



# TECHNICAL SPECIFICATION



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**Communication networks and systems for power utility automation –  
Part 80-1: Guideline to exchanging information from a CDC-based data model  
using IEC 60870-5-101 or IEC 60870-5-104**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD.....	8
1 Scope.....	10
2 Normative references.....	11
3 Abbreviated terms .....	11
4 The mapping architecture .....	12
5 Conceptual architectures and associated use cases .....	13
5.1 Conceptual architecture of a gateway device .....	13
5.1.1 General .....	13
5.1.2 Use case a) for a gateway device .....	14
5.1.3 Use case b) for a gateway device .....	15
5.1.4 Use case c) for a gateway device .....	16
5.2 Conceptual architecture of an IED directly connected to a WAN (optional).....	17
6 Mapping of a device-oriented information model to IEC 60870-5-104 or IEC 60870-5-101 .....	18
6.1 General.....	18
6.2 Mapping of a device-oriented information model reference .....	18
6.3 Logical device class mapping .....	19
6.4 Logical node class mapping.....	19
7 Mapping of the common data classes (CDC) .....	19
7.1 List of CDC, type Identifications and corresponding mappings for IEC 61850.....	19
7.2 CDC single point status (SPS).....	23
7.3 CDC double point status (DPS) .....	23
7.4 CDC integer status (INS).....	24
7.5 CDC protection activated information (ACT).....	27
7.6 CDC directional protection activation information (ACD).....	29
7.7 CDC Security violation counting (SEC) .....	32
7.8 CDC binary counter reading (BCR).....	33
7.9 CDC measured value (MV).....	34
7.10 CDC complex measured value (CMV).....	36
7.11 CDC Phase to ground related measured values of a three-phase system (WYE).....	38
7.12 CDC phase to phase measured values of a three phase system (DEL).....	39
7.13 CDC sequence (SEQ) .....	40
7.14 CDC harmonic value (HMV).....	41
7.14.1 CDC HMV defined in IEC 61850-7-3:2003 .....	41
7.14.2 CDC HMV defined in IEC 61850-7-3:2010 .....	42
7.15 CDC harmonic value for WYE (HWYE) .....	42
7.15.1 CDC WYE (HWYE) defined in IEC 61850-7-3:2003 .....	42
7.15.2 CDC WYE (HWYE) defined in IEC 61850-7-3:2010 .....	43
7.16 CDC harmonic value for DEL (HDEL).....	44
7.16.1 CDC DEL (HDEL) defined in IEC 61850-7-3:2003 .....	44
7.16.2 CDC DEL (HDEL) defined in IEC 61850-7-3:2010 .....	44
7.17 CDC controllable single point (SPC) .....	45
7.18 CDC controllable double point (DPC).....	47
7.19 CDC controllable integer status (INC).....	48
7.20 CDC binary controlled step position information (BSC).....	50

7.21	CDC integer-controlled step position information (ISC).....	53
7.22	CDC controllable analogue set point information (APC).....	55
7.22.1	CDC APC defined in IEC 61850-7-3:2003 .....	55
7.22.2	CDC APC defined in IEC 61850-7-3:2010 .....	56
7.23	CDC Single point setting (SPG) .....	59
7.24	CDC integer status setting (ING) .....	60
7.25	CDC analogue settings (ASG) .....	61
7.26	CDC enumerated status (ENS) .....	61
7.27	CDC Histogramm (HST) .....	63
7.28	CDC controllable enumerated status (ENC) .....	64
7.29	CDC Enumerated status setting (ENG) .....	68
7.30	CDC Binary controlled analog process value (BAC) .....	68
7.31	CDC Curve shape setting (CSG).....	69
8	Mapping of services.....	70
8.1	List of service models and corresponding mappings.....	70
8.2	Server class mapping .....	72
8.3	Association class mapping .....	73
8.4	Logical node class mapping.....	73
8.5	Data class mapping.....	74
8.6	Setting group class mapping.....	75
8.7	Report control block class mapping .....	76
8.8	Control class mapping.....	77
8.8.1	General .....	77
8.8.2	Direct control with normal security (optional).....	79
8.8.3	Direct control with enhanced security .....	86
8.8.4	SBO control with enhanced security .....	91
9	Protocol stack selections for IEC 60870-5-101 and IEC 60870-5-104.....	100
9.1	General.....	100
9.2	Structure of application data.....	100
9.2.1	General .....	100
9.2.2	Structure of application data defined in IEC 60870-5-101 .....	101
9.2.3	Structure of application data defined in IEC 60870-5-104 .....	101
9.3	IEC 60870-5 interoperability .....	102
9.3.1	IEC 60870-5-101 interoperability .....	102
9.3.2	IEC 60870-5-104 interoperability .....	112
Annex A (informative) Use of SCL (substation configuration language) to include IEC 60870-5-101 or IEC 60870-5-104 information.....		
A.1	SCL information model hierarchy .....	126
A.1.1	General .....	126
A.1.2	Mapping of the common address of ASDU .....	127
A.1.3	Mapping of the IOA (information object address).....	127
A.1.4	Mapping of the type identifiers (TI) .....	127
A.2	Use of the SCL elements.....	127
A.2.1	General .....	127
A.2.2	IED.....	127
A.2.3	AccessPoint.....	127
A.2.4	Server .....	127
A.2.5	LDevice .....	127
A.2.6	LN .....	128

