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

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CONTENTS

FOREWORD 12
INTRODUCTION 15
1 Scope 16
1.1 General 16
1.2 Namespace name and version 16
1.3 Code Component distribution 17
2 Normative references 17
3 Terms and definitions 18
4 Abbreviated terms 19
5 ACSI overview and basic concepts 20
5.1 Conceptual model of IEC 61850 20
5.2 The meta-meta model 21
5.3 The meta model 21
5.3.1 General 21
5.3.2 Information modelling classes 21
5.3.3 Information exchange modelling classes 22
5.3.4 Relations between classes 25
5.4 The domain type model 26
5.5 The data instance model 26
5.6 Conditions for element presence 27
5.7 Functional constraints (FcKind) 29
5.8 Trigger options 32
6 Type definition 32
6.1 General 32
6.2 Data model types 35
6.2.1 General 35
6.2.2 Basic types 35
6.2.3 Domain types (general) 36
6.2.4 Domain types (enumerated) 47
6.2.5 Domain types (coded enumerated) 51
6.3 ACSI – service parameter types 53
6.3.1 General 53
6.3.2 Basic types 53
6.3.3 Domain types 53
6.3.4 ACSI enumerated types 54
7 GenServerClass model 55
7.1 GenServerClass definition 55
7.2 Server class services 56
7.2.1 Overview of directory and GetDefinition services 56
7.2.2 GetServerDirectory 56
8 Application association model 57
8.1 Introduction 57
8.2 Concept of application associations 57
8.3 TWO-PARTY-APPLICATION-ASSOCIATION (TPAA) class model 58
8.3.1 TWO-PARTY-APPLICATION-ASSOCIATION (TPAA) class definition 58

8.3.2 Two-party application association services 59
8.4 MULTICAST-APPLICATION-ASSOCIATION (MCAA) class 62
9 GenLogicalDeviceClass model 62
9.1 GenLogicalDeviceClass definition 62
9.2 GenLogicalDeviceClass services 63
10 GenLogicalNodeClass model 63
10.1 GenLogicalNodeClass definition 63
10.1.1 GenLogicalNodeClass diagram 63
10.1.2 GenLogicalNodeClass attributes 64
10.2 GenLogicalNodeClass services 65
10.2.1 Overview 65
10.2.2 GetLogicalNodeDirectory 66
10.2.3 GetAllDataValues 66
11 Generic data object class model 67
11.1 GenDataObjectClass diagram 67
11.2 GenDataObjectClass syntax 68
11.3 GenDataObjectClass services 69
11.3.1 General definitions and overview 69
11.3.2 GetDataValues 70
11.3.3 SetDataValues 71
11.3.4 GetDataDirectory 71
11.3.5 GetDataDefinition 72
12 Generic common data class model 73
12.1 General 73
12.2 GenCommonDataClass 73
12.2.1 GenCommonDataClass diagram 73
12.2.2 GenCommonDataClass syntax 73
12.3 GenDataAttributeClass 74
12.3.1 GenDataAttributeClass diagram 74
12.3.2 GenDataAttributeClass syntax 75
12.3.3 Details of some GenDataAttributeClass attributes 76
12.4 GenConstructedAttributeClass 77
12.4.1 GenConstructedAttributeClass diagram 77
12.4.2 GenConstructedAttributeClass syntax 78
12.5 GenSubDataAttributeClass 78
12.5.1 SubDataAttributeClass diagram 78
12.5.2 SubDataAttributeClass syntax 78
12.6 Referencing data objects and their components 78
12.6.1 General 78
12.6.2 Reference syntax 79
12.6.3 Base types and their relation 79
12.6.4 Example of using references 80
13 DATA-SET class model 81
13.1 General 81
13.2 DATA-SET class definition 82
13.2.1 DATA-SET class syntax 82
13.2.2 DATA-SET class attributes 83
13.3 DATA-SET class services 84

