

Fernwirkereinrichtungen und -systeme

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

(IEC 60870-6-802:2002) Deutsche Fassung EN 60870-6-802:2002, Text Englisch

DIN**EN 60870-6-802**

ICS 33.200

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); German version EN 60870-6-802:2002,
text in English

Ersatz für
DIN EN 60870-6-802:1998-08.
Siehe Beginn der Gültigkeit.

Matériels et systèmes de téléconduite –
Partie 6-802: Protocoles de téléconduite compatible avec les normes
ISO et les recommandations de l'UIT-T – Modèles d'objets TASE.2
(CEI 60870-6-802:2002); Version allemande EN 60870-6-802:2002,
texte en anglais

Die Europäische Norm EN 60870-6-802:2002 hat den Status einer Deutschen Norm.

Beginn der Gültigkeit

Die EN 60870-6-802 wurde am 2002-05-01 angenommen.

Daneben darf DIN EN 60870-6-802:1998-08 noch bis 2005-05-01 angewendet werden.

Nationales Vorwort

Für die vorliegende Norm ist das nationale Arbeitsgremium K 952 „Netzleittechnik“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE zuständig. Die Federführung lag beim AK 952.0.7 „Fernwirkprotokolle, kompatibel mit ISO-Normen und ITU-T-Empfehlungen“ des K 952.

Norm-Inhalt war veröffentlicht als E DIN IEC 57/455/CD:2000-10.

Die enthaltene IEC-Publikation wurde vom TC 57 „Power system control and associated communications“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zum Jahr 2004 unverändert bleiben soll. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

- bestätigt,
- zurückgezogen,
- durch eine Folgeausgabe ersetzt oder
- geändert.

Die Internationale Norm IEC 60870-6-802:2002-04 „Telecontrol equipment and systems – Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – Section 802: TASE.2 Object models“ ist unverändert von CENELEC als Europäische Norm EN 60870-6-802:2002-05 und somit in das Deutsche Normenwerk übernommen worden (in der vorliegenden Norm mit geänderten Seitenzahlen).

Fortsetzung Seite 2 bis 6
und 80 Seiten EN

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird mit der Deutschen Fassung der von CENELEC für EN 60870-6-802 beschlossenen ergänzenden Festlegungen die Englische Fassung der IEC 60870-6-802 veröffentlicht. Hinzu kommt, dass die meisten Internationalen Normen, auf die darin verwiesen wird, in ihren englischen Originaltexten als Europäische Normen übernommen und dann teilweise ebenso als Deutsche Normen veröffentlicht wurden, z. B. alle Normen, die sich auf das Basis-Referenzmodell für die Kommunikation Offener Systeme (OSI-Referenzmodell [en: Open Systems Interconnection]) nach ISO/IEC 7498-1 beziehen. Um die Anwendung der vorliegenden Norm zu erleichtern, wurden die nachfolgende Einführung sowie ein Verzeichnis der Abkürzungen und eine englisch-deutsche Fachwörterliste vorangestellt.

Das Präsidium des DIN hat mit Präsidialbeschluss 13/1983 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Änderungen

Gegenüber DIN EN 60870-6-802:1998-08 wurden folgende Änderungen vorgenommen:

