

Telecontrol equipment and systems —

Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations —

Section 502: TASE.1 Protocol definitions

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ICS: 33.200

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of EN 60870-6-502	3
List of references	Inside back cover

National foreword

This British Standard has been prepared by Technical Committee PEL/57 and is the English Language version of EN 60870-6-502:1996 *Telecontrol equipment and systems. Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations Section 502: TASE.1 Protocol definitions*, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 870-6-502:1995, published by the International Electrotechnical Commission (IEC).

Cross-references

Publication referred to	Corresponding British Standard
ISO/IEC 8824:1990	BS ISO 8824:1990 <i>Information technology. Open systems interconnection. Specification of abstract syntax notation one (ASN.1)</i>
ISO/IEC 8825:1990	BS ISO 8825:1990 <i>Information technology. Open systems interconnection. Specification of basic encoding rules for abstract syntax notation one (ASN.1)</i>
	BS ISO/IEC 9072 <i>Information processing systems. Text communication. Remote operations</i>
ISO/IEC 9072-1:1979	BS ISO/IEC 9072-1:1989 <i>Model, notation and service definition</i>
ISO/IEC 9072-2:1979	BS ISO/IEC 9072-2:1989 <i>Protocol specification</i>
EN 27498:1989 ¹⁾	BS EN ISO/IEC 7498 <i>Information technology. Open Systems interconnection. Basic reference model</i>
ISO 7498:1984	BS EN ISO/IEC 7498-1:1995 <i>The basic model</i>
ISO 8649:1988	BS 7091:1989 <i>Open Systems Interconnection: service definition for the Association Control Service Element</i>
ISO 8650:1988	BS 7092:1989 <i>Open Systems Interconnection: protocol specification for the Association Control Service Element</i>
	BS 7203 <i>8-bit single-byte coded graphic character sets</i>
ISO 8859-1:1987	Part 1:1989 <i>Specification for Latin alphabet No.1</i>

¹⁾ EN 27498:1989 has been superseded by EN ISO/IEC 7498-1:1995 to which the cited British Standard is identical.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 38, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Section 502: TASE.1 Protocol definitions

(IEC 870-6-502:1995)

Matériels et systèmes de téléconduite
Partie 6: Protocoles de téléconduite compatibles avec les normes ISO et les recommandations de l'UIT-T Section 502: Définitions du protocole TASE.1
(CEI 870-6-502:1995)

Fernwirkrichtungen und-systeme
Teil 6: Fernwirkprotokolle, die mit ISO-Normen und ITU-T-Empfehlungen kompatibel sind
Hauptabschnitt 502: Beschreibung der TASE.1-Protokolle
(IEC 870-6-502:1995)

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CENELEC

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Foreword

The text of document 57/223/FDIS, future edition 1 of IEC 870-6-502, 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 60870-6-502 on 1996-03-05.

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- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-12-01

Annexes designated “normative” are part of the body of the standard.

In this standard, annexes A and ZA are normative.

Annex ZA has been added by CENELEC.

Contents

	Page
1 Scope and object	3
2 Normative references	3
3 Definitions	4
3.1 Reference model definitions	4
3.2 Service conventions definitions	4
3.3 Presentation service definitions	4
3.4 Association control definitions	4
3.5 Remote operations definitions	4
3.6 TASE.1 service definitions	5
3.7 TASE.1 protocol specification definitions	5
4 Abbreviations	5
5 Conventions	5
6 Overview of the protocol	6
6.1 Service provided	6
6.2 Use of services	7
6.3 Model for TASE.1 services	7
7 Elements of procedure	7
7.1 Descriptive conventions	7
7.2 Mapping to ACSE and ROSE services	7
7.3 Entering and leaving the TASE.1 environment	9
7.4 Operating in the TASE.1 environment	11
8 Abstract syntax definition	22

