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IEEE Standard for Phasor Data Concentrators for Power Systems

IEEE Power and Energy Society

Developed by the
Power System Relaying and Control Committee

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USA

IEEE Std C37.247™-2019

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Abstract: A phasor data concentrator (PDC) is defined in this standard as a set of functions that may be performed on synchrophasor data. It describes the PMU measurement network and indicates the place of the PDC in it. The standard defines the minimum functions that a PDC should perform. The performance requirements for these functions are given, and the ways they can be tested are described. Cybersecurity is discussed, and while its importance is acknowledged in the overall system, it is beyond the scope of this standard, which is viewed as specific to PDC functions.

Keywords: IEEE C37.247™, PDC, phasor data concentrator, phasor measurement, phasor measurement unit, PMU, synchrophasor

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Introduction

This introduction is not part of IEEE Std C37.247-2019, IEEE Standard for Phasor Data Concentrators for Power Systems.

The present version of this standard is the first. It is unlikely that the requirements addressed in this standard will remain unchanged for long. Like most IEEE standards, it is expected that revisions will be needed to keep the standard in line with emerging technology.

The standard establishes requirements for a phasor data concentrator (PDC). A PDC is part of a communication system that extends from a phasor measurement unit (PMU) to a data center or control room. An overview of such a PMU measurement system is included in Annex A. Such systems may transmit data in either direction. What might be called inbound data consist of the measurement results calculated at the PMU from the (usually three-phase) voltages and currents in the power system. Inbound data includes metadata indicating the origin of the results and the time at which they apply. Outbound data consist of settings and commands for the phasor measurement units.

A phasor data concentrator is a set of functions that combines PMU data from multiple sources for further processing. These functions may reside either in a standalone box, or as a software application on a server/computer.

The standard responds to other standards in terms of the format for the data. At present, IEEE Std C37.118.2™-2011 [B6] defines the method for the exchange of data. That standard is the latest in a series of IEEE standards that began in 1995 with IEEE Std 1344™ [B3] and has since been reaffirmed or revised about every five years. In the 2011 version, the topic of data transfer requirements was separated from that of measurement requirements, which became the subject of IEEE Std C37.118.1™-2011 and IEC/IEEE 60255-118-1:2018.

The functions that a PDC may perform are outlined in IEEE Std C37.244™-2013 [B8], IEEE Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring. The requirements for all functions that a PDC may perform are described. This standard builds on that guide. In writing this standard, the approach was taken that not every PDC must be able to perform all of the functions listed in the guide.

This standard indicates only the minimum set of functions that every PDC must perform and specifies performance requirements that every PDC must meet in doing so. Manufacturers are free (and indeed encouraged) to add a wider range of functions to their products as enhancements, recognizing that new functions and features will arise for processing PMU data.

Users may consider some of these enhancements as essential to their intended use. Such needs may vary from one user to the next. In this respect, users should assess their needs and specify additional functions and requirements as necessary.

Contents

IEEE Standard for Phasor Data Concentrators for Power Systems

1. Overview

This clause describes the scope, purpose, and the limitation of applicability of the IEEE Standard for Phasor Data Concentrators for Power Systems, hereafter referred to as "this standard."

1.1 Scope

This standard specifies the requirements of phasor data concentrators (PDCs) for power systems.

It includes the following requirements:

a) Data aggregation

b) Processing of synchrophasors and other synchronized data

c) Data interfaces with other systems

d) Handling of commands, configuration, and other metadata

e) Performance, including latency, environmental, throughput

f) Testing

1.2 Purpose

The purpose is to improve interoperability of devices, systems, and applications that use synchrophasors and other synchronized data by standardizing requirements for PDCs.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std C37.118.1™-2011, IEEE Standard for Synchrophasor Measurements for Power Systems.[1,2]

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