IEC 62325-503

Edition 1.0 2018-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Framework for energy market communications – Part 503: Market data exchanges guidelines for the IEC 62325-351 profile

Cadre pour les communications pour le marché de l'énergie – Partie 503: Lignes directrices concernant les échanges de données du marché pour le profil défini dans l'IEC 62325-351

IEC 62325-503:2018-07(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 33.200

ISBN 978-2-8322-5916-0

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FRAMEWORK FOR ENERGY MARKET COMMUNICATIONS –

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62325-503 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This edition cancels and replaces IEC TS 62325-503 published in 2014.

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

a) Use of ISO/IEC 19464:2014, Advanced Message Queuing Protocol (AMQP) v1.0 specification;
b) Splitting of the node described in the IEC TS 62325-503:2014 into a broker that implements the messaging function and a directory;
c) Increase of operability and resilience of the communication system with the ability for an endpoint to send and receive messages through several brokers;
d) Benefits of standardisation, performance and scalability of the AMQP protocol for transferring messages.

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

CDV	Report on voting
57/1936/CDV	57/1983/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this document, the following print types are used:

Help the visibility of information in table and diagram: in italic type

A list of all parts in the IEC 62325 series, published under the general title *Framework for energy market communications*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document 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 useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document is part of the IEC 62325 series for deregulated energy market communications.

The principal objective of the IEC 62325 series is to produce documents which facilitate the integration of market application software developed independently by different vendors into a market management system, between market management systems and market participant systems. This is accomplished by defining message exchanges to enable these applications or systems access to public data and exchange information independent of how such information is represented internally.

The common information model (CIM) specifies the basis for the semantics for the message exchange. The European style market profile specifications that support the European style design electricity markets are defined in IEC 62325-351. These electricity markets are based on the European regulations, and on the concepts of third party access and zonal markets. The IEC 62325-451-n International documents specify the content of the messages exchanged.

The purpose of this document is to provide the guidelines to exchange the above-mentioned messages. A European market participant (trader, distribution utilities, etc.) could benefit from a single, common, harmonised, secure platform for message exchange with the European Transmission System Operators (TSOs); thus reducing the cost of building different IT platforms to interface with all the parties involved.

This document represents an important step in facilitating parties entering into electricity markets other than their national ones; they could use the same or similar information exchange system to participate in more than one market all over Europe.

This document was originally based upon the work of the European Network of Transmission System Operators (ENTSO-E) Working Group EDI.

FRAMEWORK FOR ENERGY MARKET COMMUNICATIONS –

Part 503: Market data exchanges guidelines for the IEC 62325-351 profile

1 Scope

This part of IEC 62325 is for European electricity markets.

This document specifies a standard for a communication platform which every Transmission System Operator (TSO) in Europe can use to exchange reliably and securely documents for the energy market. Consequently a European market participant (TSO, regional supervision centre, distribution utility, power exchange, etc.) could benefit from a single, common, harmonised and secure platform for message exchange with other participants; thus, reducing the cost of building different information technology (IT) platforms to interface with all the parties involved.

“MADES” (MArket Data Exchange Standard) is the acronym to designate this standard.

MADES is a specification for a decentralised common communication platform based on international IT standards:

- From an application program perspective, MADES specifies the software interfaces to exchange electronic documents with peer applications. Such interfaces mainly provide means to send and receive documents using a so-called “MADES communication system” (or "MADES system" or simply "system"). The sender can request about the status of the delivery of a document and the recipient issues a message back, the acknowledgement, when receiving the document. This makes a MADES system usable for exchanging documents in business processes requiring a reliable delivery.
- MADES also specifies services hidden to the applications such as recipient localisation, recipient connection status, message routing and security. Services include directory, authentication, signing, encryption, message tracking, message logging and message temporary storage.

The purpose of MADES is to create a secured message exchange standard based on standard communication protocols and utilising IT best practices for exchanging data over any TCP/IP communication network, in order to facilitate business-to-business (B2B) information exchanges as described in IEC 62325-351 and the IEC 62325-451 series.