9 Conformance	22
9.1 Statement requirements	23
9.2 Static requirements	23
9.3 Dynamic requirements	23
9.4 Protocol implementation conformance statement (PICS)	23
Annex A (informative) TASE.1 in ASN.1	24
Annex ZA (normative) Normative references to international publications with their corresponding European publications	37
Table 1 — Summary of TASE.1 services	6
Table 2 — Mapping of TASE.1 services onto ROSE and ACSE service primitives	8
Table 3 — Incoming event list	9
Table 4 — Outgoing event list	10
Table 5 — TPM states	10
Table 6 — TPM state table	11
Table 7 — Incoming events for group- and unsolicited data transfer management	12
Table 8 — Outgoing events for group- and unsolicited data transfer management	13
Table 9 — TPM states for group- and unsolicited data transfer management	13
Table 10 — TPM predicates for group- and unsolicited data transfer management	13
Table 11 — TPM Group management state table	14
Table 12 — TPM Define Group state table	15
Table 13 — TPM Get Group state table	16
Table 14 — TPM Unsolicited Data Transfer Management state table	17
Table 15 — Incoming events for information transfer and test association	18
Table 16 — Outgoing events for information transfer and test association	19
Table 17 — TPM states for information transfer and test association	19
Table 18 — TPM substates for unsolicited data transfer	19
Table 19 — TPM Requested Data Transfer state table	20
Table 20 — TPM Unsolicited data transfer state table	21
Table 21 — TPM Test Association state table	22
Table 22 — PICS information	23

1 Scope and object

This section of IEC 870-6 specifies the protocol for the services provided by an application-service-element – the Telecontrol Application service Element no. 1 (TASE.1) – to support the exchange of process data between telecontrol systems.

The main goals for the design of these services are:

- simplicity;
- adaptability;
- independence of lower layer architecture;
- extensibility;
- efficiency;
- performance;
- maintainability.

The services of TASE.1 are:

- services for defining, changing, deleting and inspecting groups of information;
- services for managing the transfer of information groups and blocks of information from different groups;
- services for supervisory control.

This section of IEC 870-6 specifies the protocol (abstract syntax) and the procedures for the Telecontrol Application Service Element (TASE). The TASE.1 services are provided in conjunction with the Remote Operations Service Element (ROSE) services (ISO/IEC 9072-1) and the ROSE protocol (ISO/IEC 9072-2), and the Association Control Element (ACSE) services (ISO 8649) and the ACSE protocol (ISO 8650).

The TASE.1 procedures are defined in terms of:

- a) the interactions between peer TASE.1 protocol machines through the use of ROSE services;
- b) the interactions between the TASE.1 protocol machine and its service-user.

The scope of the protocol is limited to the interconnection of systems. It does not specify or restrict the possible implementation of interfaces within a telecontrol system.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 870-6. At the time of publication, the editions indicated were valid. All normative documents' are subject to revision, and parties to agreements based on this section of IEC 870-6 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 870-6-501:1995, *Telecontrol equipment and systems — Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations — Section 501: TASE.1 service definitions*.

ISO/IEC 8824:1990, *Information technology — Open Systems Interconnection — Specification of Abstract Syntax Notation One (ASN.1)*.

ISO/IEC 8825:1990, *Information technology — Open Systems Interconnection — Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.

ISO/IEC 9072-1:1989, *Information processing systems — Text communication — Remote Operations — Part 1: Model, notation and service definition*.

ISO/IEC 9072-2:1989, *Information processing systems — Text communication — Remote Operations — Part 2: Protocol specification*.

ISO/DIS 8825-2¹⁾, *Information technology — Open Systems Interconnection — Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1) — Part 2: Packed encoding rules*.

ISO 7498:1984, *Information processing systems — Open Systems Interconnection — Basic Reference Model*.

¹⁾ At present at the stage of Draft International Standard.

ISO/TR 8509:1987, *Information processing systems — Open Systems Interconnection — Service conventions.*

ISO 8649:1988, *Information processing systems — Open Systems Interconnection — Service definition for the Association Control Service Element.*

ISO 8650:1988, *Information processing systems — Open Systems. Interconnection — Protocol specification for the Association Control Service Element.*

ISO 8822:1994, *Information technology — Open Systems Interconnection — Presentation service definition.*

ISO 8859-1:1987, *Information processing — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No.1.*

3 Definitions

For the purpose of this section of IEC 870-6, the following definitions apply.