- a) in 5.1.1, Objekt „IndicationPoint“: Attribut „TimeStampClass“ um „TIMESTAMPEXTENDED“ ergänzt sowie Zwangsbedingung [en: constraint] „TimeStampClass“ mit den Attributen „TimeStampExtended“ und „TimeStampQuality“ eingefügt;
- b) in 5.2.1 Attribut „TransactionCode“ (mit Tabelle) aufgenommen und Attribut „TransferAccountName“ gestrichen;
- c) in 5.2.4 Festlegung des Attributs „Duration“ geändert („StartTime“ statt „StartHour“);
- d) 1. Absatz von 5.4 um 3. Satz ergänzt;
- e) in 5.5.2 Festlegung des Attributs „LFC“ geändert;
- f) neue Abschnitte 5.6 „General Data Report Object“ und 5.7 „General Data Response Object“ aufgenommen;
- g) in 6.1.1 zusätzlichen grundlegenden MMS-Typ [en: MMS foundation type] „Data_TimeStamp Extended“ sowie zusätzliche MMS-Komplextypen [en: MMS complexe types] „Data_RealQTimeTagExtended STRUCTURE“, „Data_StateQTimeTagExtended STRUCTURE“ und „Data_DiscreteQTimeTagExtended STRUCTURE“ aufgenommen;
- h) in 6.2 grundlegende MMS-Typen „Data_Real“, „Price“ und „TransactionAmount“ geändert, „TimeIntervalString“ gestrichen und „TransactionCode“ aufgenommen;
- i) neuen Abschnitt 6.2.3 „Transmission Segment Type Descriptions“ mit „TATransmissionSegmentProfile STRUCTURE“ aufgenommen und anschließende Abschnittsnummern in 6.2.4 und 6.2.5 geändert;
- j) in 6.3 grundlegenden MMS-Typ „Data_Real“ geändert und „OutageAmountTypeId“ aufgenommen sowie „COMPONENT OutageTypeAmount“ unter „DONewRevSched STRUCTURE“ und „COMPONENT DeviceName“ unter „DOCancel STRUCTURE“ eingefügt;
- k) in 6.4 Festlegung zum Typ „InfoBufXX“ ergänzt und Beispiel aufgenommen;
- l) in 6.5 grundlegende MMS-Typen „Capacity“, „Price“ und „RampRate“ geändert;
- m) in 6.5.1 Hinweis zu „COMPONENT Impact“ gestrichen;
- n) in 6.7 Festlegungen der „MMS Named Variables“ b), c) und d) ergänzt, anschließende Typdefinition „FloatArrayXX“ geändert sowie um Typ „Text32ArrayXX“ und Beispiel ergänzt;
- o) neue Abschnitte 6.8 „GeneralDataReport Type Descriptions“ und 6.9 „GeneralDataResponse Type Descriptions“ aufgenommen;
- p) in 7.1.1 Tabelle zu „PointType“ um drei zusätzliche Zeilen für „TIMESTAMPEXTENDED“ ergänzt sowie Absatz „The PointType attribute ...“ und Festlegung zu „TimeStampClass“ geändert;
- q) in 7.2.1 Festlegungen zu „ListOfTransmissionSegment“ und „ListOfPeriodicValues“ geändert; unter „The specific mapping of the Transfer Account Object attributes ...“ Festlegung zu „BuyingAgent“ geändert und „TransactionCode“ aufgenommen; Festlegungen unter „ListOfTransmissionSegment“ und „ListOfPeriodicValues“ geändert;
- r) in 7.2.2 unter der neuen Überschrift „7.2.2.1 TATransmissionSegment“ Attribute „NumberFloatIds“ und „NumberIntegerIds“ eingefügt sowie neuen Abschnitt 7.2.2.2 „TATransmissionSegmentProfile“ aufgenommen;
- s) in 7.2.3 „ProfileEnergy“ und „ProfileCapacity“ geändert;

- t) in 7.3 „OutagePeriod“, „OutageType“ und „OutageAmountType“ geändert;
- u) in 7.4 Variablentyp „InfoMessHeader“ anstelle von „InfoBufHeader“ eingesetzt (fünfmal);
- v) in 7.5.3 Aufzählung zu „ListOfForecasts“ ergänzt und geändert;
- w) neue Abschnitte 7.6 „General Data Report Mapping“ und 7.7 „General Data Response Mapping“ aufgenommen;
- x) Einleitung zu Abschnitt 8 geändert und ergänzt;
- y) Abschnitte 8.3 bis 8.5 gestrichen.

Frühere Ausgaben

DIN EN 60870-6-802:1998-08

Einführung

Die vorliegende Norm ist Teil einer Reihe von Normen für Fernwirkaufgaben in der Netzleittechnik auf der Basis des sieben Schichten und Protokolle definierenden OSI-Referenzmodells nach ISO/IEC 7498-1 in Verbindung mit MMS, der Festlegung der Nachrichtenformate für Fertigungszwecke [en: Manufacturing Message Specification] nach ISO 9506-1. Zu den Normen über das Fernwirk-Anwendungs-Dienstelement Nr. 2 (TASE.2) [en: Telecontrol Application Service Element No. 2] gehören zurzeit insbesondere die folgenden Internationalen Normen (angegeben nur Originaltitel der Hauptabschnitte, ergänzt um Angabe der betreffenden OSI-Schichten nach ISO/IEC 7498-1):

IEC 60870-6-503	TASE.2 Services and protocol (OSI-Schicht 7);
IEC/TR 60870-6-505	TASE.2 User Guide;
IEC 60870-6-601	Functional profile for providing the connection-oriented transport service in an end system connected via permanent access to a packet switched data network (OSI-Schichten 1 bis 4 mit ITU-T X.25);
IEC 60870-6-702	TASE.2 Application service in end systems (OSI-Schichten 5 bis 7);
IEC 60870-6-802	TASE.2 Object models (OSI-Schicht 7).

DIN EN 60870-6-802 beschreibt die ausgetauschten Objekte. Das Objektmodell ist vom TASE.2-Protokoll vollständig entkoppelt und damit flexibel und offen für Erweiterungen. Es ist für die Übermittlung von Objekten beliebiger Struktur und Komplexität ausgelegt. Für die Kommunikation z. B. zwischen Netzleitstellen des Transportnetzes werden spezifische Objekte wie Transitfahrpläne bereitgestellt. Ebenso gibt es spezifische Objekte z. B. für den Einsatz von Kraftwerken im Rahmen des Energieführungssystems (EMS) [en: energy management system] und für Überwachen, Steuern und Daten erfassen (SCADA) [en: supervisory, control and data acquisition] der Stationen des Netzes. Das Objektmodell für die Kommunikation mit Stationen ist inhaltlich weitgehend mit DIN EN 60870-5-101 abgestimmt. So enthält es auch die dort definierten Schutzdatensätze.

Weitere einführende Erläuterungen siehe Nationales Vorwort zu DIN EN 60870-6-503:2003-02.