A.2.7	DOI.....	128
A.2.8	SDI.....	128
A.2.9	DAI.....	128
A.2.10	DA/BDA/SDO.....	128
A.2.11	Control model.....	129
A.3	IEC 60870-5-101 or IEC 60870-5-104 private section syntax.....	129
A.3.1	General.....	129
A.3.2	IEC 60870-5-101 private section schema.....	129
A.3.3	IEC 60870-5-104 Private section schema.....	130
A.3.4	Use of Private section examples.....	131
A.4	IEC 60870-5-101 communication parameters configuration using SCL.....	167
A.5	IEC 60870-5-104 communication parameters configuration using SCL.....	169
	Bibliography.....	173
	Figure 1 – Conceptual architecture of a gateway device.....	13
	Figure 2 – Use case a) for a gateway device.....	14
	Figure 3 – Use case b) for a gateway device.....	15
	Figure 4 – Use case c) for a gateway device.....	16
	Figure 5 – Conceptual architecture of an IED.....	17
	Figure 6 – Mapping architecture (conceptual).....	19
	Figure 7 – Direct control with normal security with status update – positive case applied to gateway device.....	79
	Figure 8 – Direct control with normal security with status update – positive case applied to IED.....	80
	Figure 9 – Direct control with normal security in general – negative case a) applied to gateway device.....	80
	Figure 10 – Direct control with normal security in general – negative case a) applied to IED.....	81
	Figure 11 – Direct control with normal security in general – negative case b) applied to gateway device.....	81
	Figure 12 – Direct control with normal security in general – negative case b) applied to IED.....	82
	Figure 13 – Direct control with normal security with status update – negative case c) applied to gateway device.....	82
	Figure 14 – Direct control with normal security with status update – negative case c) applied to IED.....	83
	Figure 15 – Direct control with normal security without status update – positive case applied to gateway device.....	83
	Figure 16 – Direct control with normal security without status update – positive case applied to IED.....	84
	Figure 17 – Direct control with enhanced security – positive case applied to gateway device.....	86
	Figure 18 – Direct control with enhanced security – positive case applied to IED.....	87
	Figure 19 – Direct control with enhanced security – negative case c) applied to gateway device.....	88
	Figure 20 – Direct control with enhanced security – negative case c) applied to IED.....	88
	Figure 21 – Direct control with enhanced security – negative case d) applied to gateway device.....	89
	Figure 22 – Direct control with enhanced security – negative case d) applied to IED.....	89
	Figure 23 – SBOw control – positive case applied to gateway device.....	91

