PD IEC TS 61850-6-3:2025

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Communication networks and systems for power utility automation

Part 6-3: Format of machine-processable rules for validation of IEC 61850 XML-based files

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Communication networks and systems for power utility automation - Part 6-3: Format of machine-processable rules for validation of IEC 61850 XML-based files

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IEC TS 61850-6-3 has been prepared by IEC technical committee TC 57: Power systems management and associated information exchange. It is a Technical Specification.

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

Draft	Report on voting
57/2765/DTS	57/2795/RVDTS

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 Specification is English.

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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:

- *italic type represents elements that are defined in the SCL language* (see IEC 61850-6);
- green font is used for explanatory text.

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INTRODUCTION

In order to improve the interoperability of IEC 61850 XML-based files, particularly SCL files (which are key for an efficient specification and engineering process), this Technical Specification describes how to use and define formal rules, in a machine-processable format: OCL. The OCL language (Object Constraint Language), defined by Object Management Group (OMG) is a declarative language describing rules applying to Unified Modeling Language (UML) models, and is now part of the UML standard. It allows the description of constraints, much more precisely than XML schemas, as constraints depending on the value of elements and attributes can be defined.

Many requirements and recommendations that are written as text in the IEC 61850 documents could be formally transcribed in OCL rules, limiting the interpretation bias, and enabling an exhaustive validation of every XML-based files, particularly SCL files, that are exchanged during the specification and engineering process.

For example, the SCL language is used in different contexts: to describe the capabilities of IEDs, to describe specifications, or configurations. Dedicated rules can be defined for every case, as constraints might differ, ending with a specific set of rules for ICD files, another one for SCD files.

IEC 61850-6 specifies the System Configuration description Language (SCL), which is used to describe system specifications, system configurations, IED configurations and communication configurations. SCL files are serialized in XML. An XML schema is provided as a code component of IEC 61850-6, in order to define the structure of the SCL files in a machine-processable format. The XML schema enables some first level validations and the OCL rules complete them.

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1 Scope

1.1 General

In order to improve the interoperability of IEC 61850 XML-based files, particularly SCL files (which are key for an efficient specification and engineering process), this part of IEC 61850, which is a Technical Specification, describes how to use and define formal rules, in a machine-processable format: OCL, that can be imported and interpreted by tools.

The following main use cases are supported:

– Validate SCL files at every stage of the specification and engineering process;
– Verify the conformity of a SCL file after completion of the upgrading/downgrading rules;
– Extend standard OCL rules with private OCL rules

The purpose of this document is limited to the publication of the format and method to write correct and structured rules. The rules themselves are published as code components of the corresponding IEC 61850 parts.

1.2 Published versions of the standard and related namespace names

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

Edition	Publication date	Webstore	Namespace
Edition 1.0	2024-xx	IEC 61850-6-3:2024	IEC 61850-6-3:2022A

1.3 Identification of the namespace

The namespace associated with this document is an OCL format to be used by other documents related to IEC 61850 SCL or other users to define their rules. The parameters which identify the namespace are provided in Table 1:

Table 1 – Attributes of the IEC 61850-6-3 OCL namespace

Attribute	Content
Namespace nameplate	
Version	2022
Revision	A
Release	1 (not indicated in the namespace identifier)
XSD version header attribute	2022A

There is no description of this namespace other than the OCL format specification provided by OMG indicated in Clause 2 of this document.

1.4 Code component distribution

This TS has no code component. This namespace will not be distributed with this document, but with the different documents that will contain OCL rules.

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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 TS 61850-2, *Communication networks and systems in substations – Part 2: Glossary*

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

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 61850-80-5, *Communication networks and systems for power utility automation – Part 80-5: Guideline for mapping information between IEC 61850 and IEC 61158-15*

OCL, *OMG® Specification: Object Constraint Language™* (https://www.omg.org/spec/OCL)

UML, *OMG® specification: Unified Modeling Language® (OMG UML®)* (https://www.omg.org/spec/UML)

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.2 Abbreviated terms

In general, the glossary and abbreviations defined in IEC 61850-2 apply. The following abbreviations are either exclusive to this standard or particularly useful for understanding this standard and are repeated here for convenience.

