SVENSK STANDARD SS-EN 60870-6-503

Fastställd	Utgåva	Sida	Ansvarig kommitté
2002-09-11	2	1 (1+131)	SEK TK 57

Utrustning för fjärrstyrning – Del 6-503: Protokoll för fjärrstyrning kompatibla med ISO-standard och rekommendationer från ITU-T – TASE.2 Tjänster och protokoll

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 60870-6-503:2002. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60870-6-503:2002.

Nationellt förord

Europastandarden EN 60870-6-503:2002[*)]

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 60870-6-503, Second edition, 2002 - 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.

Tidigare fastställd svensk standard SS-EN 60870-6-503, utgåva 1, 1998, gäller ej fr o m 2005-05-01.

[*)] EN 60870-6-503:2002 ikraftsattes 2002-09-11 som SS-EN 60780-6-503 genom offentliggörande, d v s utan utgivning av något svenskt dokument.

ICS 33.200

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Telefon: 08 - 444 14 00. *Telefax*: 08 - 444 14 30
E-post: sek@elstandard.se. *Internet*: www.elstandard.se

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SEK Svensk Elstandard
Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

EUROPEAN STANDARD **EN 60870-6-503**

NORME EUROPÉENNE

EUROPÄISCHE NORM May 2002

ICS 33.200 Supersedes EN 60870-6-503:1997

English version

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

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 60870-6-503:2002)

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)

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 60870-6-503:2002 E

SEK Svensk Elstandard

Foreword

The text of document 57/574/FDIS, future edition 2 of IEC 60870-6-503, prepared by IEC TC 57, Power system control and associated communications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60870-6-503 on 2002-05-01.

This European Standard supersedes EN 60870-6-503:1997.

The following dates were fixed:

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

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A, B and ZA are normative.
Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60870-6-503:2002 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

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

Publication	Year	Title	EN/HD	Year
IEC 60870-6-702	1998	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	1998
IEC 60870-6-802	2002	Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Object models	EN 60870-6-802	2002
ISO/IEC 8073	- [1)]	Information technology - Open systems interconnection - Protocol for providing the connection-mode transport service	-	-
ISO/IEC 8208	2000	Information technology - Data communications - X.25 Packet Layer Protocol for Data Terminal Equipment	-	-
ISO/IEC 8473	Series	Information technology - Protocol for providing the connectionless-mode network service	-	-
ISO/IEC 8802-3	2001	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications	-	-
ISO 9506-1	2000	Industrial automation systems - Manufacturing Message Specification Part 1: Service definition	-	-

[1)] Undated reference.

Publication	Year	Title	EN/HD	Year
ISO 9506-2	2000	Part 2: Protocol specification	-	-
ISO/IEC 9542	- [1)]	Information processing systems - Telecommunications and information exchange between systems - End system to intermediate system routing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode network service (ISO 8473)	-	-
ISO/IEC 10589	1992	Information technology - Telecommunications and information exchange between systems - Intermediate system to intermediate system intra-domain-routing exchange protocol for use in conjunction with the protocol for providing the connectionless-mode network Service (ISO 8473)	-	-
ISO/IEC ISP 10608-1	1992	Information technology - International Standardized Profile TAnnnn - Connection-mode Transport Service over Connectionless-mode Network Service Part 1: General overview and subnetwork-independent requirements	-	-
ISO/IEC ISP 10608-2	1992	Part 2: TA51 profile including subnetwork-dependent requirements for CSMA/CD Local Area Networks (LANs)	-	-
ISO/IEC ISP 10608-5	1992	Part 5: TA1111/TA1121 profiles including subnetwork-dependent requirements for X.25 packet-switched data networks using virtual calls	-	-
ISO/IEC ISP 10613-1	1994	Information technology - International Standardized Profile RA - Relaying the Connectionless-mode Network Service Part 1: Subnetwork-independent requirements	-	-
ISO/IEC ISP 10613-2	1994	Part 2: LAN Subnetwork-dependent, media-independent requirements	-	-
ISO/IEC ISP 10613-3	1994	Part 3: CSMA/CD LAN subnetwork-dependent, media-dependent requirements	-	-
ISO/IEC ISP 10613-5	1994	Part 5: Definition of profile RA51.51, relaying the Connectionless-mode Network Service between CSMA/CD LAN subnetworks	-	-

