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Communication networks and systems for power utility automation – Part 7-5: IEC 61850 Modelling concepts

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CONTENTS

CONTENTS 2
FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms, definitions and abbreviated terms 8
3.1 Terms and definitions 8
3.2 Abbreviated terms 8
4 Control 8
4.1 Control authorization 8
4.1.1 Basics 8
4.1.2 Validating a control request 9
4.1.3 Exclusive control authorization for one out of multiple actors of the same level of control hierarchy 12
4.1.4 Different control permissions for different actors of the same level of control hierarchy 13
4.2 Control authority for process equipment 13
4.2.1 Control commands for process equipment from automations instead of HMI 13
5 Quality and its propagation 15
5.1 Standard processing principle 15
5.1.1 General 15
5.1.2 Respecting behaviour 15
5.1.3 LN specific calculations 16
5.1.4 detailQual is not propagated 16
5.1.5 Configurable propagation of the value of the element ‘source’ 16
5.1.6 operatorBlocked is not propagated 16
5.2 Special processing principle for (single phase) XCBR mapping to CSWI 16
5.2.1 General 16
5.2.2 Respecting the Behaviour 18
5.2.3 LN specific calculations 18
5.2.4 Propagation of detailQual 18
5.2.5 Substitution of switchgear position signals 18
5.2.6 operatorBlocked is not propagated 19
5.3 Conclusion 19
6 Health and its application 20
6.1 General 20
6.2 The use of LPHD.PhyHealth, LLN0.Health, LN.Health and LN.EEHealth 20
6.3 Health in Proxy-IEDs, in LNs of type Mirror and in a LD hierarchy 22
7 Special functions 24
7.1 Use of cross domain schedules and scheduler 24
7.1.1 Introduction 24
7.1.2 Example 1 25
7.1.3 Example 2 28
8 Restoration of functions/communication after IED restart (power cycle) 31
8.1 Functional description 31

8.2 Priorities 31
8.3 Stored and non-stored data 31
Bibliography 33

Figure 1 – Communication vs. application layer model for controls 9
Figure 2 – Different levels of control authority (example) 12
Figure 3 – Single-phase monitoring of the CB position 17
Figure 4 – Examples of use of Health and EEHealth in models 23
Figure 5 – FSCH and FSCC LN class 24
Figure 6 – State Machine 25
Figure 7 – Relation between schedule controller, schedules and entity scheduled 25
Figure 8 – Use case charging architecture 26
Figure 9 – LN instances and relationships in example 1 27
Figure 10 – Timelines associated to the example 1 27
Figure 11 – LN instances and relationships in example 2 28
Figure 12 – Timelines associated to the example 2 30

Table 1 – Dependence of checking Interlocking (IL) conditions on the control command and on the server configuration 10
Table 2 – Dependence of checking synchronism (CS) conditions on the control command and on the server configuration 11
Table 3 – Use case 1 definition 14
Table 4 – Example of fixed rules: Boolean OR out of two input signals 19
Table 5 – Health in IEC 61850-7-4 21
Table 6 – Examples for stored and non-stored data for restart 32

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-5: IEC 61850 Modelling concepts

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IEC TR 61850-7-5 has been prepared by Working Group 10 of IEC Technical Committee 57: Power systems management and associated information exchange. It is a Technical Report.

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

DTR	Report on voting
57/2253/DTR	57/2322/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/standardsdev/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.

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

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INTRODUCTION

The IEC 61850 standard series provides a very broad range of data models covering as much as possible all application functions in the range of power utility automation. The modelling both in the domains and between the domains show differences which may impact interoperability. Therefore, some informative guidelines are helpful to reach a common approach in application function modelling. A lot of basic functionality is based on the concept of IEC 61850 and is, therefore, the same for all application domains. As result, a basic cross-domain part in the form of a Technical Report is useful. Domain specific issues are addressed in the Technical Reports IEC TR 61850-7-5xx (e.g. IEC TR 61850-7-500 for substation automation).

To cover all domains in a comprehensive way would not come to a result in a reasonable time. This may be a task for future editions of this document. Therefore, this document describes in selected examples the use of logical nodes for modelling application functions and related concepts and guidelines in general independently from any application domain respectively valid for all application domains in the utility automation (substation automation, distributed energy resources, hydro power, wind power, etc.). It also includes some tutorial material where helpful.

The modelling of the use cases given in this document is based on the class model introduced in IEC 61850-7-1. The logical node and data names used in this document are defined in IEC 61850-7-4 and IEC 61850-7-3, the services applied in IEC 61850-7-2. If needed for the understanding of modelling these use cases, the application of services is also described. If different options cannot be excluded, all options may be mentioned.

If extensions are needed in the use cases, the normative naming rules for multiple instances and private, compatible extensions of Logical Node (LN) Classes and Data Object (DO) Names defined in IEC 61850-7-1 are considered.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-5: IEC 61850 Modelling concepts

1 Scope

This part of IEC 61850, which is a technical report, establishes modelling concepts that help the user to understand how to apply the models defined in IEC 61850-7-4 and IEC 61850-7-3 to implement practical applications.

This document provides the basic concepts that are valid for all application domains using IEC 61850. Domain specific concepts are defined in other technical reports as in the document range of IEC 61850-7-5xx; as an example, IEC 61850-7-500 describes modelling concepts for functions related to substation automation.

On one side the number of potential topics for cross-domain modelling may be very high but on the other side it may be limited by domain specific restrictions often created by the historical evolution of IEC 61850 in the domains.

The first topic selected is the common control of power utility primary objects by means of the power utility automation systems based mainly on the long experience in substation automation systems. Common attributes for reliable power utility automation systems in all domains are quality and health. A special function having a broad application range in power utility automation systems is the scheduling of services as provided by the domain distributed energy resources (DER) used in smart grids, especially also for electric mobility. Not yet so much discussed in the context of IEC 61850 but very important for all IEDs is the impact of restart (power cycle) on the data model parameters. Non-agreed behaviour will raise problems for interoperability in multi-vendor systems.

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 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 61850-7-2:2010, *Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)*
IEC 61850-7-2:2010/AMD1:2020

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes*
IEC 61850-7-4:2010/AMD1:2020

IEC TR 61850-7-500, *Communication networks and systems for power utility automation - Part 7-500: Basic information and communication structure - Use of logical nodes for modeling application functions and related concepts and guidelines for substations*

IEC 61850-8-1, *Communication networks and systems for power utility automation - Part 8-1: Specific communication service mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3*

IEC 61850-8-2, *Communication networks and systems for power utility automation - Part 8-2: Specific communication service mapping (SCSM) - Mapping to Extensible Messaging Presence Protocol (XMPP)*

IEC TR 61850-90-2, *Communication networks and systems for power utility automation - Part 90-2: Using IEC 61850 for communication between substations and control centres*

IEC TR 61850-90-8, *Communication networks and systems for power utility automation - Part 90-8: Object model for E-mobility*

IEC 62351, *Power systems management and associated information exchange – Data and communications security* (all parts)