SVENSK STANDARD SS-EN 60870-6-503

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

Som svensk standard gäller europastandarden EN 60870-6-503:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60870-6-503:2014.

Nationellt förord

Europastandarden EN 60870-6-503:2014

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

utarbetad inom International Electrotechnical Commission, IEC.

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ICS 33.200.00

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EUROPEAN STANDARD

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

Matériels et systèmes de téléconduite - Partie 6-503: Protocoles de téléconduite compatibles avec les normes ISO et les recommandations de l'UIT-T - Services et protocole TASE.2
(CEI 60870-6-503:2014)

Fernwirkeinrichtungen und -systeme - Teil 6-503: Fernwirkprotokolle, die mit ISO-Normen und ITU-T-Empfehlungen kompatibel sind - TASE.2-Dienste und -Protokoll
(IEC 60870-6-503:2014)

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Foreword

The text of document 57/1453/FDIS, future edition 3 of IEC 60870-6-503, prepared by IEC/TC 57 "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60870-6-503:2014.

The following dates are fixed:

– latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-05-19
– latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-08-19

This document supersedes EN 60870-6-503:2002.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60870-6-702	2014	Telecontrol equipment and systems - Part 6-702: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - Functional profile for providing the TASE.2 application service in end systems	EN 60870-6-702	2014
IEC 60870-6-802	2014	Telecontrol equipment and systems - Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Object models	EN 60870-6-802	2014
IEC 61970-452	2013	Energy management system application program interface (EMS-API) - Part 452: CIM static transmission network model profiles	EN 61970-452	2013
IEC 61970-552	2013	Energy Management System Application Program Interface (EMS-API) - Part 552: CIMXML Model Exchange Format	EN 61970-552	2014
IEC/TS 62351-4	2007	Power systems management and associated information exchange - Data and communications security - Part 4: Profiles including MMS	-	-
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	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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TELECONTROL EQUIPMENT AND SYSTEMS –

Part 6-503: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Services and protocol

FOREWORD

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International Standard IEC 60870-6-503 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 constitutes a technical revision.

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

– the following objects were made informative: Accounts, Programs, Event Enrollment, and Event Condition;
– services associated with the informative objects were made informative;
– the TASE.2 conformance blocks 6, 7, 8, and 9 have been made out-of-scope.

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

FDIS	Report on voting
57/1453/FDIS	57/1477/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 the 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The Telecontrol Application Service Element (TASE.2) protocol (also known as Inter-Control Centre Communications Protocol, ICCP) allows for data exchange over Wide Area Networks (WANs) between a utility control centre and other control centres, other utilities, power pools, regional control centres, and Non-Utility Generators. Data exchange information consists of real-time and historical power system monitoring and control data, including measured values, scheduling data, energy accounting data, and operator messages. This data exchange occurs between one control centre's Supervisory Control And Data Acquisition/Energy Management System/Distribution Management System (SCADA/EMS/DMS) host and another centre's host, often through one or more intervening communications processors.

This part of IEC 60870 defines a mechanism for exchanging time-critical data between control centres. In addition, it provides support for device control, general messaging and control of programs at a remote control centre. It defines a standardized method of using the ISO 9506 Manufacturing Message Specification (MMS) services to implement the exchange of data. The definition of TASE.2 consists of three documents. This part of IEC 60870 defines the TASE.2 application modelling and service definitions. IEC 60870-6-702 defines the application profile for use with TASE.2. IEC 60870-6-802 defines a set of standardized object definitions to be supported.

The TASE.2 describes real control centres with respect to their external visible data and behaviour using an object oriented approach. The objects are abstract in nature and may be used in a wide variety of applications. The use of TASE.2 goes far beyond the application in the control centre to control centre communications. This standard must be understood as a tool box for any application domain with comparable requirements. i.e. the TASE.2 may be applied in areas like substation automation, power plants, factory automation, chemical plants, or others which have comparable requirements. It provides a generic solution for advanced Information and Communication Technology.

The TASE.2 version number for this standard is 2001-08. See 8.3.4 for more details.

TELECONTROL EQUIPMENT AND SYSTEMS –

Part 6-503: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Services and protocol

1 Scope

1.1 General

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. This standard includes the exchange of real-time data indications, control operations, time-series data, scheduling and accounting information, remote program control and event notification.

Though the primary objective of TASE.2 is to provide control centre (telecontrol) data exchange, its use is not restricted to control centre data exchange. It may be applied in any other domain having comparable requirements. Examples of such domains are power plants, factory automation, process control automation, and others.

This standard does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system. This standard specifies the externally visible functionality of implementations together with conformance requirements for such functionalities.

