

IEC61850

What is IEC 61850?

IEC 61850 is a standard that improves and defines a communication model for Intelligent Electronic Devices (IEDs) at electrical substations.

The need for the standard is a result of the growing complexity among today's substations. With equipment and devices on substations becoming more complex and intelligent, there is a need for these devices at the substation to talk and exchange data efficiently. The IEC 61850 protocol is a communication model that has been internationally standardized that allows for seamless communication among several devices on a substation.

The communication model is comprised of 10 parts as displayed in the table below.

Part	Title
1	Introduction and Overview
2	Glossary
3	General Requirements
4	System and Project Management
5	Communication Requirements for Functions and Device Models
6	Configuration Description Language for Communication in Electronic Substations Related to IEDs
7	Basic Communication Structure for Substation and Feeder Equipment
8	Specific Communication Service Mapping (to MMS and to Ethernet)
9	Specific Communication Service Mapping (from Sampled Values)
10	Conformance Testing



Brief Overview of the 10 parts that make up the IEC 61850 standard:

Part 1: Introduction and Overview

This part gives an overview of the IEC 61850 standard. It defines the communication of the devices (IEDs) within the substation system.

Part 2: Glossary

Includes the glossary of definitions used in substation automation that are standardized within the IEC 61850 protocol.

Part 3: General Requirements

This refers to the system requirements which include design and environmental conditions within the substation and also defines the communication between IED and substation.

Part 4: System and Project Management

This part refers to the system and project management in terms of the engineering process, and the life cycle of the system as well as the IEDs.

Part 5: Communication Requirements for functions and device models

This section describes the communication requirements between IED and substation and more specifically refers to the communication requirements of the functions being performed on the substation. The main goal of this part is to understand how to achieve interoperability in the power system among all different branded devices.

Part 6: Communication networks and systems for power utility automation

A configuration language for communication is specified for the data exchange between electrical substation and IEDs. System Configuration Language (SCL) is the defined language that is based XML (Extensible Mark up Language).

Part 7: Basic communication structure for substation and feeder equipment

Part 7 is the core concept of the IEC 61850 protocol and is divided into 4 sub-parts.

Part 7.1 – Principles and Models

This section provides an overview of the communication between the substation and the IEDs and gives a definition of how interoperability is achieved among devices. These models or concepts refer to information exchange between meter and substation, substation to substation, data exchange to different automation systems, etc.

Part 7.2 – Abstract Communication Service Interface

This part refers to ASCI (Abstract Communication Service Interface) communication for au-



tomation. ASCI is a client/server type of communication and is used for accessing real-time data, event reporting, file transfer, and logging data from the IED.

Part 7.3 – Common Data Classes

Outlines the common data classes related to substation applications. Some of the more common data classes that are related to substation applications include data classes for status information, measured data, status settings, and control settings. These definitions or data classes would be directly mapped to a specific protocol (i.e. GOOSE, MMS, etc).

Part 7.4 – Compatible Logic Node Classes and Data Classes

Specifies information models of devices and functions related to applications within the system for automation. More specifically the relationship between the logical nodes and data objects is outlined for communication among IEDs.

Part 8: Specific Communication Service Mapping (SCSM)

This section outlines a method of exchanging data through the local area network where MMS to Ethernet is mapped. The mapping allows for data exchange between all types of utility devices and includes real-time monitoring and control data.

Part 9: Specific Communication Service Mapping (SCSM)

This section specifies the communication service mapping for the transmission of sampled values. The SCSM includes three parts:

1. Specification of the communication stack used
2. Mapping of the abstract specifications (Part 7-2) to real elements within the data stack used
3. Carrying out the specification of functionality that is not being done by the stack used.

Part 10: Conformance Testing

This part outlines the standard techniques used for testing as well as specific measurement techniques that are applied.

How the protocol is used in the Acuvim II?

The Acuvim II+AXM-WEB2 supports the IEC 61850 standard where the protocol can be enabled in the https web server of the AXM-WEB2 communications module.

The communication between the meter and substation is called MMS (Manufacturing Messaging Specification) and is a client/server type of communication. The default MMS port is TCP port 102 which is what the Acuvim II meter will use to communicate via the IEC61850 protocol. If the system is not using default port 102, the port number can be configured from 10200-10299 via the meters



web server.

The CID file for the IEC61850 protocol is available from the meters web server. The CID (Configured IED Description) file is a file that has been configured to be used for a specific IED (Acuvim II in this case) with the IEC 61850 standard. The file contains all configurations for the IED and can be downloaded from the meters web server where users can view and edit the configuration file to their liking.

Users can utilize software that can support IEC61850 in order to read the data from the Acuvim II meter. Depending on the software being used, there will be many features and tools that allow users to analyze different aspects of the meter which include viewing IED device models, investigating client/server communication, and generating reports.