3.1

reference model definitions (defined in ISO 7498)

- a) Application layer
- b) Application-protocol-data-unit
- c) Application-protocol-control-information
- d) Application-entity
- e) Application-process
- f) Application-service-element
- g) Service-element
- h) User-element

3.2

service conventions definitions (defined in ISO/TR 8509)

- a) Service-user
- b) Confirmed service
- c) Non-confirmed service
- d) Provider-initiated service
- e) Primitive
- f) Request
- g) Indication
- h) Response
- i) Confirm

3.3

presentation service definition (defined in ISO 8822)

- a) Abstract syntax
- b) Abstract syntax name
- c) Transfer syntax name

3.4

association control definitions (defined in ISO 8649)

- a) Application-association; association
- b) Application-context
- c) Application Control Service Element

3.5

remote operations definitions (defined in ISO 9072)

- a) ACSE-user
- b) ROSE-user
- c) BIND

- d) UNBIND
- e) Remote Operations
- f) RO-notation
- g) Remote Operation Service Element

3.6

TASE.1 service definitions (defined in IEC 870-6-501)

- a) Initiator
- b) Responder

3.7 TASE.1 protocol specification definitions

3.7.1

idle state

connected entity waiting for an incoming event

3.7.2

initiating entity

application entity in idle state that receives a request event from the upper service-user

3.7.3

responding entity

application entity in idle state that receives an incoming event from its lower service-provider

3.7.4

DCUT1

timer used by the application-process for supervision of the application-service-user

3.7.5

DCLT1

timer used by the application-process for supervision of the remote peer entity

3.7.6

TASE-protocol-machine

the protocol machine for the TASE.1 specified in this section of the TASE.1 standard

4 Abbreviations

ACSE	Association Control Service Element
AE	Application-entity
APCI	Application Protocol Control Information
APDU	Application Protocol Data Unit
OSIE	Open Systems Interconnection Environment
PDU	Protocol Data Unit
ROSE	Remote Operations Service Element
TASE	Telecontrol Application Service Element
TPM	Telecontrol Protocol Machine.

5 Conventions

This section of IEC 870-6 makes use of the following conventions:

- a) the abstract syntax definitions in annex A are defined using the abstract syntax notation defined in ISO/IEC 8824;
- b) the remote operation macros (RO-notation), and the application-service-element and application-context macros are defined in ISO 9072-1.

6 Overview of the protocol

6.1 Service provided

The protocol specified in this section of the TASE.1 standard provides the TASE.1 services defined in the TASE.1 service definition. These services are listed in Table 1.

Table 1 — Summary of TASE.1 services

Service	Type
TASE Bind	Confirmed
TASE Unbind	Confirmed
TASE Abort	Provider-Initiated
Group Management	Confirmed
Define Group	Confirmed
Get Group	Confirmed
Requested Data Transfer	Confirmed
Unsolicited Data Transfer Management	Confirmed
Send Non-Confirmed Data	Non-confirmed
Send Confirmed Data	Confirmed
Send Mixed Data	Non-confirmed
Command Transfer	Confirmed
Test Association	Confirmed

6.2 Use of services

The TASE.1 protocol makes use of the underlying services as described below.

6.2.1 Use of the ROSE Service

The TASE.1 protocol machine (TPM) uses the RO-INVOKE, RO-RESULT, RO-ERROR, RO-REJECT-U and RO-REJECT-P services of the ROSE.

The remote operations of the TASE.1 are class 2 (asynchronous, reporting success or failure) operations. Excepted from this general rule are the two non-confirmed services, Send Non-Confirmed Data and Send Mixed Data services, which are class 5 operations (asynchronous, outcome not reported). The restrictions on the use of the operations by the initiator and responder are defined in clause 7.