Abkürzungen

(soweit in dieser Norm nicht für Programmierzwecke verwendet)

ACE	Regelabweichung der Regelzone [en: area control error]
ASCII	Code für Informationsaustausch nach Amerikanischer Norm [en: American Standard Code for Information Interchange]
ASN.1	Notation Eins für darstellungsunabhängige Syntax [en: abstract syntax notation one]
COV	Anzahl der Wertänderungen [en: change of value]
DCS	verteiltes Erzeugungs-Leitsystem [en: distributed control system]
EMS	Energieführungssystem [en: energy management system]
en	englisch
GCS	Erzeugungs-Leitsystem [en: generation control system]
GMT	nach IEC 713-05-19 abgelehnte Abkürzung für: Weltzeit (UT) [en: universal time (statt: Greenwich mean time)]

DIN EN 60870-6-802:2003-02

ICCP	Protokoll zur Kommunikation zwischen Netzleitstellen [en: inter-control center communications protocol]; identisch mit TASE.2
IEV	Internationales Elektrotechnisches Wörterbuch [en: International Electrotechnical Vocabulary], siehe Normen der Reihe IEC 60050
ISO	Internationale Organisation für Normung [en: International Organization for Standardization], Genf
ITU	Internationale Fernmeldeunion [en: International Telecommunication Union], Genf
ITU-T	Telekommunikations-Standardisierungssektor [en: Telecommunication Standardization Sector] der ITU
LFC	Leistungsfrequenzregelung [en: load frequency control]
MMS	Nachrichtenformat für Fertigungszwecke [en: Manufacturing Message Specification]
OSI	Kommunikation Offener Systeme [en: Open Systems Interconnection]
PDU	Protokolldateneinheit [en: protocol data unit]
SBO	Anwahl vor Ausführung [en: select-before-operate]
SCADA	Überwachen, Steuern und Datenerfassen [en: supervisory control and data acquisition]
TASE	Fernwirk-Anwendungs-Dienstelement [en: telecontrol application service element]; TASE.2 identisch mit ICCP
UTC	koordinierte Weltzeit [en: coordinated universal time]

Englisch-deutsche Fachwörterliste

Siehe Verzeichnis der Abkürzungen und Fachwörterliste in DIN EN 60870-6-503:2003-02.

Nationaler Anhang NA (informativ)

Zusammenhang mit Europäischen und Internationalen Normen

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm oder andere Unterlage ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm oder anderen Unterlage.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm oder anderen Unterlage.

Eine Information über den Zusammenhang der zitierten Normen und anderen Unterlagen mit den entsprechenden Deutschen Normen und anderen Unterlagen ist nachstehend wiedergegeben (geordnet nach der Spalte „Internationale Norm“, ersatzweise nach der Spalte „Europäische Norm“; ohne Anspruch auf Vollständigkeit). Siehe auch Anhang NB.

In Abschnitt 2 oder Anhang ZA fehlerhafte Angaben, fehlende Publikationen oder, falls zutreffend, Neuausgaben sind in Tabelle NA.1 oder in Anhang NB korrigiert bzw. zusätzlich angegeben.

IEC hat 1997 die Benummerung der IEC-Publikationen geändert. Zu den bisher verwendeten Normnummern wird jeweils 60000 addiert. So ist zum Beispiel aus IEC 870 nun IEC 60870 geworden.

Tabelle NA.1

Europäische Norm	Internationale Norm	Deutsche Norm
–	IEC 60050-713:1998	IEV-Kapitel 713:1999
EN 60870-5-101:1996	IEC 60870-5-101:1995	DIN EN 60870-5-101:1996-10
EN 60870-5-101/A1:2000	IEC 60870-5-101/A1:2000	DIN EN 60870-5-101/A1:2001-11
EN 60870-5-101/A2:2001	IEC 60870-5-101/A2:2001	DIN EN 60870-5-101/A2:2002-10
EN 60870-6-2:1995	IEC 60870-6-2:1995	DIN EN 60870-6-2:1997-06
EN 60870-6-503:2002	IEC 60870-6-503:2002	DIN EN 60870-6-503:2003-02
–	IEC/TR 60870-6-505:2002	–
EN 60870-6-601:1995	IEC 60870-6-601:1994	DIN EN 60870-6-601:1995-09
EN 60870-6-702:1998	IEC 60870-6-702:1998	DIN EN 60870-6-702:2000-02
–	ISO/IEC 7498-1:1994	–
–	ISO 9506-1:2000 ^{a)}	DIN 66306-1:1992-09 DIN 66306-1/A1:1994-06 DIN 66306-1/A2:1996-10
–	ISO 9506-2:2000 ^{a)}	DIN 66306-2:1992-09 DIN 66306-2/A1:1994-06 DIN 66306-2/A2:1996-10
a) Nicht übereinstimmend.		

