procurement, configuration, and documentation to develop a general design philosophy that transforms the IEC 61850 standard are addressed in this recommended practice, using this as a practical working implementation guide. A general overview of an IEC 61850 implementation is given in this recommended practice. Future work may develop more detail behind the topics presented herein.

Keywords: GOOSE, IEC 61850, IEEE 2030.100™, MMS, sample values, substation automation, SV

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Introduction

This introduction is not part of IEEE Std 2030.100™-2017, IEEE Recommended Practice for Implementing an IEC 61850-Based Substation Communications, Protection, Monitoring, and Control System.

This recommended practice is not intended to help equipment and software vendors in implementing the basic functions of IEC 61850 into their products, although they could use it to gain a perspective of how the end user may implement IEC 61850 with their products. This recommended practice is intended for the end user who is responsible for the planning and design of parts or all components of the IEC 61850 standard within a substation.

Due to the nature and scope of IEC 61850, this recommended practice may be broken into several related standards. This introduction standard is the first in that series of standards to be developed that will gain in detail covering a specific function within the standard.

Contents

IEEE Recommended Practice for Implementing an IEC 61850-Based Substation Communications, Protection, Monitoring, and Control System

1. Overview

1.1 Scope

This recommended practice outlines the necessary steps and procedures implementers of IEC 61850 in substations should undertake in a multi-vendor equipment environment.

It is not the intent of this recommended practice to change the IEC 61850 standard, but treats the standard as providing a set of tools engineers and integrators could use in substation protection, automation, and control systems.

1.2 IEC 61850 changes and additions

The IEC 61850 standard is a constantly evolving standard with plans to update existing parts with new editions and create additional parts to the standard. At the time of this publication the IEC 61850 documents listed in the bibliography (Annex B) were considered ([B10] through [B45]).[1]

1.3 Purpose

IEC 61850 has been promoted as an interoperability standard, but to date, interoperability among vendors has been achieved only at a communications level. When actually implementing the various substation functions, the user could be forced to change methods between vendors due to the flexibility and options provided for in IEC 61850. Additionally, IEC 61850 requires significant changes to the design, construction, and commissioning of a substation. Hard-wired signals are replaced by logical bits being communicated over Ethernet networks, documentation and naming conventions are distinctly different from existing substation practice, and device functionality could be assigned, and even migrate, in an operational environment. Users will also require a methodology to integrate IEC 61850 and non-IEC 61850 operational practices in their system as both approaches will have to exist side by side for many years. This recommended practice will provide a starting point for those users who would like to migrate to an IEC 61850 substation approach and

[1]The numbers in brackets correspond to those of the bibliography in Annex B.