A MADES system acts as a post-office organisation: the transported object is a “message” in which the document of the sender is securely packaged in an envelope containing metadata, which is necessary information for transportation, tracking and delivery.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 TS 61970-2, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

ISO/IEC 19464:2014, *Information technology – Advanced Message Queuing Protocol (AMQP) v1.0 specification, https://www.amqp.org/* (developed by the OASIS open standards consortium)

ISO/IEC 9594-8:2017, *Information technology – Open systems interconnection – The Directory – Part 8: Public-key and attribute certificate frameworks*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61970-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

NOTE For general glossary definitions, see IEC 60050, *International Electrotechnical Vocabulary*.

3.1
advanced message queuing protocol
AMQP
open Internet protocol for business messaging, as described in IEC 19464:2014

3.2
advanced message queuing protocol secured with transport layer security
AMQPS
combining of the IEC 19464 business messaging protocol with transport layer security (TLS)

3.3
market data exchange standard
MADES
specification described in this document for the European market style market profile

3.4
representational state transfer
REST
method of providing interoperability between computer systems by requesting to access and manipulate textual representations of resources using predefined set of stateless operations

3.5
simple authentication and security layer
SASL
framework for authentication and data security in internet protocols

3.6
simple object access protocol
SOAP
protocol specification for exchanging structured information in the implementation of webservices

3.7
transmission system operator
TSO
entity involved in electric power transmission or in transmission of natural gas

3.8
transport layer security
TLS
cryptographic protocol to provide privacy and data integrity between two communicating computer applications

4 High level concepts

4.1 What is the purpose of MADES?

NOTE Clause 4 describes the business context for the specification usage, introduces the main concepts of the specification and does not contain requirements.

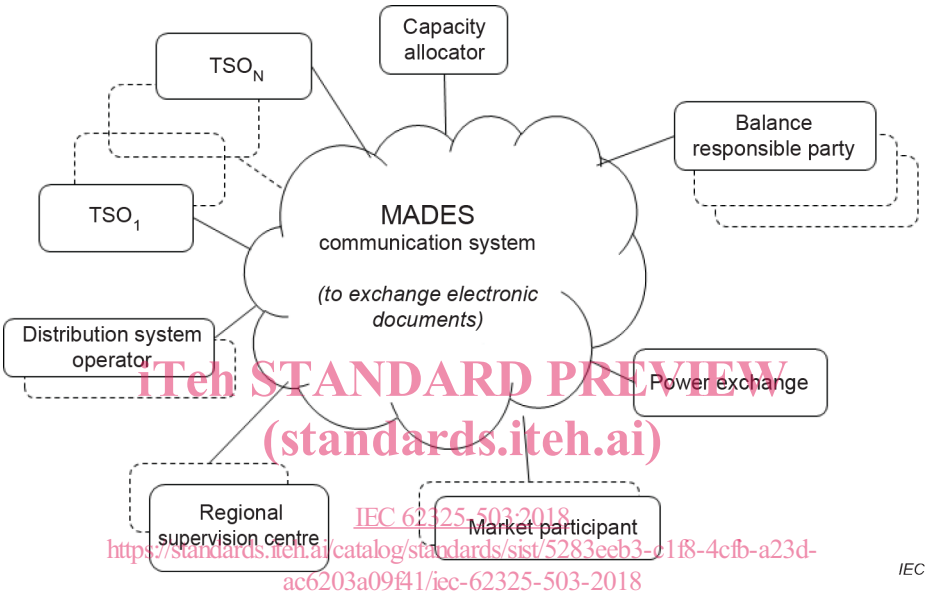

Figure 1 – MADES overall view

MADES' first intention is to provide transmission system operators (TSOs) with a standardised communication system for securely exchanging electronic documents between themselves and with others parties involved in the European electricity market as shown in Figure 1.

These documents are mainly those used in the energy market and described in IEC 62325-351 and the IEC 62325-451 series. Such parties include TSOs, regional supervision centres, power exchanges, distribution system operators, balance responsible parties, transmission capacity allocators, market operators, capacity traders, producers, etc.

MADES enables each party to host an access point to the communication system: applications of his information system can then use the access point to send and receive securely documents with other parties.

