IEC/TS 60870-5-7

Edition 1.0 2013-07

TECHNICAL SPECIFICATION

colour inside

Telecontrol equipment and systems –
Part 5-7: Transmission protocols – Security extensions to IEC 60870-5-101 and IEC 60870-5-104 protocols (applying IEC 62351)

IEC/TS 60870-5-7:2013(E)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE X

ICS 33.200

ISBN 978-2-8322-0919-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 60870-5-7, which is a technical specification, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
57/1308/DTS	57/1339/RVC

Full information on the voting for the approval of this technical specification 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.

In this publication the following print types are used:

Clause 10: Direct quotations from IEC/TS 62351-3:2007: in italic type.

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

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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.

TELECONTROL EQUIPMENT AND SYSTEMS –

Part 5-7: Transmission protocols – Security extensions to IEC 60870-5-101 and IEC 60870-5-104 protocols (applying IEC 62351)

1 Scope

This part of IEC 60870 describes messages and data formats for implementing IEC/TS 62351-5 for secure authentication as an extension to IEC 60870-5-101 and IEC 60870-5-104.

The purpose of this base standard is to permit the receiver of any IEC 60870-5-101/104 Application Protocol Data Unit (APDU) to verify that the APDU was transmitted by an authorized user and that the APDU was not modified in transit. It provides methods to authenticate not only the device which originated the APDU but also the individual human user if that capability is supported by the rest of the telecontrol system.

This specification is also intended to be used, together with the definitions of IEC/TS 62351-3, in conjunction with the IEC 60870-5-104 companion standard.

The state machines, message sequences, and procedures for exchanging these messages are defined in the IEC/TS 62351-5 specification. This base standard describes only the message formats, selected options, critical operations, addressing considerations and other adaptations required to implement IEC/TS 62351 in the IEC 60870-5-101 and 104 protocols.

The scope of this specification does not include security for IEC 60870-5-102 or IEC 60870-5-103. IEC 60870-5-102 is in limited use only and will therefore not be addressed. Users of IEC 60870-5-103 desiring a secure solution should implement IEC 61850 using the security measures from in IEC/TS 62351 referenced in IEC 61850.

Management of keys, certificates or other cryptographic credentials within devices or on communication links other than IEC 60870-5-101/104 is out of the scope of this specification and may be addressed by other IEC/TS 62351 specifications in the future.

2 Normative references

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

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

IEC 60870-5-104:2006, *Telecontrol equipment and systems – Part 5-104:Transmission protocols – Network access for IEC 60870-5-101 – Using standard transport profiles*

IEC/TS 62351-3:2007, *Power systems management and associated information exchange – Data and communications security – Part 3: Communication network and system security – Profiles including TCP/IP*

IEC/TS 62351-5:2013, *Power systems management and associated information exchange – Data and communications security – Part 5: Security for IEC 60870-5 and derivatives*

IEC/TS 62351-8, *Power systems management and associated information exchange – Data and communications security – Part 8: Role-based access control*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Terms 3.1.1 to 3.1. 7 are included here because they are specific to the IEC 60870-5 standards and may be useful for reading this specification as an independent document. Terms 3.1.8 to 3.1.9 are included here because they are specific to IEC/TS 62351-5.

3.1.1
Application Protocol Data Unit
complete application layer message transmitted by a station

3.1.2
Application Service Data Unit
application layer message submitted to lower layers for transmission

3.1.3
Controlling Station
device or application that initiates most of the communications and issues commands

Note 1 to entry: Commonly called a “master” in some protocol specifications.

3.1.4
Controlled Station
remote device that transmits data gathered in the field to the controlling station

Note 1 to entry: Commonly called the “outstation” or “slave” in some protocols.

3.1.5
Control Direction
data transmitted by the controlling station to the controlled station(s)

3.1.6
Message Authentication Code
calculated value used by a receiving station to authenticate and check the integrity of an Application Protocol Data Unit

3.1.7
Monitoring Direction
data transmitted by the controlled station to the controlling stations

3.1.8
Challenger
station that issues authentication challenges. May be either a controlled or controlling station.

3.1.9
Responder
station that responds or reacts to authentication challenges. May be either a controlled or controlling station.