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IEC 61850-7-2

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Communication networks and systems in substations –

Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)

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CONTENTS

FOREWORD 8
INTRODUCTION 10
1 Scope 11
2 Normative references 11
3 Terms and definitions 12
4 Abbreviated terms 13
5 ACSI overview and basic concepts 14
5.1 General 14
5.2 Overview of basic information models 15
5.3 Overview of the other service models 16
5.4 Overview of ACSI services 19
5.5 Type definitions 20
5.5.1 Data attribute types 20
5.5.2 BasicTypes 21
5.5.3 Common ACSI types 22
6 SERVER class model 26
6.1 SERVER class definition 26
6.1.1 SERVER class syntax 26
6.1.2 SERVER class attributes 27
6.2 Server class services 27
6.2.1 Overview of directory and GetDefinition services 27
6.2.2 GetServerDirectory 28
7 Application association model 29
7.1 Introduction 29
7.2 Concept of application associations 29
7.3 Access control 29
7.4 TWO-PARTY-APPLICATION-ASSOCIATION (TPAA) class model 30
7.4.1 TWO-PARTY-APPLICATION-ASSOCIATION (TPAA) class definition 30
7.4.2 Two-party application association services 32
7.5 MULTICAST-APPLICATION-ASSOCIATION (MCAA) class 34
7.5.1 MULTICAST-APPLICATION-ASSOCIATION (MCAA) class definition 34
8 LOGICAL-DEVICE class model 36
8.1 LOGICAL-DEVICE class definition 36
8.1.1 LOGICAL-DEVICE class syntax 36
8.1.2 LOGICAL-DEVICE class attributes 36
8.2 LOGICAL-DEVICE class services 37
8.2.1 GetLogicalDeviceDirectory 37
9 LOGICAL-NODE class model 38
9.1 LOGICAL-NODE class definition 38
9.1.1 LOGICAL-NODE class syntax 38
9.1.2 LOGICAL-NODE class attributes 38
9.2 LOGICAL-NODE class services 40
9.2.1 Overview 40
9.2.2 GetLogicalNodeDirectory 40
9.2.3 GetAllDataValues 41

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(https://standards.iteh.ai)
Document Preview
IEC 61850-7-2:2003
https://standards.iteh.ai/catalog/standards/sist/...-61850-7-2-2003
Withdrawn

10 DATA class model 42
10.1 General 42
10.2 DATA class definition 42
10.2.1 DATA class syntax 42
10.2.2 DATA class attributes 45
10.3 Relation of DATA, common DATA, and compatible DATA classes 52
10.4 DATA class services 52
10.4.1 General definitions and overview 52
10.4.2 GetDataValues 53
10.4.3 SetDataValues 54
10.4.4 GetDataDirectory 55
10.4.5 GetDataDefinition 56
11 DATA-SET class model 56
11.1 General 56
11.2 DATA-SET class definition 58
11.2.1 DATA-SET class syntax 58
11.2.2 DATA-SET class attributes 58
11.3 DATA-SET class services 59
11.3.1 Overview 59
11.3.2 GetDataSetValues 59
11.3.3 SetDataSetValues 60
11.3.4 CreateDataSet 61
11.3.5 DeleteDataSet 61
11.3.6 GetDataSetDirectory 62
12 Substitution model 63
13 SETTING-GROUP-CONTROL-BLOCK class model 65
13.1 General 65
13.2 SGCB class definition 66
13.2.1 SGCB class syntax 66
13.2.2 SGCB class attributes 67
13.3 SGCB class services 68
13.3.1 Overview 68
13.3.2 SelectActiveSG 68
13.3.3 SelectEditSG 69
13.3.4 SetSGValues 70
13.3.5 ConfirmEditSGValues 71
13.3.6 GetSGValues 71
13.3.7 GetSGCBValues 72
14 REPORT-CONTROL-BLOCK and LOG-CONTROL-BLOCK class models 74
14.1 Overview 74
14.2 REPORT-CONTROL-BLOCK class model 76
14.2.1 Basic concepts 76
14.2.2 BUFFERED-REPORT-CONTROL-BLOCK (BRCB) class definition 76
14.2.3 BRCB class services 82
14.2.4 UNBUFFERED-REPORT-CONTROL-BLOCK (URCB) class definition 94
14.2.5 URCB class services 95
14.3 LOG-CONTROL-BLOCK class model 96
14.3.1 General 96
14.3.2 LCB class definition 97