Nationaler Anhang NB (informativ)

Literaturhinweise

DIN 66306-1, *Industrielle Automation und Integration – Festlegung der Nachrichtenformate für Fertigungszwecke – Definition der Dienste; Identisch mit ISO/IEC 9506-1:1990*

DIN 66306-2, *Industrielle Automation und Integration – Festlegung der Nachrichtenformate für Fertigungszwecke – Definition der Protokolle; Identisch mit ISO/IEC 9506-2:1990*

DIN EN 60870-5-101, *Fernwirkeinrichtungen und -systeme – Teil 5: Übertragungsprotokolle – Hauptabschnitt 101: Anwendungsbezogene Norm für grundsätzliche Fernwirkaufgaben (IEC 60870-5-101:1995); Deutsche Fassung EN 60870-5-101:1996*

DIN EN 60870-5-101/A1, *Fernwirkeinrichtungen und -systeme – Teil 5-101: Übertragungsprotokolle; Anwendungsbezogene Norm für grundsätzliche Fernwirkaufgaben; Änderung A1 (IEC 60870-5-101:1995/A1:2000); Deutsche Fassung EN 60870-5-101:1996/A1:2000*

DIN EN 60870-5-101/A2, *Fernwirkeinrichtungen und -systeme – Teil 5-101: Übertragungsprotokolle; Anwendungsbezogene Norm für grundsätzliche Fernwirkaufgaben; Änderung A2 (IEC 60870-5-101:1995/A2:2001); Deutsche Fassung EN 60870-5-101:1996/A2:2001*

DIN EN 60870-6-2, *Fernwirkeinrichtungen und -systeme – Teil 6: Fernwirkprotokolle, die mit ISO-Normen und ITU-T-Empfehlungen kompatibel sind – Hauptabschnitt 2: Anwendung der Grundnormen (OSI-Schichten 1 bis 4) (IEC 60870-6-2:1995); Deutsche Fassung EN 60870-6-2:1995*

DIN EN 60870-6-503, *Fernwirkeinrichtungen und -systeme – Teil 6-503: Fernwirkprotokolle, die mit ISO-Normen und ITU-T-Empfehlungen kompatibel sind – TASE.2-Dienste und -Protokoll (IEC 60870-6-503:2002); Deutsche Fassung EN 60870-6-503:2002, Text Englisch*

DIN EN 60870-6-601, *Fernwirkeinrichtungen und -systeme – Teil 6: Fernwirkprotokolle, die mit ISO-Normen und ITU-T-Empfehlungen kompatibel sind – Hauptabschnitt 601: Funktionsprofil für den verbindungsorientierten Transportdienst in einem Endsystem mit Festanschluss an ein paketvermittelndes Datennetz (IEC 60870-6-601:1994); Deutsche Fassung EN 60870-6-601:1995*

DIN EN 60870-6-702, *Fernwirkeinrichtungen und -systeme – Teil 6-702: Fernwirkprotokolle, die mit ISO-Normen und ITU-T-Empfehlungen kompatibel sind – Funktionsprofil für den TASE.2-Anwendungsdienst in Endsystemen (IEC 60870-6-702:1998); Deutsche Fassung EN 60870-6-702:1998, Text Englisch*

IEV Kapitel 713, *Internationales Elektrotechnisches Wörterbuch – Teil 713: Funkverkehr: Sender, Empfänger, Netze und Betrieb; Identisch mit IEC 60050-713:1998-04*

Deutsche Fassung

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

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

Diese Europäische Norm wurde von CENELEC am 2002-05-01 angenommen.

Die CENELEC-Mitglieder sind gehalten, die CEN/CENELEC-Geschäftsordnung zu erfüllen, in der die Bedingungen festgelegt sind, unter denen dieser Europäischen Norm ohne jede Änderung der Status einer nationalen Norm zu geben ist.

Auf dem letzten Stand befindliche Listen dieser nationalen Normen mit ihren bibliographischen Angaben sind beim Zentralsekretariat oder bei jedem CENELEC-Mitglied auf Anfrage erhältlich.

Diese Europäische Norm besteht in drei offiziellen Fassungen (Deutsch, Englisch, Französisch). Eine Fassung in einer anderen Sprache, die von einem CENELEC-Mitglied in eigener Verantwortung durch Übersetzung in seine Landessprache gemacht und dem Zentralsekretariat mitgeteilt worden ist, hat den gleichen Status wie die offiziellen Fassungen.

CENELEC-Mitglieder sind die nationalen elektrotechnischen Komitees von Belgien, Dänemark, Deutschland, Finnland, Frankreich, Griechenland, Irland, Island, Italien, Luxemburg, Malta, den Niederlanden, Norwegen, Österreich, Portugal, Schweden, der Schweiz, der Slowakei, Spanien, der Tschechischen Republik, Ungarn und dem Vereinigten Königreich.

CENELEC

Europäisches Komitee für Elektrotechnische Normung
European Committee for Electrotechnical Standardization
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Vorwort

Der Text des Schriftstücks 57/575/FDIS, vorgesehene 2. Ausgabe von IEC 60870-6-802, ausgearbeitet von IEC TC 57 „Power system control and associated communications“, wurde bei IEC und CENELEC der Parallelen Abstimmung unterworfen und von CENELEC am 2002-05-01 als EN 60870-6-802 angenommen.

