IEC 60870-6-802

Edition 3.0 2014-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

IEC 60870-6-802:2014-07(en-fr)

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue
Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org
Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 60870-6-802

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**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**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

CONTENTS

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 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, access to 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.

International Standard IEC 60870-6-802 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This third edition cancels and replaces the second edition published in 2002 and its amendment 1 (2005). This edition constitutes a technical revision.

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

a) Accounts, Programs, Event Enrollment and Event Condition objects have been changed from informative to normative. As a result, the conformance tables have been updated.

b) The services associated with Accounts, Programs, Event Enrollment and Event Conditions are now out of scope.

c) The TASE.2 conformance blocks 6, 7, 8 and 9 have been made out of scope.

d) The MMS Mappings for Accounts, Programs, Event Enrollment and Event Condition objects have been changed from normative to informative.

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

FDIS	Report on voting
57/1455/FDIS	57/1479/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.

A list of all parts in the IEC 60870 series, published under the general title *Telecontrol equipment and systems*, 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 web site 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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 is 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. 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 would be advisable.

The notation of the object modelling used for the objects specified in Clause B.2 is defined in IEC 60870-6-503. This part of IEC 60870-6 is based on the TASE.2 services and protocol. To understand the modelling and semantics of this part of IEC 60870-6, some basic knowledge of IEC 60870-6-503 would be advisable.

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.

Clause 9 is the standards conformance table.

An informative Annex A 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60870-5-101:2003, *Telecontrol equipment and systems – Part 5-101: Transmission protocols – Companion standard for basic telecontrol tasks*

IEC 60870-6-503:2014, *Telecontrol equipment and systems – Part 6-503: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Services and protocol*

ISO 9506-1:2003, *Industrial automation systems – Manufacturing Message Specification – Part 1: Service definition*

ISO 9506-2:2003, *Industrial automation systems – Manufacturing Message Specification – Part 2: Protocol specification*

3   Terms and definitions

For the purposes of this part of IEC 60870, the terms and 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

5.1   General

Object models are required for various functions within a system. Clause 5 delineates abstract object models based on functionality. Object models within one functional area may be used in another functional area.

5.2   Supervisory Control and Data Acquisition

5.2.1   General

The object models in this clause are derived from the historical perspective of Supervisory Control and Data Acquisition (SCADA) systems. This subclause 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.

5.2.2   IndicationPoint object

An IndicationPoint object represents an actual input point.

Object: **IndicationPoint** (Read Only)
    Key Attribute: PointName
    Attribute: PointType (REAL, STATE, DISCRETE, STATESUPPLEMENTAL)
    Constraint PointType=REAL
        Attribute: PointRealValue
    Constraint PointType=STATE
        Attribute:PointStateValue
    Constraint PointType=DISCRETE
        Attribute: PointDiscreteValue
    Constraint PointType= STATESUPPLEMENTAL
        Attribute:PointStateSupplementalValue
    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, STATESUPPLEMENTAL.

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.

PointStateSupplementalValue

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

A PointStateSupplementalValue shall have the ability to indicate the current value (State), tagging information (Tag), and the expected value/state (ExpectedState). If the ExpectedState value does not match the State value, this indicates that the provider of the ExpectedState value is indicating a potential issue.

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, PointDiscreteValue, or PointStateSupplementalValue) 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, PointDiscreteValue, or PointStateSupplementalValue) 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, PointDiscreteValue, or PointStateSupplementalValue) of the IndicationPoint has changed. It is incremented each time the owner sets a new value for the IndicationPoint.

5.2.3   ControlPoint Object

A ControlPoint Object is an integral part of the services provided by TASE.2. It is used to represent values of various types of data typical of SCADA and energy management systems. Typically, a ControlPoint object will be associated with some real world object.