Withdrawn
iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 61850-7-2:2003
https://standards.iteh.ai/catalog/standards/sist/bd339a9-23f5-4b5c-a90c-dc0ba6e35e86/iec-61850-7-2-2003

14.3.3 LOG class definition 101
14.3.4 Procedures to generate the log entries 104
14.3.5 LOG services 104
15 Generic substation event class model (GSE) 107
15.1 Overview 107
15.2 GOOSE-CONTROL-BLOCK (GoCB) class 109
15.2.1 GoCB definition 109
15.2.2 GOOSE service Definitions 111
15.2.3 Generic object oriented substation event (GOOSE) message 116
15.3 Generic substation state event (GSSE) control block (GsCB) 117
15.3.1 GsCB class definition 117
15.3.2 Generic substation state event (GSSE) control block class attributes 119
15.3.3 GSSE service definitions 120
15.3.4 Generic substation state event (GSSE) message 124
16 Transmission of sampled value class model 126
16.1 Overview 126
16.2 Transmission of sampled values using multicast 127
16.2.1 MSVCB class definition 127
16.2.2 Multicast sampled value class services 129
16.3 Transmission of sampled values using unicast 132
16.3.1 USVCB class definition 132
16.3.2 Unicast sampled value services 134
16.4 Sampled value format 137
16.4.1 MsvID or UsvID 138
16.4.2 OptFlds 138
16.4.3 DatSet 138
16.4.4 Sample [1..n] 138
16.4.5 SmpCnt 138
16.4.6 RefrTm 139
16.4.7 ConfRev 139
16.4.8 SmpSynch 139
16.4.9 SmpRate 139
17 CONTROL class model 139
17.1 Introduction 139
17.2 Control with normal security 140
17.2.1 Direct control with normal security 140
17.2.2 SBO control with normal security 141
17.3 Control with enhanced security 143
17.3.1 Introduction 143
17.3.2 Direct control with enhanced security 143
17.3.3 SBO control with enhanced security 144
17.4 Time-activated operate 146
17.5 CONTROL class service definitions 147
17.5.1 Overview 147
17.5.2 Service parameter definition 148
17.5.3 Service specification 150
18 Time and time-synchronization model 154
18.1 General 154
18.2 External information 154

Withdrawn
iTeh Standards
(https://standards.iteh.ai)
Document Preview
https://standards.iteh.ai/catalog/standards/sist/...-61850-7-2-2003

19 Naming conventions 155
19.1 Class naming and class specializations 155
19.2 Referencing an instance of a class 156
19.3 Scope 158
20 File transfer 159
20.1 File transfer model 159
20.1.1 FileName 159
20.1.2 FileSize [0..1] 159
20.1.3 LastModified 159
20.2 File services 160
20.2.1 GetFile 160
20.2.2 SetFile 160
20.2.3 DeleteFile 161
20.2.4 GetFileAttributeValues 162

Annex A (normative) ACSI conformance statement 163
A.1 General 163
A.2 ACSI models conformance statement 164
A.3 ACSI service conformance statement 165

Bibliography 169

Index 170

Figure 1 – Excerpt of conceptual model 15
Figure 2 – Basic conceptual class model of the ACSI 16
Figure 3 – Conceptual service model of the ACSI 17
Figure 4 – Data attribute type concept 20
Figure 5 – Overview about GetDirectory and GetDefinition services 27
Figure 6 – Access views of a server 30
Figure 7 – Normal operation 31
Figure 8 – Aborting association 31
Figure 9 – Principle of multicast application association 35
Figure 10 – Class diagram of DATA and DataAttributeType 43
Figure 11 – Example of DATA 44
Figure 12 – Relation of TrgOp and Reporting 50
Figure 13 – Relation of DATA classes 52
Figure 14 – Excerpt of data class services 53
Figure 15 – Dynamic creation of data set instances 57
Figure 16 – Principles of substitution 64
Figure 17 – Basic model of the settings model 65
Figure 18 – Setting group state machine 67
Figure 19 – Basic building blocks for reporting and logging 75
Figure 20 – BRCB state machine 78

