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Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-3: Basic communication structure – Common data classes

FOREWORD

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This Consolidated version of IEC 61850-7-3 bears the edition number 2.1. It consists of the second edition (2010-12) [documents 57/1087/FDIS and 57/1085/RVD] and its amendment 1 (2020-02) [documents 57/2101/FDIS and 57/2132/RVD]. The technical content is identical to the base edition and its amendment.

International Standard IEC 61850-7-3 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This second edition cancels and replaces the first edition, published in 2003.

Compared to the first edition, this second edition:

- defines new common data classes used for new standards defining object models for other domains based on IEC 61850 and for the representation of statistical and historical data;
- provides clarifications and corrections to the first edition of IEC 61850-7-3;

Compared to the second edition, this first revision of the second edition:

a) provides clarifications and corrections to the second edition of IEC 61850-7-3, based on the tissues = { 690, 691, 692, 697, 698, 707, 709, 711, 722, 814, 816, 819, 832, 839, 846, 868, 887, 919, 924, 925, 926, 929, 953, 954, 962, 968, 996, 1078, 1079, 1122, 1127, 1184, 1187, 1189, 1220, 1233, 1240, 1242, 1247, 1253, 1265, 1270, 1311, 1372, 1387, 1388, 1403, 1430, 1438, 1578, 1581, 1598, 1602, 1623 };

b) includes semantic of attributes within tables in clauses 6 and 7 and thus removes the need for explicit semantic definition in Clause 8;

c) Clause 8 now contains definitions of newly introduced explicit enumerated types (with tables); this is fully backward compatible as the value of the literals have not changed;

d) some subclauses in clause 7 have different numbering because of introduction of some abstract types (that group common attributes for several concrete types);

e) first subclause under any CDC group in Clause 7, that contained the tables with applicable services with respect to functional constraints, have been removed; that information is explicitly defined in IEC 61850-7-2 with functional constraints, and temporarily included as Annex B, Functional constraints;

f) content of 6.2.7 and 6.2.8 has been moved to the normative Annex D of IEC 61850-7-2: Clarification on usage of quality;

g) implements extension introduced by IEC 62351-6 for security;

h) presence conditions have been redesigned and renamed to support their uniform usage in all of the IEC 61850-7-xxx series as necessary. Below is the table containing the old and the new presence conditions:

new	original	Notes
M	M	
O	O	
MOcond(condID)	Various C, C1, …	In IEC 61850-7-4
MFcond(condID)	Various C, C1, …	In IEC 61850-7-4
OFcond(condID)	Various C, C1, …	In IEC 61850-7-4
MFsubst	PICS_SUBST	
AtLeastOne(1)	GC_1	
AtMostOne	GC_1_EXCL	
AllOrNonePerGroup(n)	GC_2_n	
AllOnlyOneGroup(n)	GC_2_XOR_n	
MO(sibling)	GC_CON_attr	
MOln0	AC_LN0_M	
MFln0	AC_LN0_EX	
MOrootLD	C1 in CommonLN	
MOlnNs	AC_DLD_M	
MOdataNs	AC_DLN_M	
MOcdcNs	AC_DLNDA_M	
MFscaledAV	AC_SCAV	
MFscaledMagV	AC_SCAV	

new	original	Notes
MFscaledAngV	AC_SCAV	
MAllOrNonePerGroup(n)	AC_ST	
O	AC_CO_O	Documentation provided in ControllableCDC class.
	AC_SG_M	Split into explicit subtype, no need for presence condition.
	AC_SG_O	Split into explicit subtype, no need for presence condition.
	AC_SG_C1	Split into explicit subtype, no need for presence condition.
	AC_NSG_M	Split into explicit subtype, no need for presence condition.
	AC_NSG_O	Split into explicit subtype, no need for presence condition.
	AC_NSG_C1	Split into explicit subtype, no need for presence condition.
MOrms	AC_RMS_M	
O	AC_CLC_O	Eliminated presence condition on Vector.ang in favour of documenting the relevant DO (in IEC 61850-7-4).

Clauses 5 to 8 and their subclauses, replacement for Annex A, Annex B and XML enumerations from Annex D are automatically generated from the UML model.

This publication has been drafted in accordance with 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.

Contrary to usual IEC practice, for ease of use in this case, all tables and figures (including those which have been added since Edition 2) have been numbered consecutively in the amendment and the consolidated version.

This IEC standard includes Code Components i.e. components that are intended to be directly processed by a computer. Such content is any text found between the markers <CODE BEGINS> and <CODE ENDS>, or otherwise is clearly labeled in this standard as a Code Component. In the current version of this document, such indication is made at the beginning of each concerned top-level clauses

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If any updates are required to the published code component that needs to apply immediately and can not wait for an amendment (i.e. fixing a major problem), a new release of the Code Component will be issued and distributed through the IEC WebSite. Any new release of the Code Component related to this part will supersede any previously published Code Component including the one published within the current document.

This publication contains attached nsd files which compose the Code Component of this part. These files are intended to be used as a complement and do not form an integral part of this standard.