Diese Europäische Norm ersetzt EN 60870-6-802:1997.

Nachstehende Daten wurden festgelegt:

- spätestes Datum, zu dem die EN auf nationaler Ebene durch Veröffentlichung einer identischen nationalen Norm oder durch Anerkennung übernommen werden muss (dop): 2003-02-01
- spätestes Datum, zu dem nationale Normen, die der EN entgegenstehen, zurückgezogen werden müssen (dow): 2005-05-01

Anhänge, die als „normativ“ bezeichnet sind, gehören zum Norminhalt.

Anhänge, die als „informativ“ bezeichnet sind, enthalten nur Informationen.

In dieser Norm ist Anhang A informativ und Anhang ZA normativ.

Der Anhang ZA wurde von CENELEC hinzugefügt.

Anerkennungsnotiz

Der Text der Internationalen Norm IEC 60870-6-802:2002 wurde von CENELEC ohne irgendeine Abänderung als Europäische Norm angenommen.

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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.

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 NOTTIMESTAMP 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.

5.1.2 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.

5.1.3 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.

ElapsedTimeValidity

The elapsed time (attribute EventDuration, DurationTime, or OperatingTime depending on the event type) is valid if it was correctly acquired. If the acquisition function detects invalid conditions, the ElapsedTimeValidity attribute is INVALID, otherwise it is VALID.

Blocked

The Blocked attribute is BLOCKED if the value of protection event is blocked for transmission, and is NOTBLOCKED otherwise. The value remains in the state that was acquired before it was blocked. Blocking and deblocking may be initiated by a local lock or by a local automatic cause.

Substituted

The Substituted attribute takes the value SUBSTITUTED if the event was provided by input of an operator (dispatcher) or by an automated source.

Topical

The Topical attribute is TOPICAL if the most recent update was successful, and is NOTTOPICAL if it was not updated successfully during a specified time interval or is unavailable.

EventValidity

The EventValidity attribute takes the value INVALID if the acquisition function recognizes abnormal conditions of the information source, otherwise it is VALID.

ProtectionClass

The ProtectionClass attribute identifies the type of protection event, and must be one of the following: SINGLE or PACKED.

EventState

The EventState attribute of a SINGLE protection event takes the value of the protection event: OFF, ON or INDETERMINATE.

EventDuration

The EventDuration attribute takes the value of the event duration (total time the fault was detected) or operation time (time between start of operation and trip command execution).

EventTime

The EventTime attribute signifies the time of the start of the operation.

EventClass

The type of protection event being reported. The value START signifies a start event, and TRIP signifies a trip event.

StartGeneral

The value NOSTART signifies no general start of operation, and START signifies that the event includes a general start of operation.

StartPhase1

The value NOSTART for StartPhase1 implies that Phase L1 was not involved in the event, START implies that it was involved.

StartPhase2

The value NOSTART for StartPhase2 implies that Phase L2 was not involved in the event, START implies that it was involved.

StartPhase3

The value NOSTART for StartPhase3 implies that Phase L3 was not involved in the event, START implies that it was involved.

StartEarth

The value NOSTART for StartEarth implies that earth current was not involved in the event, START implies that it was involved.

StartReverse

The value NOSTART for StartReverse implies that reverse direction was not involved in the event, START implies that it was involved.

DurationTime

Time in milliseconds from the start of operation until the end of operation.

StartTime

Time of the start of operation of the protection equipment.

TripGeneral

The TripGeneral attribute takes on the value of TRIP if a general command to the output circuit was issued during the operation, NOTRIP otherwise.

TripPhase1

The TripPhase1 attribute takes on the value of TRIP if a command to output circuit Phase L1 command was issued during the operation, NOTRIP otherwise.

TripPhase2

The TripPhase2 attribute takes on the value of TRIP if a command to output circuit Phase L2 command was issued during the operation, NOTRIP otherwise.

TripPhase3

The TripPhase3 attribute takes on the value of TRIP if a command to output circuit Phase L3 command was issued during the operation, NOTRIP otherwise.

OperatingTime

The time in milliseconds from the start of operation until the first command to an output circuit was issued.

TripTime

Time of the start of the operation.

5.2 Transfer Accounts

One of the key control centre application requirements is the ability to exchange "scheduling" and "accounting" information. In the utility world, "schedules" is a term that generally means an amount of electrical energy transferred from one system to another on a periodic basis for a certain interval of time under the restrictions of a formal agreement. From a data exchange standpoint, exchanging "schedules" has been expanded to include the exchange of any periodic or profile data for control centre energy scheduling, accounting or monitoring applications. Thus exchanging schedules may also mean exchanging generation, actual interchange, loads, price information, memo accounts, etc. Again, any information may be exchanged if it can be modelled as periodic or profile data.

Schedule accounts and accounting information accounts specify a list of quantities (energy, capacity or some other user-defined quantity) to be exchanged during sequential time periods. These transactions may be specified either as flat periodic values or as ramped profiles. In addition, schedule accounts may contain a list of transmission segments defining the paths used to implement the transaction.