Figure 24 – SBOw control – positive case applied to IED .....	91
Figure 25 – SBOw control – negative case a) applied to gateway device .....	92
Figure 26 – SBOw control – negative case a) applied to IED .....	92
Figure 27 – SBOw control – negative case b) applied to gateway device .....	93
Figure 28 – SBOw control – negative case b) applied to IED .....	93
Figure 29 – SBOw control – negative case c) applied to gateway device .....	94
Figure 30 – SBOw control – negative case c) applied to IED .....	94
Figure 31 – SBO with enhanced security – positive case applied to gateway device .....	95
Figure 32 – SBO with enhanced security – positive case applied to IED .....	96
Figure 33 – SBO with enhanced security – negative case a) applied to gateway device .....	96
Figure 34 – SBO with enhanced security – negative case a) applied to IED .....	97
Figure 35 – SBO with enhanced security – negative case b) applied to gateway device .....	97
Figure 36 – SBO with enhanced security – negative case b) applied to IED .....	98
Table 1 – Mapping structure CDC onto ASDU type .....	20
Table 2 – CDC: Single point status (SPS) .....	23
Table 3 – CDC: Single point status (SPS) mapping .....	23
Table 4 – CDC: Double point status (DPS) .....	24
Table 5 – CDC: Double point status (DPS) mapping .....	24
Table 6 – CDC: Integer status (INS) .....	25
Table 7 – CDC: Integer status (INS) mapping .....	26
Table 8 – CDC: Protection activated information (ACT) .....	27
Table 9 – CDC: Protection activated information (ACT) mapping .....	28
Table 10 – CDC: Protection activated information (ACD) .....	30
Table 11 – CDC: Directional protection activated information (ACD) mapping .....	31
Table 12 – CDC: Security violation counting (SEC) .....	33
Table 13 – CDC: Security violation counting (SEC) mapping .....	33
Table 14 – CDC: Binary counter reading (BCR) .....	33
Table 15 – CDC: Binary counter reading (BCR) mapping .....	34
Table 16 – CDC: Measured value (MV) .....	35
Table 17 – CDC: Measured value (MV) mapping .....	35
Table 18 – CDC: Complex measured value (CMV) .....	36
Table 19 – CDC: Complex measured value (CMV) mapping .....	37
Table 20 – CDC: Phase to ground related measured values of a three-phase system (WYE) .....	38
Table 21 – CDC: Phase to phase measured values of a three phase system (DEL) .....	39
Table 22 – CDC: Sequence (SEQ) .....	40
Table 23 – CDC: Harmonic value (HMV) Ed.1 .....	41
Table 24 – CDC: Harmonic value (HMV) Ed.1 mapping .....	41
Table 25 – CDC: Harmonic value (HMV) Ed.2 .....	42
Table 26 – CDC: Harmonic value for WYE (HWYE) Ed.1 .....	43
Table 27 – CDC: Harmonic value for WYE (HWYE) Ed.2 .....	43
Table 28 – CDC: Harmonic value for DEL (HDEL) .....	44

Table 29 – CDC: Harmonic value for DEL (HDEL) Ed.2.....	44
Table 30 – CDC: Controllable single point (SPC).....	45
Table 31 – CDC: Controllable single point (SPC) mapping .....	46
Table 32 – CDC: Controllable double point (DPC).....	47
Table 33 – CDC: Controllable double point (DPC) mapping.....	48
Table 34 – CDC: Controllable integer status (INC).....	49
Table 35 – CDC: Controllable integer status (INC) mapping .....	50
Table 36 – CDC: Binary controlled step position information (BSC).....	51
Table 37 – CDC: Binary controlled step position information (BSC) mapping of data attributes of the functional constraint ST.....	52
Table 38 – CDC: Binary controlled step position information (BSC) mapping of data attributes of the functional constraint CO.....	53
Table 39 – CDC: Integer-controlled step position information (ISC).....	54
Table 40 – CDC: Integer-controlled step position information (ISC) mapping .....	55
Table 41 – CDC: Controllable analogue set point information (APC) (Ed.1) .....	56
Table 42 – CDC: Controllable analogue set point information (APC) (Ed.2) .....	57
Table 43 – CDC: Controllable analogue set point information (APC) mapping of data attributes of the functional constraint MX.....	58
Table 44 – CDC: Controllable analogue set point information (APC) mapping of data attributes of the functional constraint SP .....	59
Table 45 – CDC: Single point setting (SPG) .....	60
Table 46 – CDC: Integer status setting (ING).....	60
Table 47 – CDC: Analogue settings (ASG) .....	61
Table 48 – CDC: Enumerated status (ENS) .....	62
Table 49 – CDC: Enumerated status (ENS) mapping .....	63
Table 50 – CDC: Histogramm (HST).....	64
Table 51 – CDC: Controllable enumerated status (ENC) .....	65
Table 52 – CDC: Controllable enumerated status (ENC) mapping .....	66
Table 53 – CDC: Enumerated status setting (ENG).....	68
Table 54 – CDC Binary controlled analog process value (BAC).....	68
Table 55 – CDC: Binary controlled analog process value (BAC) mapping of data attributes of the functional constraint MX.....	69
Table 56 – CDC: Curve shape setting CSG .....	70
Table 57 – Services requiring client/server communication profile .....	71
Table 58 – Server services mapping.....	73
Table 59 – Association services mapping .....	73
Table 60 – Logical nodes services mapping.....	74
Table 61 – Data services mapping .....	75
Table 62 – Setting group services mapping .....	76
Table 63 – Report control block services mapping .....	77
Table 64 – Direct control with normal security services mapping .....	85
Table 65 – Direct control with enhanced security services mapping.....	90
Table 66 – SBO control with enhanced security services mapping.....	99
Table A.1 – Extension of the “P” element types to hold IEC 60870-5-101 information .....	167

Table A.2 – Extension of the “P” element types to hold IEC 60870-5-104 information ..... 170  
Table A.3 – Extension of the “P” element types using redundancy groups ..... 171

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**COMMUNICATION NETWORKS AND  
SYSTEMS FOR POWER UTILITY AUTOMATION –****Part 80-1: Guideline to exchanging information from a CDC-based  
data model using IEC 60870-5-101 or IEC 60870-5-104**

## FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61850-80-1, which is a technical specification, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.