Publication	Year	Title	EN/HD	Year
ISO/IEC ISP 10613-7	1994	Part 7: PSDN subnetwork-dependent, media-dependent requirements for virtual calls over a permanent access	-	-
ISO/IEC ISP 10613-8	1994	Part 8: Definition of profile RA51.1111, relaying the Connectionless-mode Network Service between CSMA/CD LAN subnetworks and PSDNs using virtual calls over a PSTN leased line permanent access	-	-
ISO/IEC ISP 10613-9	1994	Part 9: Definition of profile RA51.1121, relaying the Connectionless-mode Network Service between CSMA/CD LAN subnetworks and PSDNs using virtual calls over a digital data circuit/CSDN leased line permanent access	-	-
ISO/IEC 8649	- [1)]	Information technology - Open systems interconnection - Service definition for the Association Control Service Element (ACSE)	-	-

CONTENTS

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 8.2.3 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

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.

1.1 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.

1.2 Architecture

The TASE.2 protocol relies on the use of MMS services (and 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.

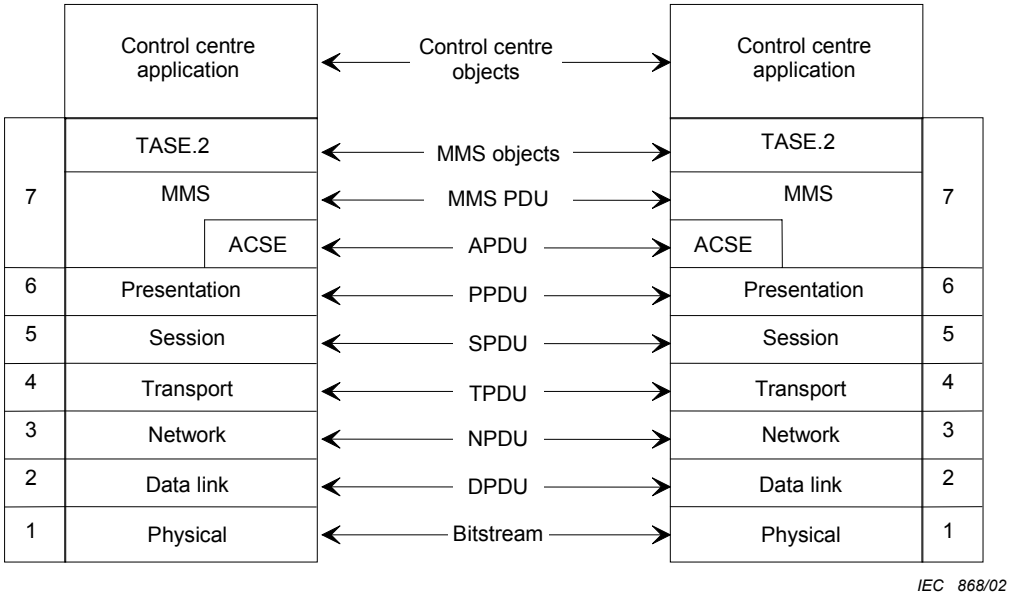

Figure 1 – Protocol relationships

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

1.3 Network Model

The TASE.2 Data Exchange network may 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 3 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.