1.2 Control centre

The model of a control centre includes four primary classes of host processors: SCADA/EMS, Demand Side Management (DSM)/ Load Management, Distributed Applications, and Display Processors. The SCADA/EMS host is the primary processor, utilizing analogue and digital monitoring data collected at power plants, Non-Utility Generators, and transmission and distribution substations via Data Acquisition Units (DAUs) and Remote Terminal Units (RTUs). The control centre typically contains redundant SCADA/EMS/DMS hosts in a "hot standby" configuration. The DSM/Load Management host(s) are used by either an operator or EMS application to initiate load management activities. The Distributed Application host(s) perform miscellaneous analysis, scheduling, or forecasting functions. Display Processors allow for local operator and dispatcher display and control. Typically, the control centre will contain one or more Local Area Networks (LANs) to connect these various hosts. The control centre will also access several WANs, often through intermediate communications processors. These WAN connections may include the company-wide area network for communications with the corporate host and a distinct real-time SCADA network. Each control centre will also have one or more TASE.2 instances to handle data exchange with remote control centres.

Other classes of host processors like archive systems, engineering stations, or quality control systems (e.g., for data recording according to ISO 9000) may also be included. The application of the TASE.2 control centre model is in principle unlimited. This model provides a common and abstract definition applicable for any real systems which have comparable requirements.

1.3 Architecture

The TASE.2 protocol relies on the use of MMS services (hence the underlying MMS protocol) to implement the control centre data exchange. Figure 1 shows the relationship of TASE.2, the MMS provider, and the rest of the protocol stack. In most cases, the values of objects being transferred are translated from/to the local machine representation automatically by the

local MMS provider. Some TASE.2 objects require a common syntax (representation) and meaning (interpretation) by both communicating TASE.2 systems. This common representation and interpretation constitutes a form of protocol. The control centre applications are not part of this standard. It is assumed that these applications request TASE.2 operations and supply control centre data and functions to the TASE.2 implementation as needed. The specific interface between TASE.2 and the control centre applications is a local issue and not part of this standard.

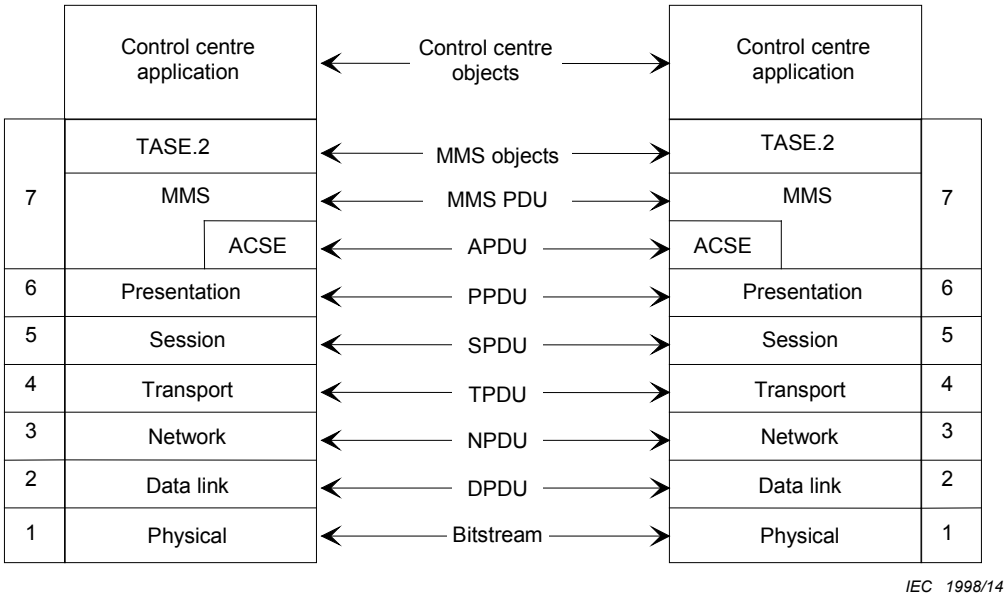


Figure 1 – Protocol relationships

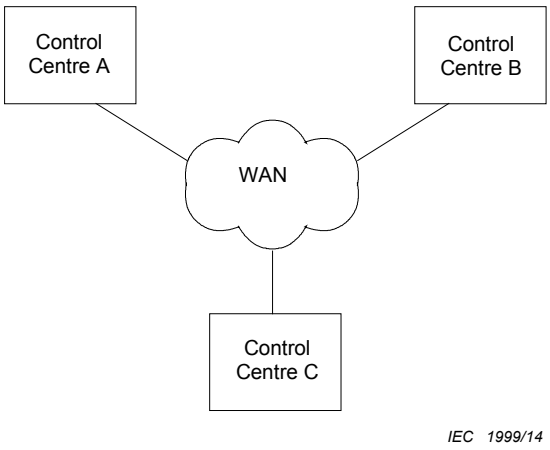
The protocol architecture for TASE.2 requires the use of ISO protocols in layers 5 to 7 of the OSI reference model. The Transport Profiles (layers 1 to 4) can use virtually any standard or de-facto standard (e.g. TCP) connection-mode transport layer and connectionless-mode network layer (e.g., IP) services over any type of transmission media.