The application-associations of TASE.1 are association class 3, by which both initiator and responder entities can invoke operations.

The TASE.1 services are defined by means of RO-notation and the abstract syntax notation (ASN.1) defined in ISO 8824.

6.2.2 Use of the ACSE service

The ACSE provides for the control (establishment, release, abort) of application-associations between application-entities.

The ROSE Bind and Unbind macros are the sole users of the A-ASSOCIATE and A-RELEASE services of ACSE in normal mode. The TASE.1 protocol-machine (TPM) is the user of the A-P-ABORT and A-ABORT services of the ACSE.

6.3 Model for TASE.1 services

The TASE.1 protocol-machine (TPM) communicates with its service-user by means of primitives defined in the TASE.1 service definition (see IEC 870-6-501).

The TPM is driven by TASE.1 service request primitives from its service-user, and by indication primitives of the ROSE services. The TPM, in turn, issues indication primitives to its service-user, and request primitives on the used ROSE services.

7 Elements of procedure

7.1 Descriptive conventions

Paragraphs 7.3 and 7.4 define a TASE.1 Protocol Machine (TPM) using state table descriptive mechanism. All tables are shown from the viewpoint of the TASE.1 service-provider.

The state tables do not constitute a formal definition of the TPM. They are included to provide a more precise specification of the elements of procedure for the TASE.1 services defined in the TASE.1 Service Definition (see IEC 870-6-501).

The notation used in the state tables is the same as used in ROSE Protocol Specification, annex A, and thus follows the same conventions (see ISO 9072-2).

7.2 Mapping to ACSE and ROSE services

This subclause defines how the Association Control Service Element (ACSE) and the Remote Operation Service Element (ROSE) services are used by the Telecontrol Protocol Machine (TPM). Any use of the ACSE or ROSE services other than described in this subclause shall constitute a protocol error.

The TASE.1 protocol is positioned within the Open Systems Interconnection Environment (OSIE) within the application layer. As an application-service-element (ASE), TASE.1 makes use of and maps onto the services and service primitives of ACSE and ROSE. The TASE.1-user may be elements within the application-process or another ASE.

7.2.1 Mapping of TASE.1 service primitives

All TASE.1 service primitives shall be mapped on ACSE or ROSE services primitives. The mapping is described in Table 2 below.

Table 2 — Mapping of TASE.1 services onto ROSE and ACSE service primitives

TASE.1 service primitive	ACSE or ROSE service primitives	Invoked by
TASE Bind request	A-ASSOCIATE request, indication	Initiator
TASE Bind response	A-ASSOCIATE response, confirm	Responder
TASE Unbind request	A-RELEASE request, indication	Initiator
TASE Unbind response	A-RELEASE response, confirm	Responder
TASE Abort indication	A-ABORT indication	ACSE service provider
Group Management request	RO-INVOKE request, indication	Initiator
Group Management response	RO-RESULT request, indication or RO-ERROR request, indication	Responder
Define Group request	RO-INVOKE request, indication	Initiator
Define Group response	RO-RESULT request, indication or RO-ERROR request, indication	Responder
Get Group request	RO-INVOKE request, indication	Initiator
Get Group response	RO-RESULT request, indication or RO-ERROR request, indication	Responder
Requested Data Transfer request	RO-INVOKE request, indication	Initiator
Requested Data Transfer response	RO-RESULT request, indication or RO-ERROR request, indication	Responder
Unsolicited Data Transfer Management request	RO-INVOKE request, indication	Initiator
Unsolicited Data Transfer Management response	RO-RESULT request, indication or RO-ERROR request, indication	Responder
Send Non-Confirmed Data request	RO-INVOKE request, indication	Responder
Send Confirmed Data request	RO-INVOKE request, indication	Responder
Send Confirmed Data response	RO-RESULT request, indication or RO-ERROR request, indication	Initiator
Send Mixed Data request	RO-INVOKE request, indication	Responder
Command Transfer request	RO-INVOKE request, indication	Initiator
Command Transfer response	RO-RESULT request, indication or RO-ERROR request, indication	Responder
Test Association request	RO-INVOKE request, indication	Initiator
Test Association response	RO-RESULT request, indication or RO-ERROR request, indication	Responder

The ACSE A-P-ABORT and A-ABORT services are mapped directly to the TASE Abort service, and hence TASE.1 does not define an Abort PDU.

