



BSI Standards Publication

## Communication networks and systems for power utility automation

---

Part 90-10: Models for scheduling

## National foreword

This Published Document is the UK implementation of IEC/TR 61850-90-10:2017.

The UK participation in its preparation was entrusted to Technical Committee PEL/57, Power systems management and associated information exchange.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017  
Published by BSI Standards Limited 2017

ISBN 978 0 580 95595 2

ICS 33.200

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 November 2017.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---



# IEC TR 61850-90-10

Edition 1.0 2017-10

## TECHNICAL REPORT



---

**Communication networks and systems for power utility automation –  
Part 90-10: Models for scheduling**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 33.200

ISBN 978-2-8322-4917-8

**Warning! Make sure that you obtained this publication from an authorized distributor.**

CONTENTS

FOREWORD.....	5
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 Requirements for schedules .....	8
4.1 Schedules for establishing time-based behaviour.....	8
4.2 Relation between schedules and directly set values and parameters of the DER system.....	9
5 Principles for modelling schedules.....	9
5.1 Schedule controllers and their schedules .....	9
5.2 Scheduling and direct control / setting .....	10
5.2.1 General .....	10
5.2.2 Case when the scheduled entity is of type "controllable data object".....	10
5.2.3 Case when the scheduled entity is of type "setting".....	10
5.3 Schedule behaviour .....	11
5.4 Schedule structure.....	13
5.5 Managing schedules .....	14
5.5.1 Overview .....	14
5.5.2 The state machine of the schedule.....	14
5.5.3 The role of the schedule controller.....	17
5.5.4 Relations between schedule controller, schedule and scheduled entity.....	18
5.6 Configuration of schedules.....	19
6 IEC 61850 LNs and CDCs .....	19
6.1 CDCs of supported scheduled entities .....	19
6.2 Package CommonDataClasses_90_10.....	20
6.2.1 General .....	20
6.2.2 Package CDCStatusInfo .....	21
6.3 Logical node classes.....	23
6.3.1 General .....	23
6.3.2 Package LNGroupF .....	24
6.4 Enumerated data attribute types .....	28
6.4.1 General .....	28
6.4.2 Schedule states (ScheduleStateKind enumeration).....	28
6.4.3 Schedule states (ScheduleEnablingErrorKind enumeration).....	28
6.4.4 SCL enumerations (from DOEnums_90_10).....	29
6.5 Schedule implementation examples .....	29
Annex A (informative) Impact of Mode (Mod) on the schedule status and on the controllable entity .....	30
Annex B (informative) Conditions for element presence .....	31
Annex C (informative) Abstract classes used as a basis for new LNs/CDCs.....	33
C.1 General.....	33
C.2 <<abstract>> Common attributes for primitive CDC (BasePrimitiveCDC).....	33
C.3 <<abstract,admin>> LN: Domain Name: DomainLN.....	33
Annex D (informative) Time setting related CDC and attributes .....	35

D.1	General.....	35
D.2	Calendar time definition (CalendarTime).....	35
D.3	Time setting CDC (TSG).....	36
D.3.1	General.....	36
D.3.2	<<abstract>> Time setting (TSG).....	37
D.3.3	Time setting (FC=SP) (TSG_SP).....	37
D.3.4	Time setting (FC=SG) (TSG_SG).....	37
D.3.5	Time setting (FC=SE) (TSG_SE).....	38
D.3.6	Month (MonthKind enumeration).....	38
D.4	Occurrence (OccurrenceKind enumeration).....	39
D.5	Period (PeriodKind enumeration).....	39
D.6	Week day (WeekdayKind enumeration).....	40
Annex E	(informative) Scheduling example.....	41
Figure 1	– Scheduling principle.....	10
Figure 2	– State diagram for schedule.....	15
Figure 3	– Flow chart for transition out of running state.....	16
Figure 4	– Handling priorities of schedules to determine the <i>Active</i> one.....	18
Figure 5	– Relation between schedule controller, schedules and entity controlled.....	19
Figure 6	– Class diagram CDCStatusInfo::CDCStatusInfo90_10.....	21
Figure 7	– Class diagram LogicalNodes_90_10::LogicalNodes_90_10.....	23
Figure 8	– Class diagram LNGroupF::LNGroupF.....	24
Figure 9	– Class diagram DOEnums_90_10::DOEnum_90_10.....	28
Figure D.1	– Interpretation of calendar time settings.....	35
Figure D.2	– Class diagram TSG::TSG.....	36
Figure E.1	– LN instances and relationships involved in the implementation of the schedule example.....	41
Figure E.2	– Timelines associated to the example.....	42
Table 1	– Normative abbreviations for data object names.....	8
Table 2	– Expected behaviour of a schedule.....	13
Table 3	– Structure of a schedule.....	14
Table 4	– Attributes of FCS.....	22
Table 5	– Attributes of ORS.....	22
Table 6	– Data objects of FSCC.....	25
Table 7	– Data objects of FSCH.....	26
Table 8	– Literals of ScheduleStateKind.....	28
Table 9	– Literals of ScheduleEnablingErrorKind.....	28
Table B.1	– Conditions for presence of elements within a context.....	31
Table C.1	– Attributes of BasePrimitiveCDC.....	33
Table C.2	– Data objects of DomainLN.....	34
Table D.1	– Attributes of CalendarTime.....	36
Table D.2	– Attributes of TSG.....	37
Table D.3	– Attributes of TSG_SP.....	37
Table D.4	– Attributes of TSG_SG.....	38

Table D.5 – Attributes of TSG_SE.....	38
Table D.6 – Literals of MonthKind.....	39
Table D.7 – Literals of OccurrenceKind.....	39
Table D.8 – Literals of PeriodKind.....	40
Table D.9 – Literals of WeekdayKind.....	40

Currently in preview, click buy full version

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**COMMUNICATION NETWORKS AND SYSTEMS FOR POWER  
UTILITY AUTOMATION –****Part 90-10: Models for scheduling**

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, accept IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 61850-90-10, which is a technical report, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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

Enquiry draft	Report on voting
57/1762/DTR	57/1902/RVDTR

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

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

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 "<http://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.

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

**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.**

## COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

### Part 90-10: Models for scheduling

#### 1 Scope

This part of IEC 61850, which is a Technical Report, describes scheduling for devices using IEC 61850.

The parameters, which identify this new namespace, are:

- Namespace Version: 2017
- Namespace Revision: A
- UML model file which reflects this namespace edition: wg10uml02v11b-wg8uml02v11b-wg17uml02v18-jwg25uml02v04c.eap, UML model version WG17(Tr)IEC61850-90-10:2017
- Namespace release date: 2017-06-12
- Namespace name: "(Tr)IEC61850-90-10:2017A"

The namespace "(Tr)IEC61850-90-10:2017A" is considered as "transitional" since the models are expected to be included in the next editions of IEC 61850-7-4xx and IEC 61850-7-3. Potential extensions/modifications may happen if/when the models are moved to International Standard status. Only the new data objects and CFCs that are not said inherited from existing LNs will be tagged with this namespace name. The others should still refer to the namespace where they are primarily defined.

#### 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 61850-7-1:2011, *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 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

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*