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Oprema in sistemi za daljinsko vodenje - 6-802. del: Protokoli daljinskega vodenja, ki so združljivi s standardi ISO in priporočili ITU-T - Objektni modeli TASE.2 (IEC 60870-6-802:2002)

Telecontrol equipment and systems -- Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Object models

Fernwirkeinrichtungen und -systeme -- Teil 6-802: Fernwirkprotokolle, die mit ISO-Normen und ITU T-Empfehlungen kompatibel sind - TASE.2-Objektmodelle

Matériels et systèmes de téléconduite -- Partie 6-802: Protocoles de téléconduite compatibles avec les normes ISO et les recommandations de l'UIT-T - Modèles d'objets TASE.2

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Telecontrol equipment and systems Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Object models

(IEC 60870-6-802:2002)

Matériels et systèmes de téléconduite
Partie 6-802: Protocoles de téléconduite
compatibles avec les normes ISO
et les recommandations de l'UIT-T -
Modèles d'objets TASE.2
(CEI 60870-6-802:2002)

Fernwirkeinrichtungen und -systeme
Teil 6-802: Fernwirkprotokolle,
die mit ISO-Normen und
ITU-T-Empfehlungen kompatibel sind -
TASE.2-Objektmodelle
(IEC 60870-6-802:2002)

This European Standard was approved by CENELEC on 2002-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 57/575/FDIS, future edition 2 of IEC 60870-6-802, prepared by IEC TC 57, Power system control and associated communications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60870-6-802 on 2002-05-01.

This European Standard supersedes EN 60870-6-802:1997.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2003-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2005-05-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annex A is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60870-6-802:2002 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60870-5-101	1995	Telecontrol equipment and systems Part 5-101: Transmission protocols - Companion standard for basic telecontrol tasks	EN 60870-5-101	1996
IEC 60870-6-503	2002	Part 6-503: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Services and protocol	EN 60870-6-503	2002
ISO 9506-1	2000	Industrial automation systems - Manufacturing message specification Part 1: Service definition	-	
ISO 9506-2	2000	Part 2: Protocol specification	-	-

INTERNATIONAL STANDARD

IEC 60870-6-802

Second edition
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Telecontrol equipment and systems –

Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Object models

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

TELECONTROL EQUIPMENT AND SYSTEMS –

Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Object models

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, 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 organizations liaising with the IEC also participate in this preparation. The 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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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60870-6-802 has been prepared by IEC technical committee 57: Power system control and associated communications.

This second edition cancels and replaces the first edition published in 1997 and constitutes a technical revision.

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

FDIS	Report on voting
57/575/FDIS	57/583/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.

Annex A is for information only.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be:

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

INTRODUCTION

The primary purpose of Telecontrol Application Service Element (TASE.2) is to transfer data between control systems and to initiate control actions. Data is represented by object instances. This part of IEC 60870 proposes object models from which to define object instances. The object models represent objects for transfer. The local system may not maintain a copy of every attribute of an object instance.

The object models presented herein are specific to "control centre" or "utility" operations and applications; objects required to implement the TASE.2 protocol and services are found in IEC 60870-6-503. Since needs will vary, the object models presented here provide only a base; extensions or additional models may be necessary for two systems to exchange data not defined within this standard.

It is by definition that the attribute values (i.e. data) are managed by the owner (i.e. source) of an object instance. The method of acquiring the values are implementation dependent; therefore accuracy is a local matter.

The notation of the object modelling used for the objects specified in clause 5 is defined in IEC 60870-6-503. It should be noted that this part of IEC 60870 is based on the TASE.2 services and protocol. To understand the modelling and semantics of this standard, some basic knowledge of IEC 60870-6-503 is recommended.

Clause 5 describes the control centre-specific object models and their application. They are intended to provide information to explain the function of the data.

Clause 6 defines a set of MMS type descriptions for use in exchanging the values of instances of the defined object models. It is important to note that not all attributes of the object models are mapped to types. Some attributes are described simply to define the processing required by the owner of the data and are never exchanged between control centres. Other attributes are used to determine the specific types of MMS variables used for the mapping, and therefore do not appear as exchanged values themselves. A single object model may also be mapped onto several distinct MMS variables, based on the type of access and the TASE.2 services required.