Withdrawn
iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 61850-7-2:2003
https://standards.iteh.ai/catalog/standards/sist/0e0e0e2f5-4b5c-a90c-dc0ba6e35e86/iec-61850-7-2-2003

Figure 21 – Buffer time 80
Figure 22 – Report example on the use of sequence number 84
Figure 23 – Data set members and reporting 86
Figure 24 – Report example 87
Figure 25 – Log model overview 96
Figure 26 – GoCB model 108
Figure 27 – Specifics for GsCB model 118
Figure 28 – Model for transmission of sampled values 126
Figure 29 – Principle of the control model 140
Figure 30 – State machine of direct control with normal security 141
Figure 31 – Direct control with normal security 141
Figure 32 – State machine of SBO control with normal security 142
Figure 33 – State machine of direct control with enhanced security 143
Figure 34 – State machine SBO control with enhanced security 144
Figure 35 – Select before operate with enhanced security – positive case 145
Figure 36 – Select before operate with enhanced security – negative case (no status change) 145
Figure 37 – Time-activated operate 147
Figure 38 – Time model and time synchronization (principle) 154
Figure 39 – Specializations 155
Figure 40 – Object names and object reference 158

Table 1 – ACSI classes 19
Table 2 – BasicTypes 21
Table 3 – ObjectName type 22
Table 4 – ObjectReference type 22
Table 5 – ServiceError type 23
Table 6 – PACKED-LIST type 23
Table 7 – TimeStamp type 24
Table 8 – TimeQuality definition 24
Table 9 – TimeAccuracy 25
Table 10 – TriggerConditions type 26
Table 11 – SERVER class definition 26
Table 12 – TWO-PARTY-APPLICATION-ASSOCIATION (TPAA) class definition 31
Table 13 – MULTICAST-APPLICATION-ASSOCIATION (MCAA) class definition 35
Table 14 – LOGICAL-DEVICE (LD) class definition 36
Table 15 – LOGICAL-NODE (LN) class definition 38
Table 16 – DATA class definition 45
Table 17 – DAType definition 46
Table 18 – Functional constraints 48
Table 19 – Trigger option 49
Table 20 – COMMON-DATA class definition 51
Table 21 – DATA-SET (DS) class definition 58

iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 61850-7-2:2003
https://standards.iteh.ai/catalog/standards/sist/1d339a9-23f5-4b5c-a90c-dc0ba6e35e86/iec-61850-7-2-2003
Withdrawn

Table 22 – SGCB class definition 66
Table 23 – BRCB class definition 77
Table 24 – Report format specification 83
Table 25 – URCB class definition 94
Table 26 – LCB class definition 97
Table 27 – LOG class definition 102
Table 28 – GOOSE control block class definition 109
Table 29 – GOOSE message definition 116
Table 30 – GSSE control block class definition 118
Table 31 – GSSE message definition 125
Table 32 – MSVCB class definition 127
Table 33 – USVCB class definition 132
Table 34 – Sampled value (SV) format definition 138
Table 35 – Control services 147
Table 36 – Control time-stamp definition 148
Table 37 – Test status definition 148
Table 38 – Check condition definition 148
Table 39 – Additional cause diagnosis definition 149
Table 40 – AddCause semantic 149
Table 41 – TimeActivatedOperate response definition 150
Table 42 – List of ObjectReferences 156
Table 43 – FILE class definition 159
Table A.1 – Basic conformance statement 163
Table A.2 – ACSI models conformance statement 164
Table A.3 – ACSI service conformance statement 165

Withdrawn
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COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organisation for standardisation comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardisation in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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 organisations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organisation for Standardisation (ISO) in accordance with conditions determined by agreement between the two organisations.
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International Standard IEC 61850-7-2 has been prepared by IEC technical committee 57: Power system control and associated communications.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/612/FDIS	57/629/RVD

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

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

IEC 61850 consists of the following parts, under the general title *Communication networks and systems in substations:*

Part 1: Introduction and overview [1]

Part 2: Glossary [1]

Part 3: General requirements

Part 4: System and project management

[1] To be published.