1.4 Network Model

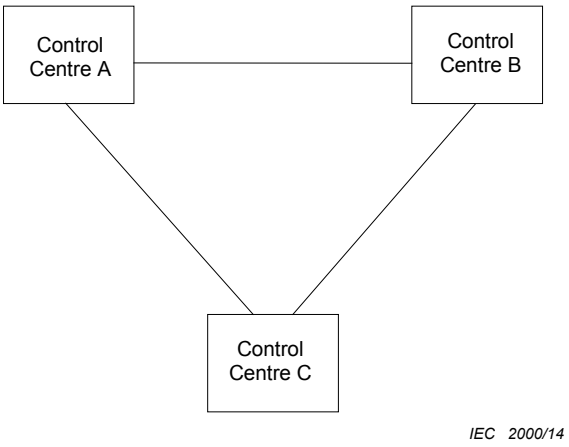
The TASE.2 Data Exchange network can be either a private or public packet-switched or mesh network connecting communications processors which provide adequate routing functionality to allow for redundant paths and reliable service.

Figure 2 shows a typical network topology using a router-based Wide Area Network (WAN). The WAN provides routing and reliable service between control centres (which may include internal networks and routing capabilities).

The mesh network shown in Figure 2 demonstrates the concept of redundant paths for a mesh network. Each control centre maintains its own series of direct circuits, and also provides a mechanism for routing between those direct circuits. Control Centre C provides an alternate routing path for network traffic going from Control Centre A to B. This network configuration requires key control centres to provide significant routing capabilities.



WAN Topology



Mesh Topology

Figure 2 – TASE.2 network topologies

1.5 Relation between TASE.2 and MMS

The TASE.2 resides on top of MMS. It describes a standardized application of MMS using the MMS services and protocol. TASE.2 enhances the functionality of MMS by specifying structured data mapped to MMS objects and assigning specific semantics to it. As an example of pure MMS services, MMS allows reading data from a remote system. The data will be responded without any specific condition. If these data are read depending on very specific conditions (e.g., on change only) then TASE.2 provides appropriate services which are not provided by MMS.

Though the specific requirements agreed upon within the IEC IEC TC 57 have led to the definition of TASE.2 there are several other application domains (outside the control centres) with less, very limited or mixed requirements which might use the TASE.2 services. These other areas are outside the scope of this standard but the use of TASE.2 goes far beyond the specific scope of this standard.

TASE.2 provides an independent and scalable set of services to allow efficient implementations optimized for the respective requirements of a control centre. It does this by defining several conformance building blocks. MMS offers also a scalability of its services specifying MMS Conformance Building Blocks (CBBs). A simple TASE.2 implementation requires only a simple MMS implementation.

TASE.2 and MMS provide their services to their respective users. MMS provides its services to TASE.2 and TASE.2 provides its services to the control centre application. MMS is an independent standard that can provide its services also to users other than TASE.2 – it can serve directly to specific control centre applications and to any other application. This means that the use of MMS is not restricted to TASE.2.

For requirements outside the scope of this standard or for future requirements, for example journaling of data, downloading and uploading of mass data like programs, additional MMS models and services, i.e. Journaling and Domain Loading respective can be applied by a real system in addition to TASE.2. This is possible because the additional application of MMS objects and services is independent of the use of TASE.2 and the use of MMS by TASE.2.

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 60870-6-702:2014, *Telecontrol equipment and systems – Part 6-702: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – Functional profile for providing the TASE.2 application service in end systems*

IEC 60870-6-802:2014, *Telecontrol equipment and systems – Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Object models*

IEC 61970-452:2013*, Energy management system application program interface (EMS-API) – Part 452: CIM Static transmission network model profiles*

IEC 61970-552:2013*, Energy Management System Application Program Interface (EMS-API) – Part 552: CIM XML model exchange format*

IEC/TS 62351-4:2007, *Power systems management and associated information exchange – Data and communications security – Part 4: Profiles including MMS*

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*