The subclauses below discuss the object models for transfer accounts.

5.2.1 TransferAccount Object

A Transfer Account object represents what, where, when, and how much is transferred between two utilities in a particular account. It may also represent generation schedules and other energy delivery schedules within a utility. It is a container for a number of different attributes and objects which together define the entire transfer account definition, i.e. which account, when is the effective time frame, and what are the periodic or profile values of the data. Refer to annex A for more information concerning how these object definitions relate to each other.

Object: **TransferAccount**

Key Attribute: TransferAccountReference

Attribute: SendUtility
Attribute: ReceiveUtility
Attribute: SellingAgent
Attribute: BuyingAgent
Attribute: TimeStamp
Attribute: TransactionCode
Attribute: NumberOfLocalReference
Attribute: ListOfLocalReference
Attribute: Name
Attribute: TransmissionSegmentOption (INCLUDED, NOTINCLUDED)
Constraint: TransmissionSegmentOption=INCLUDED
 Attribute: NumberOfTransSegments
 Attribute: ListOfTransmissionSegment
Attribute: DataType (PERIODIC, PROFILE)
Constraint: DataType = PERIODIC
 Attribute: StartTime
 Attribute: PeriodResolution
 Attribute: NumberOfPeriods
 Attribute: ListOfPeriodicValues
Constraint: DataType = PROFILE
Attribute: NumberOfProfiles
Attribute: ListOfProfileValues

TransferAccountReference

The TransferAccountReference attribute specifies a unique reference value between the sender and the receiver to identify this particular transfer account.

SendUtility

The SendUtility attribute specifies the utility initially delivering the energy or service.

ReceiveUtility

The ReceiveUtility attribute specifies the utility ultimately receiving the energy or service.

SellingAgent

Currently, the seller is almost always the same as SendUtility. However, as a result of deregulation and open access, it is likely in the future that the seller may be an independent power producer within the area serviced by the SendUtility. Obviously, in such cases it is necessary to distinguish between the seller and the sending utility; this attribute allows such a distinction.

BuyingAgent

Currently, the buyer is almost always the same as ReceiveUtility. However, as a result of deregulation and open access, it is likely in the future that the buyer may be a municipality or cooperative within the area serviced by the ReceiveUtility. Obviously, in such cases it is necessary to distinguish between the buyer and the receiving utility; this attribute allows such a distinction.

TimeStamp

The TimeStamp attribute provides a means for the receiver to know when the sender sent this message. The time stamp indicates when the application created the Transfer Account data for the purpose of transmitting the data. It is not related to the time to which the Transfer Account data itself applies. If the applications providing data to TASE.2 include a transmission (or object creation) time stamp, that time stamp is used. Otherwise, TASE.2 provides the time stamp prior to passing the Transfer Account object to MMS.

TransactionCode

The TransactionCode attribute provides status on the TransferAccount transaction. The values are shown below:

TransactionCode	Description
NEW	Original submittal of a newly proposed schedule or of a report
REQUESTED	Report or schedule is requested via the Account Request operation
REVISED	Revised version of previously sent schedule or report
CONFIRMED	Schedule or report has now been scheduled for actual implementation and is not subject to further approval cycles. A <i>curtailment</i> , <i>halt</i> , <i>revision</i> , or <i>deletion</i> after this stage requires a new schedule or report to be sent
DELETED	Any time the originator of the schedule or report cancels the transaction (for example, due to equipment failure)

NumberOfLocalReference

This attribute contains the count of entries in the ListOfLocalReference.

ListOfLocalReference

The ListOfLocalReference contains locally defined parameters that specify how the Transfer Account Object is to be treated as a whole. For example, it might specify that the schedule or transaction applies to all Mondays during Summer. The meaning of the parameter list is a local matter and is agreed upon among the participating parties for each type of Transfer Account object, for all Transfer Account objects, or for a combination of the two as needed.

Name

The Name attribute provides an option for the user application to include string related information associated with the Transfer Account object. For example, a schedule may need to identify a generating unit by name. Whether or not this attribute is used and its semantics are a local implementation matter.

TransmissionSegmentOption

The TransmissionSegmentOption indicates whether or not a ListOfTransmissionSegments is included in the Transfer Account object. Transmission segments may be included in a Transfer Account object independently of the kind of data the Transfer Account object represents, i.e. it does not have to be included only for energy buy-sell transactions between utilities where wheeling is involved. Transmission segments can be used in any Transfer Account object to convey any information between multiple parties when some of the information is unique to each party and it is desired to provide all of the information in the account to all parties.

NumberOfTransSegments

This attribute defines the number of transmission segments to be included in the report.

ListOfTransmissionSegments

The ListOfTransmissionSegments attribute describes the various transmission paths (or segments) that an interchange schedule may take to get from the SendUtility to the ReceiveUtility, or to describe other information that is significant to intermediate parties of any transaction. Each TransmissionSegment object provided describes one component of the path, or data for one intermediate party. As many or as few TransmissionSegment Objects as required may be added to the list.

