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Communication networks and systems for power utility automation

Part 9.3: Precision time protocol profile for power utility automation



AS IEC/IEEE 61850.9.3:2025

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Australian Energy Market Operator
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(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

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(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

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(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Standards Australia Committee EL-050, Power System Control and Communication.

The objective of this document is to specify a precision time protocol (PTP) profile of IEC 61588:2009 / IEEE Std 1588-2008 applicable to power utility automation, which allows compliance with the highest synchronization classes of AS IEC 61850.5:2025 and AS 61869.9:2021.

This document is identical to, and has been reproduced from, IEC/IEEE 61850-9-3:2016, *Communication networks and systems for power utility automation – Part 9-3: Precision time protocol profile for power utility automation*.

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FOREWORD

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International Standard IEC IEEE 61850-9-3 has been prepared by IEC Technical Committee 57, Power systems management and associated information exchange, in cooperation with IEC subcommittee 65C, Industrial networks, and with IEEE Power Systems Relaying Committee Working Group H24/Substation Committee Working Group C7, of the Power & Energy Society[1] of the IEEE, under the IEC/IEEE Dual Logo Agreement.

This standard cancels and replaces IEC/PAS 61850-9-3 published in 2015.

The text of this standard is based on the following IEC documents:

FDIS	Report on voting
57/1679/FDIS	57/1713/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

International standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61850 series, published under the general title *Communication networks and systems for power utility automation*, can be found on the IEC website.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

[1] A list of IEEE participants can be found at the following URL: http://standards.ieee.org/downloads/61850-9-3/61850-9-3-2016/61850-9-3-2016_wg-participants.pdf

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INTRODUCTION

General

This part of IEC 61850 specifies a precision time protocol (PTP) profile of IEC 61588:2009 ¦ IEEE Std 1588-2008 applicable to power utility automation, which allows compliance with the highest synchronization classes of IEC 61850-5 and IEC 61869-9.

This part of IEC 61850 applies Layer 2 communication according to IEC 61588:2009 ¦ IEEE Std 1588-2008, Annex F, and uses peer-to-peer delay measurement according to the default profile of IEC 61588:2009 ¦ IEEE Std 1588-2008, Annex J.4, with restricted range of values.

When clocks are singly attached, this profile is a subset of IEC 61588:2009 ¦ IEEE Std 1588-2008 with above restrictions.

When clocks are doubly attached, this profile extends the BMCA of IEC 61588:2009 ¦ IEEE Std 1588-2008 as IEC 62439-3:2016, Annex A, specifies.

NOTE IEC 62439-3:2016, Annex B is identical to this part of IEC 61850, except that doubly attached clocks are mandatory, while this part of IEC 61850 leaves them optional.

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Communication networks and systems for power utility automation

Part 9.3: Precision time protocol profile for power utility automation

1 Scope

This part of IEC 61850 specifies a precision time protocol (PTP) profile of IEC 61588:2009 ¦ IEEE Std 1588-2008 applicable to power utility automation, which allows compliance with the highest synchronization classes of IEC 61850-5 and IEC 61869-9.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61588:2009, *Precision clock synchronization protocol for networked measurement and control systems ¦ IEEE Std 1588-2008, IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems*[2]

IEC TR 61850-90-4:2013, *Communication networks and systems for power utility automation – Part 90-4: Network engineering guidelines*

IEC 62439-3:2016, *Industrial communication networks – High availability automation networks – Part 3: Parallel Redundancy Protocol (PRP) and High availability Seamless Redundancy (HSR)*

ISO/IEC 9646-7, *Open systems interconnection – Conformance testing methodology and framework – Part 7: Implementation conformance statements*

3 Terms, definitions, abbreviations, acronyms, and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61588:2009 ¦ IEEE Std 1588-2008 and IEC 62439-3:2016, as well as the following, apply:

3.1.1
device time inaccuracy
time inaccuracy evaluated or measured between the time signal at the input of a device and the time signal that this device generates

Note 1 to entry: This definition applies to TCs, BCs and media converters.

Note 2 to entry: Device time inaccuracy includes the uncertainties in the computation of the path delay assuming an ideal Pdelay_Resp from an upstream neighbour, and the uncertainty introduced in responding to an ideal Pdelay_Req from a downstream neighbour.

3.1.2
grandmaster-capable
ordinary clock or boundary clock that is able to take the role of a grandmaster

Note 1 to entry: A grandmaster-capable clock is not necessarily connected to a recognized standard time source.

[2] IEEE Std 1588-2008 was adopted as IEC 61588:2009.

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