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TECHNICAL REPORT

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Communication networks and systems for power utility automation – Part 7-6: Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-6: Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

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IEC TR 61850 has been prepared by IEC technical committee 57: Power systems management and associated information exchange. It is a Technical Report.

This second edition cancels and replaces the first edition published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) New Clause 5 added to describe the way to express Basic Application Profile in SCL files;
b) New Annex F and Annex G added to list specific use cases and roles of the Concept Definition Tool.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
57/2710/DTR	57/2735/RVDTR

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

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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.

NOTE The following print types are used:

Element and attribute types: in italic type.

This IEC technical report includes Code Components i.e. components that are intended to be directly processed by a computer. In this technical report, the code component includes all specifications of the XSD schema as well as all SCL examples.

The purchase of this IEC technical report carries a copyright license for the purchaser to sell software containing Code Components from this technical report to end users either directly or via distributors, subject to IEC software licensing conditions, which can be found at: http://www.iec.ch/CCv1.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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

The IEC 61850 series of standards offers a broad basis for communication networks and systems in power utility automation. Due to its broad coverage of power utility automation applications, it is up to the standard's user (utility, vendor, system integrator, etc.) to pick and choose specific options from the standard in order to meet the requirements of the intended objective. As a consequence, implementations of IEC 61850 represent specific subsets of the standard.

In the context of standards, the term "profile" is commonly used to describe a subset of an entity (e.g. standard, model, rules).

Accordingly, an IEC 61850 standard profile contains a selection of data models (mandatory elements), applicable communication services and relevant engineering conventions (based on the Substation Configuration Language SCL defined in IEC 61850-6) for an application function of a specific use case in the domain of power utility automation.

Depending on the scope and objective different profile types can be distinguished:

- User profile – defined subset that is valid for a specific user / organization (e.g. utility)
- Product / device profile – implemented subset in a specific vendor product / device
- Domain profile – defined subset for a specific domain and relevant use cases (e.g. monitoring of substation)
- Application / function profile – subset covering a specific application or function (e.g. substation interlocking)

These profile types target the reduction of complexity and facilitation of interoperability for their specific scope and during engineering and device / substation lifetime. In order to achieve both these goals, a properly defined profile and appropriate implementations (processes, tools, products) that support the profile are required.

This Technical Report was first published in 2019, to cover the methodology for profiling Basic Application Profile. The text of the first edition of the Technical Report is based on the following documents:

Draft TR	Report on voting
57/1986/DTR	57/2034/RVDTR

A request for revision of the Technical Report was circulated in 2022, in order to add information about machine processable Basic Application Profiles, described in SCL.

Revision Request	Report on voting
57/2475/DC	57/2493/INF

This document related to the second edition of the Technical Report, prepared, and circulated as a CD in 2023. Clauses 1, 2, 3 and 4 are taken from the first edition of the Technical Report (IEC 61850-7-6:2019) and reproduced here without modifications. A new clause (5) has been added to describe the way to express the Basic Application Profile in SCL files. Specific use cases and roles of the Concept Definition Tool are added in Annex G in relation with this new clause.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-6: Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

1 Scope

1.1 General

This part of IEC 61850, which is a Technical Report, is focused on building application / function profiles and specifies a methodology to define Basic Application Profiles (BAPs), in textual documents (edition 1, 2019) or in a machine processable SCL format (current edition). These Basic Application Profiles provide a framework for interoperable interaction within or between typical substation automation functions. BAPs are intended to define a subset of features of IEC 61850 in order to facilitate interoperability in a modular way in practical applications.

It is the intention of this document to provide a common and generic way to describe the functional behavior of a specific application function in the domain of power utility automation systems as a common denominator of various possible interpretations/implementations of using IEC 61850.

The guidelines in this document are based on the functional definitions of:

- IEC 61850-5, *Communication requirements for functions and device models*, which gives a comprehensive overview of all application functions needed in a state-of-the-art substation automation implementation.
- IEC TR 61850-7-500, *Basic information and communication structure – Use of logical nodes for modelling application functions and related concepts and guidelines for substations*, which illustrates and explains application functions for the substation/protection domain of Logical Nodes in modelling simple and complex functions, to improve common understanding in modelling and data exchange, and finally to lead to interoperable implementations.
- IEC TR 61850-90-3, *Using IEC 61850 for condition monitoring diagnosis and analysis*, which gives use cases and data modelling for condition monitoring diagnosis and analysis functions for substation and power grid facilities.
- IEC TR 61850-90-30, *IEC 61850 Function Modelling in SCL*, which describes extensions of the SCL Substation/Process Section allowing to create a comprehensive, IED and hardware independent specification of an IEC 61850 based power system.