13.3.1 Overview 84
13.3.2 GetDataSetValues 84
13.3.3 SetDataSetValues 84
13.3.4 CreateDataSet 85
13.3.5 DeleteDataSet 86
13.3.6 GetDataSetDirectory 86
14 Service tracking 86
14.1 General service tracking 86
14.2 Control block service tracking 87
14.3 Control service tracking 88
15 Modelling of control block classes 89
15.1 General 89
15.2 Control block class models 89
16 SETTING-GROUP-CONTROL-BLOCK class model 89
16.1 General 89
16.2 SGCB class definition 91
16.3 SGCB class services 92
16.3.1 Overview 92
16.3.2 SelectActiveSG 92
16.3.3 SelectEditSG 93
16.3.4 SetEditSGValue 94
16.3.5 ConfirmEditSGValues 94
16.3.6 GetEditSGValue 95
16.3.7 GetSGCBValues 96
17 REPORT-CONTROL-BLOCK and LOG-CONTROL-BLOCK class models 96
17.1 Overview 96
17.2 REPORT-CONTROL-BLOCK class model 98
17.2.1 Basic concepts 98
17.2.2 BUFFERED-REPORT-CONTROL-BLOCK (BRCB) class definition 98
17.2.3 BRCB class services 109
17.2.4 UNBUFFERED-REPORT-CONTROL-BLOCK (URCB) class definition 119
17.2.5 URCB class services 121
17.3 LOG-CONTROL-BLOCK class model 122
17.3.1 General 122
17.3.2 LCB class definition 123
17.3.3 LCB services 124
17.3.4 LOG class definition 126
17.3.5 Reason code for log entries 128
17.3.6 LOG services 128
18 Generic substation event class model (GSE) 130
18.1 Overview 130
18.2 GOOSE-CONTROL-BLOCK (GoCB) class 131
18.2.1 GoCB definition 131
18.2.2 GOOSE service definitions 133
18.2.3 Generic object oriented substation event (GOOSE) message 135
19 Transmission of sampled value class model 136
19.1 Overview 136
19.2 Transmission of sampled values using multicast 138

19.2.1 General 138
19.2.2 MSVCB class definition 138
19.2.3 MSVCB class services 139
19.3 Transmission of sampled values using unicast 142
19.3.1 General 142
19.3.2 USVCB class definition 142
19.3.3 USVCB services 144
19.4 Sampled value format 146
20 CONTROL class model 148
20.1 General 148
20.2 Control with normal security 150
20.2.1 General 150
20.2.2 Direct control with normal security 151
20.2.3 SBO control with normal security 154
20.3 Control with enhanced security 157
20.3.1 General 157
20.3.2 Direct control with enhanced security 157
20.3.3 SBO control with enhanced security 159
20.4 Time-activated operate 163
20.5 CONTROL class service definitions 164
20.5.1 Overview 164
20.5.2 Service parameter definition 165
20.5.3 Service specification 165
21 Time and time-synchronization model 170
21.1 General 170
21.2 Information requirements 171
22 Naming conventions 172
22.1 Class naming and class specializations 172
22.2 Referencing an instance of a class 173
22.3 Scopes in IEC 61850 174
23 File transfer model 174
23.1 File class 174
23.2 File services 175
23.2.1 Overview 175
23.2.2 GetFile 175
23.2.3 SetFile 176
23.2.4 DeleteFile 176
23.2.5 GetFileAttributeValues 177
Annex A (normative) ACSI conformance statement 178
A.1 General 178
A.2 ACSI basic conformance statement 178
A.3 ACSI models conformance statement 179
A.4 ACSI service conformance statement 182
Annex B (normative) SCL enumerations 186
Annex C (informative) Generic substation state event (GSSE) control block (GsCB) 187
C.1 General 187
C.2 GsCB class definition 187
C.3 Generic substation state event (GSSE) control block class attributes 188