Data Type

The data contained in a Transfer Account object can be periodic as is the case of most of the data for generation schedules, energy transactions, and billing. The data can also define a series of ramping requirements which together result in an energy (or price) profile. The DataType attribute indicates which of these two types of data the Transfer Account object contains. Note that a Transfer Account object cannot contain both periodic and profile data. However, there is no restriction on the use of the TransferAccountReference attribute with respect to the object's data type. Therefore, two Transfer Account objects could be transmitted with the same TransferAccountReference; the first would convey periodic type information while the other would convey profile type data.

StartTime

For a Transfer Account object containing periodic data, StartTime specifies the UTC time to which the first time period in the sequence applies.

PeriodResolution

For a Transfer Account object containing periodic data, PeriodResolution specifies the quantity of time to which each entry in the sequence applies.

NumberOfPeriods

This attribute defines the number of time periods being specified in the sequence defined by the Transfer Account object. Together with StartTime and PeriodResolution, it also defines the maximum time frame covered by the Transfer Account.

ListOfPeriodicValues

This attribute contains the bulk of the data associated with the account. For energy transactions, this is the data related to the end-use of the transaction that is, the transaction between the buyer and seller. Information specific to the wheeling partners of each transmission segment is specified in the ListOfTransmissionSegment attribute (if included).

NumberOfProfiles

This attribute defines the number of time periods specified in the ListOfProfileValues.

ListOfProfileValues

The ListOfProfileValues attribute describes profile, or ramping information. The number of ProfileValue objects passed in the message implies the number of inflection point changes in the profile – one for each change.

5.2.2 TransmissionSegment Object

A TransmissionSegment object is used to represent the specifics of a wheeling arrangement where a utility allows another utility the use of its high-voltage transmission grid to transfer energy to a third utility. This object may also be used to convey any information to a utility involved in a multi-utility transaction. The TransmissionSegment may describe either where the energy is to be received and which utility it is coming from (INONLY) or where the energy is to be delivered and which utility is to receive it (OUTONLY). Also a TransmissionSegment object may describe both the in and out utilities and their associated receipt and delivery points (INOUT). Or if the energy is being scheduled directly between two utilities (DIRECT), it may only specify the point of interchange. In addition, the utility providing the service and the utility paying for the transmission service (wheeling) may be specified.

Object: TransmissionSegment

Attribute: TransmissionReference

Attribute: UtilWheeling

Attribute: TransmissionSegType (INONLY, OUTONLY, INOUT, DIRECT)

Constraint: TransmissionSegType = INONLY

Attribute: UtilIn

Attribute: InterchangePtIn

Constraint: TransmissionSegType = OUTONLY

Attribute: UtilOut

Attribute: InterchangePtOut

Constraint: TransmissionSegType = INOUT

Attribute: UtilIn

Attribute: InterchangePtIn

Attribute: UtilOut

Attribute: InterchangePtOut

Constraint: TransmissionSegType = DIRECT

Attribute: InterchangePt

Attribute: UtilPaying

Attribute: ListOfSegmentData

TransmissionReference

The TransmissionReference attribute specifies a value agreed upon between the sender and receiver of the message that further describes the transmission segment (transmission agreement reference number, etc.).

UtilWheeling

The UtilWheeling attribute specifies the utility providing the transmission services (if any).

TransmissionSegType

The TransmissionSegType attribute specifies the type of data in the TransmissionSegment object as follows:

TransmissionSegType	Description
INONLY	The object <u>only</u> specifies which utility the energy is coming from and where it is being received. This object type shall be used when the outbound side of the segment is either not known or not important
OUTONLY	The object <u>only</u> specifies which utility the energy is delivered to and where it is delivered. This object type shall be used when the inbound side of the segment is either not known or not important
INOUT	The object specifies both the in and out utilities and the associated receiving and delivering interchange points
DIRECT	The object specifies only the interchange point between the initial sending utility and the ultimate receiving utility. This object type shall be used when no intermediate utilities are providing transmission services

UtilIn

The UtilIn attribute specifies which utility the inbound energy is coming from.

InterchangePtIn

The InterchangePtIn attribute specifies which interchange point or interface the inbound energy is to be received from UtilIn.

UtilOut

The UtilOut attribute specifies which utility the outbound energy is delivered to.

InterchangePtOut

The InterchangePtOut attribute specifies which interchange point or interface the outbound energy is to be delivered to UtilOut.

InterchangePt

The InterchangePt attribute specifies which interchange point or interface the direct transfer of energy is to take place between SendUtility and RecvUtility.

UtilPaying

The UtilPaying attribute specifies which utility should be billed for any transmission service charges (wheeling, losses, etc.)

ListOfSegmentData

The ListOfSegmentData contains the information specific to the wheeling partners of each transmission segment. This may include data such as the energy transferred through the segment and/or the cost.