This document does not describe the applications and respective implementation requirements; the focus is on their typical information exchange including data and communication services and engineering conventions.

1.2 Published versions of the standard and related namespace names

This technical report defines an SCL namespace extension. This allows the addition of these extensions to existing SCL files without requiring a new SCL schema release. They will be included in a future SCL release.

This technical report also defines ASD examples of files showing the possibilities offered by this new document. The content of the examples is defined in the code component 2024A1.

The SCL namespace extension is defined under IEC 61850-6-100 identifier which is a common extension between this document and TR IEC 61850-90-30:—[1].

Table 1 provides a reference between all published editions, amendments or corrigenda of this document and the full name of the namespace.

Table 1 – Reference between published versions of the standard and related namespace name

Edition	Publication date	Webstore	Namespace
Edition 1.0	2019-01	IEC 61850-7-6:2019	NA
Edition 2.0	2024	IEC 61850-7-6:2022	IEC 61850-6-100:2019C1

1.3 Identification of the code components

1.3.1 General

The namespace associated with this document is an XML schema (XSD) for an extension to the System Configuration Language (SCL) as defined in IEC 61850-6.

1.3.2 IEC 61850-6-100 XML namespace

The namespace associated with this document is an XML schema (XSD) for an extension to the System Configuration Language (SCL) as defined in IEC 61850-6. The parameters which identify the namespace are provided in Table 2:

Table 2 – Attributes of the IEC 61850-6-100:2019C1 XML namespace

Attribute	Content
Namespace nameplate	
Namespace Identifier (xmlns)	http://www.iec.ch/61850/2019/SCL/6-100
Version	2019
Revision	C
Release	1
XSD version header attribute	2019C1
Recommended reference name	eIEC61850-6-100
CodeComponentName	IEC_61850-6-100.XSD.2019C1.Full
Namespace dependencies	
includes	http://www.iec.ch/61850/2003/SCL version: 2007 revision: C release: 5

1.3.3 IEC 61850-7-6 ASD example

The example associated with this document is an SCL file (ASD) example based on IEC 61850-6-100 2019C1 and IEC 61850-6 2007C5. The parameters which identify the example are provided in Table 3:

[1] Under preparation. Stage at the time of publication: IEC/RDTR 61850-90-30:2024.

Table 3 – Attributes of the IEC 61850-7-6 ASD example

Attribute	Content
Example nameplate	
Version	2024
Revision	A
Release	1
Code Component Name	IEC_61850-7-6.ASD.2024A1.Full
Example dependencies	
includes	http://www.iec.ch/61850/2003/SCL version: 2007 revision: C release: 5
includes	http://www.iec.ch/61850/2019/SCL/6-100 version: 2019 revision: C release: 1

1.4 Code Component distribution

1.4.1 General

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 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 in case of urgent fixes of InterOp Tissues, thus without need to publish an amendment.

Consequently, new releases of the Code Component may be released, which supersedes the previous release, and will be distributed through the IEC TC57 web site at:

https://www.iec.ch/tc57/supportdocuments

1.4.2 SCL extension namespace code component

The latest version/release of the document will be found by selecting the file for the code component with the highest value for VersionStateInfo, e.g. IEC_61850-6-100.XSD.{VersionStateInfo}.full.zip.

The code component associated to this TR is an XML schema file (XSD). It is available as a full version only. It is freely accessible on the IEC website for download at http://www.iec.ch/tc57/supportdocuments, but the usage remains under the licensing conditions.

In case of any differences between the downloadable code and the IEC pdf published content, the downloadable code component is the valid one; it may be subject to updates. See history files.

1.4.3 ASD example code component

The latest version/release of the ASD examples will be found by selecting the file for the code component with the highest value for VersionStateInfo, e.g. IEC_61850-7-6.ASD.{VersionStateInfo}.full.zip.

The code component associated to this TR is a list of examples packages as ZIP file used as informative. It is available as a full version only. It is freely accessible on the IEC website for download at http://www.iec.ch/tc57/supportdocuments, but the usage remains under the licensing conditions.

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 61131 (all parts), *Programmable controllers*

IEC 61850-5:2013, *Communication networks and systems for power utility automation – Part 5: Communication requirements for functions and device models*

IEC 61850-6:2009, *Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substations related to IEDs*
IEC 61850-6:2009/AMD2:2024

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 TR 61850-90-30:2024, *Communication networks and systems for power utility automation – Part 90-30: Guideline for function modelling in SCL for substation automation*

IEC TR 62361-103:2018, *Power systems management and associated information exchange – Interoperability in the long term – Part 103: Standard profiling*

IEC TR 62390:2005, *Common automation device – Profile guideline*