The committee has decided that the contents of the base publication and its amendment 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document is part of a set of specifications, that details layered substation communication architecture. This architecture has been chosen to provide abstract definitions of classes and services such that the specifications are independent of specific protocol stacks and objects. The mapping of these abstract classes and services to communication stacks is outside the scope of IEC 61850-7-x and may be found in IEC 61850-8-x (station bus) and IEC 61850-9-x (process bus).

IEC 61850-7-1 gives an overview of this communication architecture. This part of IEC 61850 defines constructed attributed classes and common data classes related to applications in the power system using IEC 61850 modeling concepts such as substations, hydro power or distributed energy resources. These common data classes are used in IEC 61850-7-4 to define compatible dataObject classes. The SubDataObjects, DataAttributes or SubAttributes of the instances of dataObject are accessed using services defined in IEC 61850-7-2.

This part of IEC 61850 is used to specify the abstract common data class and constructed attribute class definitions. These abstract definitions are mapped into concrete object definitions that are to be used for a particular protocol (for example MMS, ISO 9506 series).

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-3: Basic communication structure – Common data classes

1 Scope

1.1 General

This part of IEC 61850 specifies constructed attribute classes and common data classes related to substation applications. In particular, it specifies:

– common data classes for status information,
– common data classes for measured information,
– common data classes for control,
– common data classes for status settings,
– common data classes for analogue settings and
– attribute types used in these common data classes.

This International Standard is applicable to the description of device models and functions of substations and feeder equipment.

This International Standard may also be applied, for example, to describe device models and functions for:

– substation to substation information exchange,
– substation to control centre information exchange,
– power plant to control centre information exchange,
– information exchange for distributed generation, or
– information exchange for metering.

1.2 Namespace name and version

This new section is mandatory for any IEC 61850 namespace (as defined by IEC 61850-7-1:2011).

The parameters which are identifying this new release of this namespace are:

– Namespace Version: 2007
– Namespace Revision: B
– Namespace name: “IEC 61850-7-3:2007B”
– Namespace release: 3
– Namespace release date: 2019-10-02

IEC 61850-7-3 depends on IEC 61850-7-2:2007B latest release.

The table below provides an overview of all published versions of this namespace.

Edition	Publication date	Webstore	Namespace
Edition 1.0	2003-05	IEC 61850-7-3:2003	IEC 61850-7-3:2003
Edition 2.0	2010-12	IEC 61850-7-3:2010	IEC 61850-7-3:2007
Amendment 1 of Edition 2.0	2020-02	IEC 61850-7-3:2010/AMD1:2020	IEC 61850-7-3:2007B
Edition 2.1	2020-02	IEC 61850-7-3:2010+AMD1:2020 CSV	IEC 61850-7-3:2007B

1.3 Code Component distribution

The Code Component will be available in light and full version:

– Full version will contain definition of the whole LNs defined in this standard with the documentation associated and access will be restricted to purchaser of this part.
– Light version will not contain the documentation but will contain the whole definition of the LNs as per full version, and this light version will be freely accessible on the IEC website for download, but the usage remains under the licensing conditions.

The link for downloading the light version of this code component is:

http://www.iec.ch/public/TC57/supportdocuments/IEC_61850-7-3.NSD.2007B3.light.zip

The Code Components for IEC 61850 data models (like basic types, presence conditions, … definition in this IEC standard) are available as the file format NSD defined by IEC 61850-7-7.

The Code Component(s) included in this IEC standard are potentially subject to maintenance works and user shall select the latest release in the repository located at:

http://www.iec.ch/TC57/supportdocuments

The latest version/release of the document will be found by selecting the file IEC_61850-7-3.NSD.{VersionStateInfo}.light.zip with the filed VersionStateInfo of the highest value.

Each Code Component is a ZIP package containing the electronic representation of the Code Component itself, with a file describing the content of the package (IECManifest.xml).

The IECManifest contains different sections giving information on:

– The copyright notice
– The identification of the code component
– The publication related to the code component
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– An optional list of history files to track changes during the evolution process of the code component

The life cycle of a code component is not restricted to the life cycle of the related publication. The publication life cycle goes through two stages, Version (corresponding to an edition) and Revision (corresponding to an amendment). A third publication stage (Release) allows publication of Code Component without need to publish an amendment.

This is useful when InterOp Tissues need to be fixed. Then a new release of the Code Component will be released, which supersedes the previous release, and distributed through the IEC TC57 web site.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60255-151:2009, *Measuring relays and protection equipment - Part 151: Functional requirements for over/under current protection*

IEC TS 61850-2, *Communication networks and systems for power utility automation - Part 2: Glossary*

IEC 61850-7-1, *Communication networks and systems for power utility automation - Part 7-1: Basic communication structure - Principles and models*

IEC 61850-7-2, *Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)*

IEC 61850-7-4, *Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes*

IEC TS 61850-7-7, *Communication networks and systems for power utility automation - Part 7-7: Machine-processable format of IEC 61850-related data models for tools*

IEC TS 62351-6:–, *Power systems management and associated information exchange data and communication security – Part 6: Security for IEC 61850*[1]

IEC/IEEE 60255-118-1, *Measuring relays and protection equipment – Part 118-1: Synchrophasor for power systems – Measurements*

ISO 4217, *Codes for the representation of currencies and funds*

[1] Under preparation. Stage at the time of publication: IEC/PRVC 62351-6:2020.