5.2.3 ProfileValue Object

A ProfileValue object represents a profile of a quantity or value being exchanged over time. The value may be energy, capacity, price and/or other information. It is represented by specifying a target value, ramp start time and a ramp rate. When a ProfileValue object is received which effects the magnitude of the exchange, the profile moves in the direction of the new target, starting at the time specified by the RampStartTime and at a rate specified by the RampDuration. If a zero is specified for the RampDuration (or it is not passed), the value does not begin to ramp but is implemented instantly at RampStartTime. Upon reaching the target value, it proceeds at a constant level through time. This constant level may be altered or terminated with another ProfileValue object.

Object: ProfileValue

Attribute: RampStartTime

Attribute: RampDuration

Attribute: ProfilePrice

Attribute: TargetClass (ENERGY, CAPACITY, OTHER)

Constraint: TargetClass = ENERGY

Attribute: ProfileEnergy

Constraint: TargetClass = CAPACITY

Attribute: ProfileCapacity

Constraint: TargetClass = OTHER

Attribute: ProfileOther

RampStartTime

The time when the change is to occur.

RampDuration

The length of time that the ramp transition may occur. The units are as specified in the bilateral agreements.

ProfilePrice

The price value is generally expressed in currency units per unit of measure (such as \$/MWH) as defined in bilateral agreements.

TargetClass

The TargetClass attribute determines the type of profile. It takes on the values ENERGY, CAPACITY or OTHER.

ProfileEnergy

The energy value is generally expressed in energy/hours (such as MWH) as defined in bilateral agreements. This attribute exists if the TargetClass attribute is ENERGY.

ProfileCapacity

The capacity value, is generally expressed as a quantity of capacity (such as MW) as defined in bilateral agreements. This attribute exists if the TargetClass attribute is CAPACITY.

ProfileOther

Some other unspecified value as defined in bilateral agreements. Use local interpretation. This attribute exists if the TargetClass attribute is OTHER.

5.2.4 AccountRequest Object

An AccountRequest object is used to request account information. This request may be used for interchange schedule accounts and/or accounting information accounts. This object, when written, will cause the TASE.2 server to generate a TASE.2 Transfer Account Transfer Report (see IEC 60870-6-503) of the requested data. The Transfer Report will contain the identifier AccountRequested as the MMS variable being reported.

Object: AccountRequest

Key Attribute: AccountRequestName
 Attribute: Transfer Account Reference
 Attribute: StartTime
 Attribute: Duration
 Attribute: RequestId
 Attribute: TaConditionRequested

AccountRequestName

The AccountRequestName uniquely identifies the AccountRequest object.

TransferAccountReference

The TransferAccountReference attribute specifies a unique reference value between the sender and the receiver to identify this particular transfer account.

StartTime

The StartTime attribute specifies the starting time that is being requested. This time is specified in seconds.

Duration

The duration attribute specifies the ending time that is being requested. It designates the number of seconds from StartTime.

RequestId

Used to match the response with the request. The value is returned in the Transfer Account report.

TaConditionsRequested

Identifies the type of data being requested.

5.3 Device Outage Object

A DeviceOutage object is used to communicate schedule information regarding device outages. It is composed of a number of objects which define the device which will be (was) affected and describe the time period for which the outage will occur.

Object: **DeviceOutage**

- Key Attribute: OutageReferenceId
- Attribute: OwningUtilityID
- Attribute: Timestamp
- Attribute: StationName
- Attribute: DeviceType (GENERATOR, TRANSFORMER, CAPACITOR, TRANSMISSION_CIRCUIT, BREAKER_SWITCH, INDUCTOR, OTHER)
- Attribute: DeviceName
- Attribute: DeviceNumber
- Attribute: DeviceRating
- Attribute: ActivityDateAndTime
- Attribute: Activity (NEWPLAN, REVISE, CANCEL, ACTUAL)
- Constraint: Activity = NEWPLAN, REVISE
 - Attribute: PlanType (SCHEDULED, ESTIMATED)
 - Attribute: PlannedOpenOrOutOfServiceDateAndTime
 - Attribute: PlannedCloseOrInServiceDateAndTime
 - Attribute: OutagePeriod (CONTINUOUS, DAILY, WEEKDAYS, OTHER)
 - Attribute: OutageType (FORCED, MAINTENANCE, PARTIAL, ECONOMY, UNPLANNED, OTHER)
 - Attribute: OutageAmountType (PARTIAL, FULL)
 - Constraint: OutageAmountType = PARTIAL
 - Attribute: Amount
 - Attribute: UpperOperatingLimit
 - Attribute: LowerOperatingLimit
 - Attribute: Class (INSERVICE, OUTSERVICE)
- Constraint: Activity = ACTUAL
 - Attribute: Action (TRIPPED, OFFLINE, ONLINE, OPEN, CLOSE)
 - Constraint: Action = TRIPPED, OFFLINE, OPEN
 - Attribute: Affected Amount
- Attribute: Comments
- Attribute: OutageEffect

OutageReferenceId

The OutageReferenceId attribute is a unique reference value assigned by the originator for identifying this particular outage.

OwningUtilityID

ID of the utility or control area owning the equipment.

TimeStamp

The TimeStamp attribute provides the time at which a DeviceOutage object was generated.

StationName

Name of station at which the affected equipment, circuit, etc. resides.

DeviceType

Type of the device which is affected.