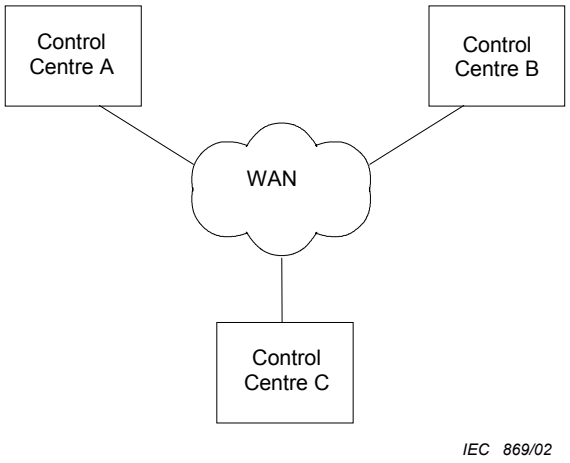

Figure 2 – Router-based WAN

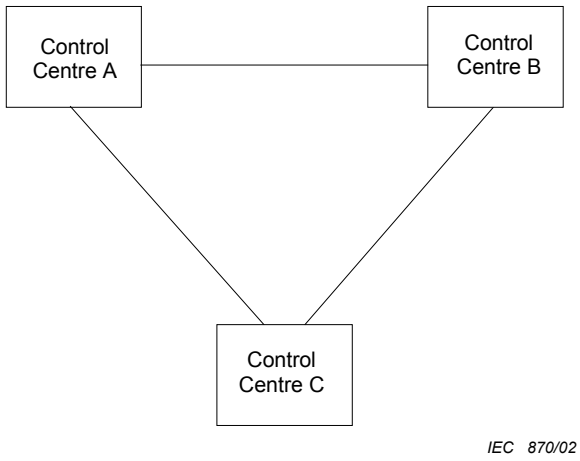

Figure 3 – Mesh network

1.4 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 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 may 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 scaleable 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 scaleability 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 may 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 an 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 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 60870-6-702:1998, *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 60870-6-802:2002, *Telecontrol equipment and systems – Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations – TASE.2 Object models*

ISO/IEC 8073, *Information technology – Open Systems Interconnection – Protocol for providing the connection-mode transport service*

ISO/IEC 8208:2000, *Information technology – Data communications – X.25 Packet Layer Protocol for Data Terminal Equipment*

ISO/IEC 8473, *Information technology – Protocol for providing the connectionless-mode network service*

ISO/IEC 8802-3:2001, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

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*

ISO/IEC 9542, *Information processing systems – Telecommunications and information exchange between systems – End system to Intermediate system routing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode network service (ISO 8473)*

ISO/IEC 10589:1992, *Information technology – Telecommunications and information exchange between systems – Intermediate system to intermediate system intra-domain-routing exchange protocol for use in conjunction with the protocol for providing the connectionless-mode network Service (ISO 8473)*

ISO/IEC ISP 10608-1:1992, *Information technology – International Standardized Profile TAnnnn – Connection-mode Transport Service over Connectionless-mode Network Service – Part 1: General overview and subnetwork-independant requirements*

ISO/IEC ISP 10608-2:1992, *Information technology – International Standardized Profile TAnnnn – Connection-mode Transport Service over Connectionless-mode Network Service – Part 2: TA51 profile including subnetwork-dependent requirements for CSMA/CD Local Area Networks (LANs)*

ISO/IEC ISP 10608-5:1992, *Information technology – International Standardized Profile TAnnnn – Connection-mode Transport Service over Connectionless-mode Network Service – Part 5: TA1111/TA1121 profiles including subnetwork-dependent requirements for X.25 packet-switched data networks using virtual calls*

ISO/IEC ISP 10613-1:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 1: Subnetwork-independent requirements*

ISO/IEC ISP 10613-2:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 2: LAN Subnetwork-dependent, media-independent requirements*

ISO/IEC ISP 10613-3:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 3: CSMA/CD LAN subnetwork-dependent,media-dependent requirements*

ISO/IEC ISP 10613-5:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 5: Definition of profile RA51.51, relaying the Connectionless-mode Network Service between CSMA/CD LAN subnetworks*

ISO/IEC ISP 10613-7:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 7: PSDN subnetwork-dependent, media-dependent requirements for virtual calls over a permanent access*

ISO/IEC ISP 10613-8:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 8: Definition of profile RA51.1111, relaying the Connectionless-mode Network Service between CSMA/CD LAN subnetworks and PSDNs using virtual calls over a PSTN leased line permanent access*

ISO/IEC ISP 10613-9:1994, *Information technology – International Standardized Profile RA – Relaying the Connectionless-mode Network Service – Part 9: Definition of profile RA51.1121, relaying the Connectionless-mode Network Service between CSMA/CD LAN subnetworks and PSDNs using virtual calls over a digital data circuit/CSDN leased line permanent access*

ISO 8649, *Information processing systems – Open Systems Interconnection – Service definition for the Association Control Service Element*