Part 5: Communication requirements for functions and device models [2]

Part 6: Configuration description language for communication in electrical substations related to IEDs [2]

Part 7-1: Basic communication structure for substation and feeder equipment – Principles and models

Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)

Part 7-3: Basic communication structure for substation and feeder equipment – Common data classes

Part 7-4: Basic communication structure for substation and feeder equipment – Compatible logical node classes and data classes

Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO/IEC 9506-1 and ISO/IEC 9506-2) and to ISO/IEC 8802-3 [2]

Part 9-1: Specific communication service mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link

Part 9-2: Specific communication service mapping (SCSM) – Sampled values over ISO/IEC 8802-3 [2]

Part 10: Conformance testing [2]

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition; or
- amended.

A bilingual version of this publication may be issued at a later date.

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[2] To be published.

INTRODUCTION

This document is part of a set of specifications which details a 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, implementations, and operating systems.

The IEC 61850 series is intended to provide interoperability between a variety of substation and feeder 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 parts IEC 61850-7-x.

This part of IEC 61850 defines the abstract communication service interface (ACSI) for use in the utility substation domain that require 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[3] (SCSM) are specified in part 8-x and part 9-x of this standard.

This part of IEC 61850 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.

NOTE 1 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 2 This part of IEC 61850 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 3 Examples use names of classes (e.g. 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.

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

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)

1 Scope

This part of IEC 61850 applies to the ACSI communication in substations and feeder applications. The ACSI provides the following abstract 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,
- publisher/subscriber,
- 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).

This part of IEC 61850 may also be applied to describe device models and functions for additional activities, such as:

- 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.

2 Normative references

The following referenced documents are indispensable for the application 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 61850-2, *Communication networks and systems in substations – Part 2: Glossary*

IEC 61850-5, *Communication networks and systems in substations – Part 5: Communication requirements for functions and devices models*

IEC 61850-7-1, *Communication networks and systems in substations – Part 7-1: Basic communication structure for substation and feeder equipment – Principles and models*

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IEC 61850-7-3, *Communication networks and systems in substations – Part 7-3: Basic communication structure for substation and feeder equipment – Common data classes*

IEC 61850-7-4, *Communication networks and systems in substations – Part 7-4: Basic communication structure for substation and feeder equipment – Compatible logical node classes and data classes*

IEC 61850-8-1: *Communication networks and systems in substations – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO/IEC 9506-1 and ISO/IEC 9506-2) and to ISO/IEC 8802-3*

3 Terms and definitions

For the purpose of this document, the terms and definitions provided in IEC 61850-2 and the following definitions apply.

3.1
class
description of a set of objects that share the same attributes, services, relationships, and semantics

3.2
client
entity that requests a service from a server and that receives unsolicited messages from a server

3.3
device
entity that performs control, actuating and/or sensing functions and interfaces to other such entities within an automation system

NOTE Devices alone do not perform energy transport functions.

3.4
external equipment
entity that is stand-alone, or interfaces to an automation system, and that performs energy transport functions

EXAMPLE Transformer, circuit-breaker, line.

NOTE 1 Equipment can contain devices.

NOTE 2 Equipment cannot have a direct connection to the communication network – only devices can be directly connected to the communication network.

3.5
instance (of a class)
entity that has unique identity, to which a set of services can be applied, and which has a state that stores the effects of the services

NOTE Instance is a synonym for the term object.

3.6
Logical device
entity that represents a set of typical substation functions

3.7
Logical node
entity that represents a typical substation function

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