Object: **ControlPoint**   (Write Only, except for attributes CheckBackName, Tag, State and Reason)
     Key Attribute: ControlPointName
     Attribute: ControlPointType: (COMMAND, SETPOINT)
     Constraint: ControlPointType = COMMAND
          Attribute: CommandValue
     Constraint: ControlPointType = SETPOINT
          Attribute: SetPointType: (REAL, DISCRETE)
          Constraint SetpointType=REAL
               Attribute: SetpointRealValue
          Constraint SetpointType=DISCRETE
               Attribute: SetpointDiscreteValue
     Attribute: DeviceClass: (SBO, NONSBO)
     Constraint: DeviceClass = SBO
          Attribute: CheckBackName
          Attribute: State: (SELECTED, NOTSELECTED)
          Attribute: Timeout
     Attribute: TagClass: (TAGGABLE, NONTAGGABLE)
     Constraint: TagClass = TAGGABLE
          Attribute: Tag: (NO-TAG, OPEN-AND-CLOSE-INHIBIT, CLOSE-ONLY-INHIBIT)
          Attribute: State: (IDLE, ARMED)
          Attribute: Reason

ControlPointName

The ControlPointName attribute uniquely identifies the object.

ControlPointType

The value of the ControlPointType attribute for an instance of a ControlPoint will be COMMAND or SETPOINT, indicating the type of controlled device.

CommandValue

The CommandValue attribute indicates the command for a device.

SetPointType

The value of the SetPointType attribute for an instance of a ControlPoint of ControlPointType SETPOINT will be REAL or DISCRETE, indicating the type of setpoint.

SetPointRealValue

The SetPointRealValue attribute may be set with the floating point value requested for the setpoint control.

SetPointDiscreteValue

The SetPointDiscreteValue attribute may be set with the integer value requested for the setpoint control.

DeviceClass

The DeviceClass attribute of an instance of a ControlPoint has the value SBO if the device requires a Select operation before being operated, and the value NONSBO otherwise.

CheckBackName

The CheckBackName attribute contains a symbolic description of the physical object being controlled. This data is returned by the system operating the physical object to the system requesting the operation so that the person or system requesting the operation can be assured the proper object has been selected.

State

The State attribute indicates whether the ControlPoint is SELECTED or NOTSELECTED.

Timeout

The Timeout attribute of an instance of a ControlPoint has the value of the maximum allowed time for which the ControlPoint of DeviceClass SBO may remain SELECTED before operation.

TagClass

The TagClass attribute of an instance of a ControlPoint has the value TAGGABLE if the instance contains a Tag attribute, and otherwise has the value NONTAGGABLE.

Tag

The Tag attribute indicates whether or not the ControlPoint is tagged, and if it is, what the level of tagging is. The Tag attribute can take on the values NO-TAG, OPEN-AND-CLOSE-INHIBIT, CLOSE-ONLY-INHIBIT.

Reason

The Reason attribute contains a message that indicates the reason for tagging.

5.2.4   Protection Equipment Event Object Model

The following object model represents the events generated in the operation of protection equipment. Start events are generated by the protection equipment when it detects faults. Trip events report commands to output circuits which are generated by the protection equipment when it decides to trip the circuit-breaker. Both events are transient information. The protection event models are based on IEC 60870-5-101.

Object: **ProtectionEvent**
      KeyAttribute: Name
      Attribute: ElapsedTimeValidity (VALID, INVALID)
      Attribute: Blocked (NOTBLOCKED, BLOCKED)
      Attribute: Substituted (NOTSUBSTITUTED, SUBSTITUTED)
      Attribute: Topical (TOPICAL, NOTTOPICAL)
      Attribute: EventValidity (VALID, INVALID)
      Attribute: ProtectionClass (SINGLE, PACKED)
      Constraint: ProtectionClass = SINGLE
            Attribute: EventState (INDETERMINATE, OFF, ON)
            Attribute: EventDuration
            Attribute: EventTime
      Constraint: ProtectionClass = PACKED
            Attribute: EventClass (START, TRIP)
            Constraint: EventClass = START
                  Attribute: StartGeneral (NOSTART, START)
                  Attribute: StartPhase1 (NOSTART, START)
                  Attribute: StartPhase2 (NOSTART, START)
                  Attribute: StartPhase3 (NOSTART, START)
                  Attribute: StartEarth (NOSTART, START)
                  Attribute: StartReverse (NOSTART, START)
                  Attribute: DurationTime
                  Attribute: StartTime
            Constraint: EventClass = TRIP
                  Attribute: TripGeneral (NOTRIP, TRIP)
                  Attribute: TripPhase1 (NOTRIP, TRIP)
                  Attribute: TripPhase2 (NOTRIP, TRIP)
                  Attribute: TripPhase3 (NOTRIP, TRIP)
                  Attribute: OperatingTime
                  Attribute: TripTime

Name

The Name attribute uniquely identifies the protection event.