Clause 7 describes the mapping of instances of each object type MMS variables and named variable lists for implementing the exchange.

Clause 8 describes device-specific codes and semantics to be used with the general objects.

An informative annex is included which describes some typical interchange scheduling scenarios, along with the use of TASE.2 objects to implement the schedule exchange.

TELECONTROL EQUIPMENT AND SYSTEMS –

Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Object models

1 Scope

This part of IEC 60870 specifies a method of exchanging time-critical control centre data through wide-area and local-area networks using a full ISO compliant protocol stack. It contains provisions for supporting both centralized and distributed architectures. The standard includes the exchange of real-time data indications, control operations, time series data, scheduling and accounting information, remote program control and event notification.

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 60870-5-101:1995, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 101: Companion standard for basic telecontrol tasks*

IEC 60870-6-503:2002, *Telecontrol equipment and systems – Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – Section 503: TASE.2 Services and protocol*

ISO 9506-1:2000, *Industrial automation systems – Manufacturing message specification – Part 1: Service definition*

ISO 9506-2:2000, *Industrial automation systems – Manufacturing message specification – Part 2: Protocol specification*

3 Definitions

For the purposes of this part of IEC 60870, the definitions in the above referenced standards apply.

4 Abbreviations

For the purposes of this part of IEC 60870, all the abbreviations defined in the above referenced standards apply.

5 Object models

Object models are required for various functions within a system. This clause delineates abstract object models based on functionality. Object models within one functional area may be used in another functional area.

5.1 Supervisory Control and Data Acquisition

The object models in this clause are derived from the historical perspective of Supervisory Control and Data Acquisition (SCADA) systems. The following text presents the context within which the object models are defined.

Fundamental to SCADA systems are two key functions: control and indication. The control function is associated with the output of data whereas the indication function is associated with the input of data. A more recent concept that is finding usage is the control and indication function where data output may also be input (i.e. bi-directional).

The previous identified functions within SCADA systems are mapped to point equipment (point). The primary attribute of a point is the data value. SCADA systems define three types of data for points: analog, digital and state.

The association of one or more points together is used to represent devices. For example, a breaker device may be represented by a control point and an indication point. The control point represents the new state that one desires for the breaker device. The indication point represents the current state of the breaker device. For SCADA to SCADA data exchange (e.g. control centre to control centre, control centre to SCADA master, etc.), additional data is often associated with point data. Quality of point data is often exchanged to defined whether the data is valid or not. In addition, for data that may be updated from alternate sources, quality often identifies the alternate source. Select-Before-Operate control is associated with Control Points for momentary inhibiting access except from one source. Two other informative data values are: time stamp and change of value counter. The time stamp, when available, details when a data value last changed. The change of value counter, when available, details the number of changes to the value.

From the context presented, the primary object models required are: Indication Point, and Control Point. The attributes Point Value, Quality, Select-Before-Operate, Time Stamp, and Change of Value Counter are required to meet the desired functionality for data exchange. The Indication Point and Control Point models may be logically combined to a single model to represent a device which implements a control function with a status indication as to its success/failure. The combined logical model will result in the same logical attributes, and map onto the same MMS types as the independent models.

5.1.1 IndicationPoint Object

An IndicationPoint object represents an actual input point.

Object: **IndicationPoint** (Read Only)
- Key Attribute: PointName
- Attribute: PointType (REAL, STATE, DISCRETE)
- Constraint PointType=REAL
  - Attribute: PointRealValue
- Constraint PointType=STATE
  - Attribute:PointStateValue
- Constraint PointType=DISCRETE
  - Attribute: PointDiscreteValue
- Attribute: QualityClass: (QUALITY, NOQUALITY)