C.3.1 GsCBName – GSSE control name 188
C.3.2 GsCBRef – GSSE control reference 188
C.3.3 GsEna – GSSE enable 188
C.3.4 GsID – GSSE identification 188
C.3.5 DataLabel [1..n] 189
C.3.6 LSentData [1..n] – last sent data values 189
C.3.7 DstAddress 189
C.4 GSSE service definitions 189
C.4.1 Overview 189
C.4.2 SendGSSEMessage 189
Annex D (normative) Clarification on usage of quality 196
D.1 Relation of the detailed quality identifiers with invalid or questionable quality 196
D.2 Quality in the client server context 196
D.3 Relation between quality identifiers 197
Annex E (normative) Clarification on RCB reservation 199
E.1 General 199
E.2 Buffered Report Control Block 199
E.2.1 Instanciation of the buffered report control block from the SCL definition 199
E.2.2 Reservation of a BRCB 201
E.2.3 Un-reservation of a BRCB 203
E.2.4 End of association and BRCB reservation scheme 205
E.3 Unbuffered Report Control Block 208
E.3.1 Instanciation of the unbuffered report control block from the SCL definition 208
E.3.2 Reservation of a URCB 210
E.3.3 Un-reservation of a URCB 213
E.3.4 End of association and URCB reservation scheme 215
Annex F (normative) Compatibility of the different revisions of the standard 218
F.1 General 218
F.2 List of the modifications to consider for backward / forward compatibility 218
F.3 Special compatibility rules 223
F.3.1 Leap second by server conformant to previous version of the standard 223
F.3.2 TimeAccuracy by server conformant to previous version of the standard 223
F.3.3 RCB reservation 223
Bibliography 225
Index 226

Figure 1 – Excerpt of conceptual model of IEC 61850 21
Figure 2 – Basic conceptual class model of the ACSI 22
Figure 3 – Conceptual service model of the ACSI 23
Figure 4 – Core of the conceptual meta model and relationship 25
Figure 5 – Data instance model (conceptual) 26
Figure 6 – P_Timestamp 38
Figure 7 – Time accuracy 39
Figure 8 – Overview about GetDirectory and GetDefinition services 56
Figure 9 – Normal operation 58
Figure 10 – Aborting association 58

Figure 11 – Principle of multicast application association 62
Figure 12 – Basic conceptual model of the GenLogicalNodeClass 64
Figure 13 – Basic conceptual class model of the GenDataObjectClass 68
Figure 14 – Excerpt of GenDataObjectClass services 70
Figure 15 – Class diagram of the GenCommonDataClass 73
Figure 16 – Conceptual Class diagram of the GenCommonDataClass 74
Figure 17 – Class diagram of the GenDataAttributeClass 75
Figure 18 – Relation of TrgOp and Reporting 77
Figure 19 – Class diagram of the GenConstructedAttributeClass 77
Figure 20 – Relation of types (example) 80
Figure 21 – Example of a data object 81
Figure 22 – Dynamic creation of DataSet instances 82
Figure 23 – Control block service mapping 88
Figure 24 – Basic model of the settings model 90
Figure 25 – Basic building blocks for reporting and logging 97
Figure 26 – BRCB state machine 100
Figure 27 – General queue of entries for report handler 101
Figure 28 – Buffer time 103
Figure 29 – State Machine for Sequence Number Generation 104
Figure 30 – Logical state machine for general interrogation 106
Figure 31 – Report example on the use of sequence number 111
Figure 32 – Entry discard that does not cause indication of loss of information in enabled state 112
Figure 33 – Indication of loss of information due to resource constraints in enable state 113
Figure 34 – DataSet members and reporting 114
Figure 35 – Report example 115
Figure 36 – Log model overview 123
Figure 37 – GoCB model 131
Figure 38 – Model for transmission of sampled values 137
Figure 39 – Principle of the control model 148
Figure 40 – State machine of direct control with normal security 153
Figure 41 – Direct control with normal security 154
Figure 42 – State machine of SBO control with normal security 156
Figure 43 – State machine of direct control with enhanced security 159
Figure 44 – State machine SBO control with enhanced security 161
Figure 45 – Select before operate with enhanced security – positive case 162
Figure 46 – Select before operate with enhanced security – negative case (no status change) 162
Figure 47 – Time-activated operate 164
Figure 48 – Time model and time synchronization (principle) 171
Figure 49 – Specializations 172
Figure 50 – Object names and object reference 174
Figure C.1 – GsCB model 187
Figure D.1 – Quality identifiers in a single client-server relationship 196

Figure D.2 – Quality identifiers in a multiple client-server relationship 197
Figure D.3 – Interaction of substitution and validity (CL=client, Se=server) when used in a proxy model environement 198
Figure E.1 – BRCB instanciation from SCL and reservation scheme 201
Figure E.2 – BRCB reservation scheme 203
Figure E.3 – BRCB un-reservation scheme 205
Figure E.4 – BRCB reservation and end of association 207
Figure E.5 – URCB instanciation from SCL and reservation scheme 210
Figure E.6 – URCB reservation scheme 212
Figure E.7 – URCB un-reservation scheme 215
Figure E.8 – URCB reservation and end of association 217