Technically, MADES is a data exchange standard comprised of standard communication protocols and utilising information technology standards and best practices to create a mechanism for exchanging data over any TCP/IP communication network and infrastructure, in order to facilitate business-to-business information exchanges.

New market rules induce new business processes and activities, and generally require new information exchanges between parties. Experience shows that, for the data exchanges to meet the business goals, the chosen technical solution results from an agreement of all the involved parties gathering various constraints including implementation time scale, vendors' offers, already existing communication infrastructure and links, integration capabilities of existing information systems, confidentiality of exchanged information, legal risks, performance, etc.

Whereas business processes require that information be exchanged between multiple systems or multiple parties, solutions developed bilaterally can become complex, each interface taking time before coming in operation, taking money and resources for development and maintenance. A noticeable consequence is that some parties involved in business processes that require exchanges with many others parties have to install and operate different communication tools and solutions to interface with multiple information systems. The process towards a more integrated European electricity market creates many such situations with new coordinated processes between actors with regulated roles. Market participants acting in several countries are also looking for a harmonised interface.

MADES can support any business process whatever the transmitted document format (e.g. XML, binary) and the sequence for the exchanges.

MADES is independent of the physical underlying communication Infrastructure, which can be any internet protocol (IP) network, such as Internet, a physical private infrastructure, or a multi access-point virtual private network (VPN).

MADES relies on and only on non-proprietary IT standards for communication protocols, data integrity, peer authentication (signature), confidentiality (encryption), accessible parties' directory (e.g. HTTP, AMQP, TLS, X.509), as shown in Figure 2.

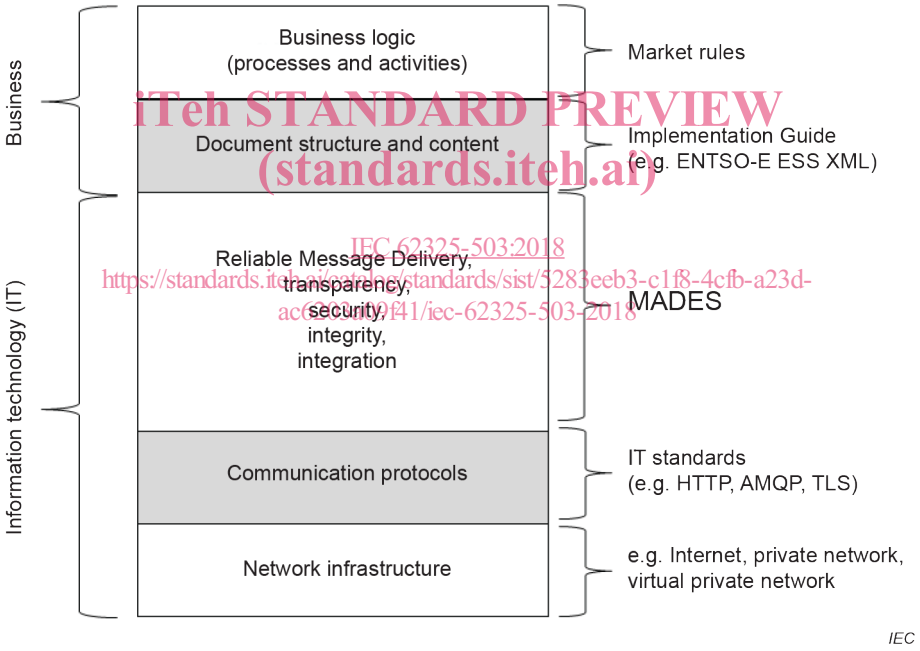

Figure 2 – MADES scope in a layered architecture

4.2 Overview

The MADES standard specifies a communication system that delivers messages between authorised parties. Such a system has the following key features:

1) Reliable message delivery – A (sender) party connected can send a message to another (recipient) party connected or that can connect to the system. The sender is notified when a message is not acknowledged by the recipient in due time, whatever reason.
2) Transparency – The system is not a black box: it tracks every message down to gather trustworthy information about the delivery.
3) Security – Only the recipient of the message can read the content (confidentiality) and the recipient unambiguously authenticates the sender (signature).
4) Integrity – The system guarantees that the content of a message is unaltered during the delivery process.