Constraint: QualityClass = QUALITY
Attribute: Validity (VALID, HELD, SUSPECT, NOTVALID)
Attribute: CurrentSource (TELEMETERED, CALCULATED, ENTERED, ESTIMATED)
Attribute: NormalSource (TELEMETERED, CALCULATED, ENTERED, ESTIMATED)
Attribute: NormalValue (NORMAL,ABNORMAL)
Attribute: TimeStampClass: (TIMESTAMP, TIMESTAMPEXTENDED, NOTIMESTAMP)
Constraint: TimeStampClass = TIMESTAMP
Attribute: TimeStamp
Attribute: TimeStampQuality: (VALID, INVALID)
Constraint: TimeStampClass = TIMESTAMPEXTENDED
Attribute: TimeStampExtended
Attribute: TimeStampQuality: (VALID, INVALID)
Attribute: COVClass: (COV, NOCOV)
Constraint: COVClass = COV
Attribute: COVCounter

PointName
The PointName attribute uniquely identifies the object.

PointType
The PointType attribute identifies the type of input point, and must be one of the following: REAL, STATE, DISCRETE.

PointRealValue
The current value of the IndicationPoint, if the PointType attribute is REAL.

PointStateValue
The current value of the IndicationPoint, if the PointType attribute is STATE.

PointDiscreteValue
The current value of the IndicationPoint, if the PointType attribute is DISCRETE.

QualityClass
The QualityClass has the value QUALITY if the object instance has any of the quality attributes (Validity, CurrentSource, or NormalValue), and takes the value NOQUALITY if none of the attributes are present.

Validity
The Validity attribute specifies the validity or quality of the PointValue data it is associated with. These are based on the source system's interpretation as follows:

Validity	Description
VALID	Data value is valid
HELD	Previous data value has been held over. Interpretation is local
SUSPECT	Data value is questionable. Interpretation is local
NOTVALID	Data value is not valid

CurrentSource
The CurrentSource attribute specifies the current source of the PointValue data it is associated with as follows:

CurrentSource	Description
TELEMETERED	The data value was received from a telemetered site
CALCULATED	The data value was calculated based on other data values
ENTERED	The data value was entered manually
ESTIMATED	The data value was estimated (State Estimator, etc.)

NormalSource
The NormalSource attribute specifies the normal source of the PointValue data it is associated with as follows:

NormalSource	Description
TELEMETERED	The data value is normally received from a telemetered site
CALCULATED	The data value is normally calculated based on other data values
ENTERED	The data value is normally entered manually
ESTIMATED	The data value is normally estimated (State Estimator, etc.)

NormalValue
The NormalValue attribute reports whether value of the PointValue attribute is normal. Only one bit is set, it is defined as follows:

NormalValue	Description
NORMAL	The point value is that which has been configured as normal for the point
ABNORMAL	The point value is not that which has been configured as normal for the point

TimeStampClass
The TimeStampClass attribute has the value TIMESTAMP or TIMESTAMPEXTENDED if the IndicationPoint is time stamped, and has the value NOTIMESTAMP if the IndicationPoint contains no TimeStamp attribute.

TimeStamp
The TimeStamp attribute provides a time stamp (with a minimum resolution of one second) of when the value (attribute PointRealValue, PointStateValue or PointDiscreteValue) of the IndicationPoint was last changed. It is set at the earliest possible time after collection of the IndicationPoint value from the end device.

TimeStampExtended
The TimeStampExtended attribute provides a time stamp (with a resolution of one millisecond) of when the value (attribute PointRealValue, PointStateValue or PointDiscreteValue) of the IndicationPoint was last changed. It is set at the earliest possible time after collection of the IndicationPoint value from the end device.

TimeStampQuality
The TimeStampQuality attribute has the value VALID if the current value of the TimeStamp attribute contains the time stamp of when the value was last changed, and has the value INVALID at all other times.

COVClass
The COVClass (**C**hange **O**f **V**alue Counter) attribute has the value COV if the IndicationPoint contains a COVCounter attribute, otherwise it has the value NOCOV.

COVCounter
The COVCounter attribute specifies the number of times the value (attribute PointRealValue, PointStateValue, or PointDiscreteValue) of the IndicationPoint has changed. It is incremented each time the owner sets a new value for the IndicationPoint.