Table 1 – Example of class instantiation 22
Table 2 – ACSI model classes with related services 24
Table 3 – Conditions for presence of elements within a context 27
Table 4 – Functional constraints (FcKind) 29
Table 5 – Trigger options 32
Table 6 – Type definition overview 33
Table 7 – Use of IEC 61850-6 bType 34
Table 8 – Attributes of P_Timestamp 39
Table 9 – Attributes of TimeQuality 40
Table 10 – Attributes of P_Quality 42
Table 11 – Attributes of DetailQual 43
Table 12 – Attributes of P_TriggerConditions 44
Table 13 – Attributes of P_RCBReportOptions 45
Table 14 – Attributes of P_LCBLogEntryOptions 45
Table 15 – Attributes of P_SVMessageOptions 46
Table 16 – Attributes of P_CheckConditions 46
Table 17 – Attributes of S_Originator 46
Table 18 – Literals of ServiceNameKind 47
Table 19 – Literals of ServiceStatusKind 49
Table 20 – Literals of OriginatorCategoryKind 49
Table 21 – Literals of ControlServiceStatusKind 50
Table 22 – Literals of SamplingModeKind 51
Table 23 – Literals of StepControlKind 52
Table 24 – Literals of DpStatusKind 52
Table 25 – Literals of SourceKind 52
Table 26 – Literals of ValidityKind 53
Table 27 – Attributes of ReasonForInclusionInReport 54
Table 28 – Attributes of ReasonForInclusionInLog 54
Table 29 – Literals of ACSIClassKind 55
Table 30 – GenServerClass definition 55
Table 31 – GetServerDirectory service parameters 57

Table 32 – TWO-PARTY-APPLICATION-ASSOCIATION (TPAA) class definition 59
Table 33 – Two-party-application-association services 59
Table 34 – Associate service parameters 60
Table 35 – Abort service parameters 61
Table 36 – Release service parameters 61
Table 37 – MULTICAST-APPLICATION-ASSOCIATION (MCAA) class definition 62
Table 38 – GenLogicalDeviceClass (GenLD) class definition 63
Table 39 – GetLogicalDeviceDirectory service parameters 63
Table 40 – GenLogicalNodeClass definition 65
Table 41 – GenLogicalNodeClass services 66
Table 42 – GetLogicalNodeDirectory service parameters 66
Table 43 – GetAllDataValues service parameters 67
Table 44 – GenDataObjectClass definition 69
Table 45 – GenDataObjectClass services 69
Table 46 – GetDataValues service parameters 70
Table 47 – SetDataValue service parameters 71
Table 48 – GetDataDirectory service parameters 72
Table 49 – GetDataDefinition service parameters 72
Table 50 – GenCommonDataClass definition 74
Table 51 – GenDataAttributeClass definition 75
Table 52 – GenConstructedAttributeClass definition 78
Table 53 – GenSubDataAttributeClass definition 78
Table 54 – DATA-SET (DS) class definition 83
Table 55 – DATA-SET services 84
Table 56 – GetDataSetValues service parameters 84
Table 57 – SetDataSetValues service parameters 85
Table 58 – CreateDataSet service parameters 85
Table 59 – DeleteDataSet service parameters 86
Table 60 – GetDataSetDirectory service parameters 86
Table 61 – CB class definition 89
Table 62 – SGCB class definition 91
Table 63 – SGCB services 92
Table 64 – SelectActiveSG service parameters 93
Table 65 – SelectEditSG service parameters 94
Table 66 – SetEditSGValue service parameters 94
Table 67 – ConfirmEditSGValues service parameters 95
Table 68 – GetEditSGValue service parameters 95
Table 69 – GetSGCBValues service parameters 96
Table 70 – BRCB class definition 99
Table 71 – BRCB services 109
Table 72 – Report service parameters 109
Table 73 – Report segment format specification 110
Table 74 – GetBRCBValues service parameters 118