This second edition cancels and replaces the first edition published in 2008. This edition constitutes a technical revision.

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

- a) IEC TS 61850-80-1:2008 is based on the definitions of IEC 61850 Edition 1. After the publication of IEC TS 61850-80-1:2008 the standard series IEC 61850 was updated to Edition 2 (almost all parts);
- b) In particular, IEC 61850-7-3:2010 introduces new Common Data Classes (CDCs) which are currently not mapped to IEC 60870-5-101 or IEC 60870-5-104 in IEC 61850-80-1:2008. Those new CDCs are: ENS, HST, VSS, ENC, BAC, ENG, ORG, TSG, CUG, VSG, CSG. IEC 61400-25-4, which is currently being updated, makes reference to IEC TS 61850-80-1:2008 and therefore needs to be updated according to the definitions of this second edition of IEC 61850. The following CDCs are missing in the IEC 61850-80-1:2008 and have therefore been added to this new edition for IEC 61400-25-4 Edition 2: ENS, ENC, ENG, ORG.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
57/1649/DTS	57/1726/RVC

Full information on the voting for the approval of this technical specification 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.

A list of all parts of 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 publication 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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual edition of this document may be issued at a later date.

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## **COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –**

### **Part 80-1: Guideline to exchanging information from a CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104**

#### **1 Scope**

This part of IEC 61850, which is a technical specification, gives a guideline on how to exchange information from a CDC-based data model (for example IEC 61850) using IEC 60870-5-101 or IEC 60870-5-104 between substation(s) and control center(s). Mostly guidelines for functions needed in a substation gateway device are given.

The goal of this technical specification is to describe standardized mapping of device-oriented data models (for example IEC 61850) with already defined attributes of CDCs and services (for example IEC 61850-7) onto the already defined ASDUs and services of IEC 60870-5-104 or IEC 60870-5-101. It is not the goal of this technical specification to add any extensions to published standards (for example IEC 61850 or IEC 60870-5-104 or IEC 60870-5-101).

After an introduction giving a basic description of the mapping, the mapping of the information model with associated data classes, and the mapping of services are described. Clause 9 shows how the mapped data and services according to the IEC 60870-5-104 and IEC 60870-5-101 protocol are marked (selected) in the interoperability sheet.

The scope of this technical specification is to achieve real-time exchange of process information required for operational purposes between a substation using a CDC-based data model (for example IEC 61850) and (a) control center(s) using a communication link over a wide area network (WAN) compliant to the definitions of IEC 60870-5-101 or IEC 60870-5-104. The amount of real-time information provided by the substation-gateway device can vary dependent on the operational needs. Actors could be regional and nationwide control centers that receive real-time information in order to monitor and control geographically widespread processes. The described mapping can be used for several fields of application of power utilities, such as substations, hydro and wind power plants, and decentralized energy resources DER. The mapping is based on the definitions of the IEC 61850 series and IEC 60870-5-104:2006/IEC 60870-5-101:2003. The scope of the mapped IEC 60870-5-104 and IEC 60870-5-101 subset is given in Clause 9.

This technical specification focuses mainly on defining rules and functions of a gateway device as a part of the substation. However, the rules and functions are also valid when an IED may optionally be connected directly to a WAN compliant with IEC 60870-5-101 or IEC 60870-5-104 and therefore, the mapping has to be done inside the IED.

To enable an automated database management approach, which aims to ensure consistency between the databases of substations and control centers, the SCD file (substation configuration description) can be extended with IEC 60870-5-101/IEC 60870-5-104 specific information to configure the 61850 to 101/104 gateway. How the SCD file can be extended is described in Annex A.

The extended substation configuration description (SCD+) is recommended to be used to configure any gateway in a vendor independent format.

## 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 60870-5-3, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 3: General structure of application data*

IEC 60870-5-4:1993, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 4: Definition and coding of application information elements*

IEC 60870-5-5:1995, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 5: Basic application functions*

IEC 60870-5-101, *Telecontrol equipment and systems – Part 5-101: Transmission protocols – Companion standard for basic telecontrol tasks*

IEC 60870-5-104:2006, *Telecontrol equipment and systems – Part 5-104: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profiles*

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

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 61850-7-2:2003, *Communication networks and systems in substations – Part 7-2: Basic information and communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)*

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

IEC 61850-7-3:2003, *Communication networks and systems in substations – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

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*

IEEE 754:2008, *IEEE Standard for Binary Floating-Point Arithmetic*

RFC 2200, *Internet Official Protocol Standards, Request for Comments 2200 (June 1997)*