FVT File Validation Tool

NSD Name Space Definition

OCL Object Constraint Language

SCL System Configuration description Language (defined in IEC 61850-6)

UML Unified Modeling Language (https://www.omg.org/spec/UML)

XML Extensible Markup Language (https://www.w3.org/TR/xml/)

XSD XML Schema Definition (https://www.w3.org/TR/xmlschema-0/)

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4 Use of OCL (machine processable rules) in the specification and engineering process

A new role is introduced in the IEC 61850 specification and engineering process: SCL File validator, which consists in validating a SCL file produced by a tool during the specification or engineering process.

This role can be implemented by different type of tools, as shown in Figure 1:

– **System Specificator (SST):** IED independent system level tool that shall be able to import or export specification files defined by IEC 61850-6.
– **System Configurator (SCT):** IED independent system level tool that shall be able to import or export configuration files defined by IEC 61850-6.
– **IED Configurator (ICT):** manufacturer-specific, may be even IED-specific, tool that shall be able to import or export the files defined by IEC 61850-6.
– **SCL File validator (FVT: file validation Tool):** IED independent system level tool that can validate SCL files during all phases of the specification and engineering process.

  This tool uses XSD validation (mandatory), and optionally OCL rules and even private hardcoded rules, to check SCL files exchanged during the specification and engineering process.

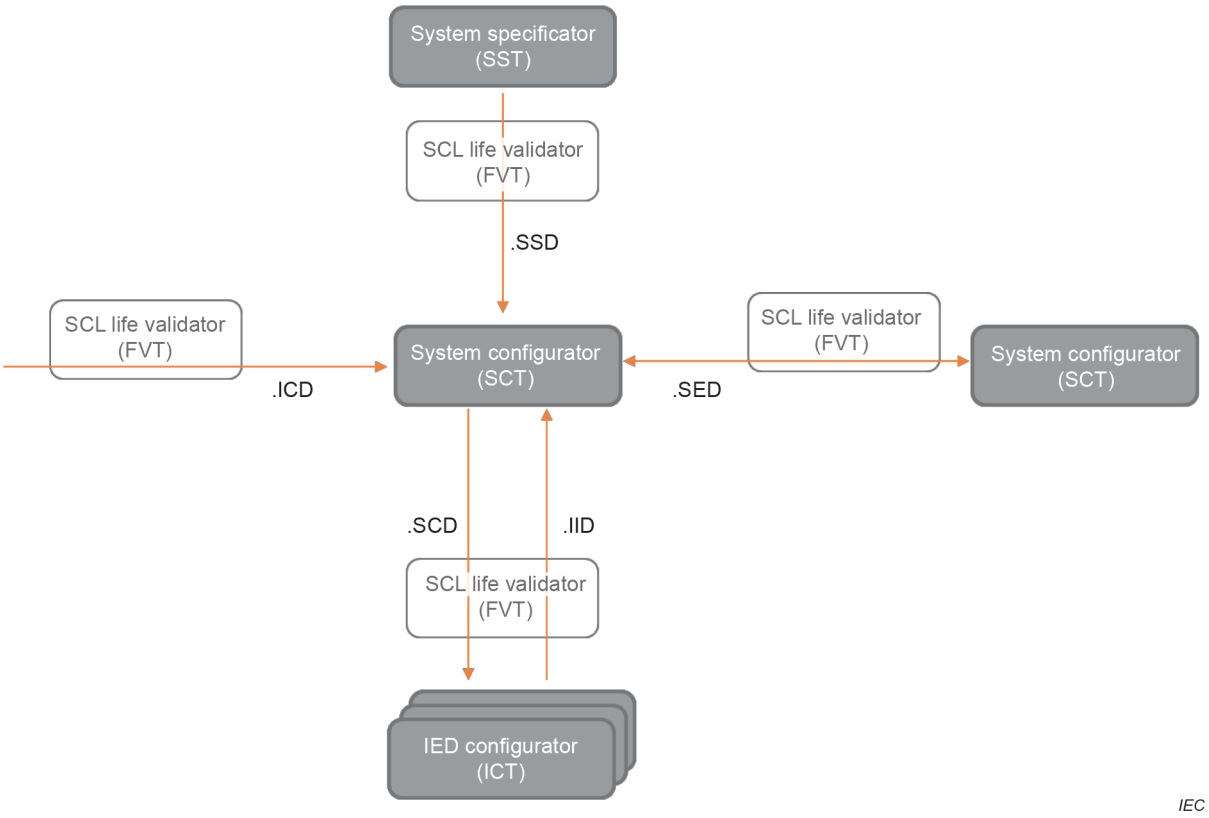

Figure 1 – Information flow in the configuration process, including SCL File validator tool

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