Table 75 – SetBRCBValues service parameters 119
Table 76 – URCB class definition 119
Table 77 – URCB services 121
Table 78 – LCB class definition 124
Table 79 – LCB services 124
Table 80 – GetLCBValues service parameters 125
Table 81 – SetLCBValues service parameters 126
Table 82 – LOG class definition 126
Table 83 – LOG services 128
Table 84 – QueryLogByTime service parameters 128
Table 85 – QueryLogAfter service parameters 129
Table 86 – GetLogStatusValues service parameters 129
Table 87 – GOOSE control block class definition 132
Table 88 – GoCB services 133
Table 89 – SendGOOSEMessage service parameters 133
Table 90 – GetGoReference service parameters 134
Table 91 – GetGOOSEElementNumber service parameters 134
Table 92 – GetGoCBValues service parameters 135
Table 93 – SetGoCBValues service parameters 135
Table 94 – GOOSE message definition 136
Table 95 – MSVCB class definition 138
Table 96 – MSVCB services 139
Table 97 – SendMSVMessage service parameters 140
Table 98 – GetMSVCBValues service parameters 140
Table 99 – SetMSVCBValues service parameters 141
Table 100 – GetMsvReference service parameters 141
Table 101 – GetMSVElementNumber service parameters 142
Table 102 – USVCB class definition 143
Table 103 – USVCB services 144
Table 104 – SendUSVMessage service parameters 144
Table 105 – GetUSVCBValues service parameters 145
Table 106 – SetUSVCBValues service parameters 145
Table 107 – Sampled value (SV) format definition 147
Table 108 – Generic behavior and negative responses 149
Table 109 – Control services 164
Table 110 – Control service parameters 165
Table 111 – FILE class definition 175
Table 112 – File services 175
Table 113 – GetFile service parameters 176
Table 114 – SetFile service parameters 176
Table 115 – DeleteFile service parameters 176
Table 116 – GetFileAttributeValues service parameters 177
Table A.1 – Basic conformance statement 179

Table A.2 – ACSI models conformance statement 180
Table A.3 – ACSI service conformance statement 182
Table C.1 – GSSE control block class definition 188
Table C.2 – GsCB Services 189
Table C.3 – SendGSSEMessage parameter table 190
Table C.4 – GetGsReference parameter table 190
Table C.5 – GetGSSEDataOffset parameter table 191
Table C.6 – GetGsCBValues parameter table 192
Table C.7 – SetGsCBValues parameter table 193
Table C.8 – GSSE message definition 194
Table D.1 – Relation of the detailed quality identifiers with invalid or questionable quality 196

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61850-7-2 edition 2.1 contains the second edition (2010-08) [documents 57/1065/FDIS and 57/1083/RVD] and its amendment 1 (2020-02) [documents 57/2100/FDIS and 57/2131/RVD].

International Standard IEC 61850-7-2 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

a) class diagrams have been updated;
b) data types have been gathered in one document and harmonized with IEC 61850-6:2007B;
c) errors and typos have been corrected;
d) CDCs for service tracking have been moved to IEC 61850-7-3:2007B to gather all CDCs in one document;
e) several terms have been harmonized with those in the other parts;
f) definition and explanation of values for each attribute were moved into the class definition tables;
g) definition and explanation of values for each service parameter were move to service parameter definition tables;
h) harmonization of the namingscheme for Enumeration and CodedEnum types to <EnumTitle>Kind resp. <CodedEnumTitle>Kind – fully backward compatible as the value of the literal have not changed;
i) deprecation of the USVCB model.

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

– provides clarifications and corrections to the second edition of IEC 61850-7-2, based on the tissues = { 728, 730, 778, 780, 783, 786, 813, 820, 850, 852, 858, 860, 861, 869, 875, 876, 943, 970, 1038, 1050, 1061, 1062, 1071, 1091, 1092, 1116, 1122, 1127, 1145, 1154, 1194, 1202, 1232, 1242, 1252, 1276, 1283, 1307, 1308, 1319, 1338, 1341, 1356, 1377, 1386, 1428, 1432, 1433, 1435, 1439, 1455, 1569, 1589, 1622, 1630, 1650, 1652 }.

Content in some parts of Clause 6, some UML diagrams, as well as Annex B are automatically generated from the UML model.

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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this document, the following print types are used:

– **bold** is used to highlight defined terms,
– **Tahoma bold** is used where the difference between a capital i (I) and a small L (l) is important to see.
– Table numbering with additional characters 'N' (e.g. Table 16N) are tables following the Ed 2.1 numbering.