The mapping of the abstract-syntax notation of the TASE.1 onto ROSE and ACSE services is as defined in ISO/IEC 9072-1.

An implementation of the TASE.1 service-provider can support service primitives for users acting only as Initiators, or only as Responders, or service primitives for users acting as both Initiators and Responders.

7.3 Entering and leaving the TASE.1 environment

The TASE Bind and TASE Unbind services provide the mechanism for entering and leaving the TASE.1 environment. The model for these services is described in clause 9 of IEC 870-6-501. Two AE-invocations enter the TASE.1 environment when they both have defined the same TASE.1 application context and each AE-invocation has identified its context for the peer AE-invocation.

Table 3 — Incoming event list

Abbreviated name	Source	Name and description
TBreq	TASE.1-user	TASE Bind request primitive
TBRE +	TPM-peer	TASE Bind response (result = “accepted”) as user data on a A-ASSOCIATE confirm primitive
TBRE –	TPM-peer	TASE Bind response (result = “rejected”) as user data on a A-ASSOCIATE confirm primitive
A-ASCcnf –	AC-provider	A-ASSOCIATE confirm primitive (result = “rejected (permanent)” or result = “rejected (transit)”)
TBrsp +	TASE.1-user	TASE Bind response primitive (result = “accepted”)
TBrsp –	TASE.1-user	TASE Bind response primitive (result = “rejected”)
TBRQ	TPM-peer	TASE Bind request as user data on a A-ASSOCIATE request primitive
TUBreq	TASE.1-user	TASE Unbind request primitive
TUBrsp +	TASE.1-user	TASE Unbind response primitive (result = “ok”)
TUBrsp –	TASE.1-user	TASE Unbind response primitive (result = “error”)
TUBRQ	TPM-peer	TASE Unbind request as user data on a A-RELEASE indication primitive
TUBRE +	TPM-peer	TASE Unbind response (result = “ok”) as user data on a A-RELEASE confirm primitive
TUBRE –	TPM-peer	TASE Unbind response (result = “error”) as user data on a A-RELEASE confirm primitive
A-ABRind	AC-provider	A-ABORT indication primitive

Table 4 — Outgoing event list

Abbreviated name	Destination	Name and description
A-ASCreq	AC-provider	A-ASSOCIATE request primitive with TASE Bind request as user data.
A-ASCrsp +	AC-provider	A-ASSOCIATE response primitive with TASE Bind response (result="accepted") as user data.
A-ASCrsp –	AC-provider	A-ASSOCIATE response primitive with TASE Bind response (result="rejected") as user data.
TBind	TASE.1-user	TASE Bind indication
TBcnf +	TASE.1-user	TASE Bind confirm primitive (result="accepted")
TBcnf –	TASE.1-user	TASE Bind confirm primitive (result="rejected")
TABRind	TASE.1-user	TASE Abort indication primitive
A-RELreq	AC-provider	A-RELEASE request primitive
A-RELrsp +	AC-provider	A-RELEASE response primitive (result="ok")
A-RELrsp –	AC-provider	A-RELEASE response primitive (result="error")
TUind	TASE.1-user	TASE Unbind indication primitive
TUBcnf +	TASE.1-user	TASE Unbind confirm primitive (result="ok")
TUBcnf –	TASE.1-user	TASE Unbind confirm primitive (result="error")

Table 5 — TPM states

Abbreviated name	Name and description
STC0	Idle, unassociated
STC1	Awaiting TASE Bind Response (TBRE)
STC2	Awaiting TASE Unbind Response (TUBRE)
STC3	Awaiting TASE Bind response primitive (TBrsp)
STC4	Awaiting TASE Unbind response primitive (TUBrsp)
STC10	Associated