A list of all parts of the IEC 61850 series, 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 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 definitions which details a layered utility communication architecture. This architecture has been chosen to provide abstract definitions of classes and services such that the definitions are independent of specific protocol stacks, implementations, and operating systems.

The IEC 61850 series is intended to provide interoperability between a variety of devices. Communication between these devices is achieved by the definition of a hierarchical class model (for example, logical device, logical node, data, data set, report control, or log) and services provided by these classes (for example, get, set, report, define, delete) in IEC 61850-7-x.

This document defines the abstract communication service interface (ACSI) for use in the utility application domain, which requires real-time cooperation of intelligent electronic devices. The ACSI has been defined so as to be independent of the underlying communication systems. Specific communication service mappings[1] (SCSM) are specified in IEC 61850-8-x and IEC 61850-9-x.

This document defines the abstract communication service interface in terms of

– a hierarchical class model of all information that can be accessed via a communication network,

– services that operate on these classes, and

– parameters associated with each service.

The ACSI description technique abstracts away from all the different approaches to implement the cooperation of the various devices.

This document does not provide comprehensive tutorial material. It is recommended that IEC 61850-5 and IEC 61850-7-1 be read first in conjunction with IEC 61850-7-2 and IEC 61850-7-3.

NOTE 1 Refer to International Electrotechnical Vocabulary, IEC 60050, for general glossary definitions.

NOTE 2 Abstraction in ACSI has two meanings. First, only those aspects of a real device (for example, a breaker) or a real function that are visible and accessible over a communication network are modelled. This abstraction leads to the hierarchical class models and their behaviour defined in IEC 61850-7-2, IEC 61850-7-3, and IEC 61850-7-4. Second, the ACSI abstracts from the aspect of concrete definitions on how the devices exchange information; only a conceptual cooperation is defined. The concrete information exchange is defined in the SCSMs.

NOTE 3 Examples use names of classes (for example XCBR for a class of a logical node) defined in IEC 61850-7-4 and IEC 61850-7-3. The normative names are defined in IEC 61850-7-4 and IEC 61850-7-3 only.

[1] The ACSI is independent of the specific mapping. Mappings to standard application layers or middle ware technologies are possible.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)

1 Scope

1.1 General

This document applies to the ACSI communication for utility automation. The ACSI provides the following abstract communication service interfaces.

a) Abstract interface describing communications between a client and a remote server for
   – real-time data access and retrieval,
   – device control,
   – event reporting and logging,
   – setting group control,
   – self-description of devices (device data dictionary),
   – data typing and discovery of data types, and
   – file transfer.
b) Abstract interface for fast and reliable system-wide event distribution between an application in one device and many remote applications in different devices (publisher/subscriber) and for transmission of sampled measured values (publisher/subscriber).

1.2 Namespace name and version

This new clause is mandatory for any IEC 61850 namespace (as defined by the part 7-1 of IEC 61850 Edition 2).

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

- Namespace version: 2007
- Namespace revision: B
- Namespace name: “IEC 61850-7-2:2007B”
- Namespace release: 3
- Namespace release date: 2019-10-02

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

Edition	Publication date	Webstore	Namespace
Edition 1.0	2003-05	IEC 61850-7-2:2003	IEC 61850-7-2:2003
Edition 2.0	2010-10	IEC 61850-7-2:2010	IEC 61850-7-2:2007
Amendment 1 of Edition 2.0	2020-02	IEC 61850-7-2:2010/AMD1:2020	IEC 61850-7-2:2007B
Edition 2.1	2020-02	IEC 61850-7-2:2010+AMD1:2020 CSV	IEC 61850-7-2:2007B

1.3 Code Component distribution

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

– Full version will contain definition of the whole Basic Types 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 Basic Types 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_61850-7-2.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 standard 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_61850-7-2.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
– The list of the electronic files which compose the code component
– 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 TS 61850-2, *Communication networks and systems for power utility automation - Part 2: Glossary*

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

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 61850-7-1:2020, *Communication networks and systems for power utility automation - Part 7-1: Basic communication structure - Principles and models*

IEC 61850-7-3:2020, *Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes*

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

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

IEEE 754, *Standard for Floating-Point Arithmetic*