TECHNICAL REPORT

IEC TR 62055-21

First edition
2005-08

Electricity metering – Payment systems –

Part 21: Framework for standardization

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ELECTRICITY METERING – PAYMENT SYSTEMS –

Part 21: Framework for standardization

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Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful by the maintenance team.

IEC 62055-21, which is a technical report, has been prepared by Technical Committee 13: Equipment of electrical energy measurement and load control.

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

Enquiry draft	Report on voting
13/1318A/DTR	13/1325A/RVC

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

IEC 62055 consists of the following parts, under the general title *Electricity metering – Payment systems:*

Part 21: Framework for Standardization

Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)

Part 41: Standard Transfer Specification – Application layer protocol for one-way token carrier systems

Part 51: Standard Transfer Specification – Physical layer protocol for one-way numeric and magnetic card token carriers

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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- withdrawn,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.

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INTRODUCTION

There is widespread activity in the application and development of payment metering systems in IEC member countries. Whilst there are many similarities in equipment functionality and operation of electricity payment metering systems in these countries, there is divergence in the particular payment technology used as well as in the use of particular token carrier technologies. An example of this is the large number of solutions using disposable magnetic cards.

A need has been identified to describe the various systems and their elements in a coherent manner and to provide a framework for standardization of payment metering systems, their elements and interfaces.

This technical report thus seeks to meet the following objectives:

a) to present a systematic methodology to follow for use by suppliers to produce requirements specifications for system procurement;

b) to present a systematic methodology to follow for use by equipment manufacturers to produce specifications for systems and products;

c) to present a standard way in specifying system requirements or functionality in order that such specifications may be easily compared and evaluated by manufacturers and users;

d) to ensure that such specifications are produced in an “open” format to allow the interoperability of sub-system components.

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It has to be noted that it is not the intention of this technical report that there should be only one standard for payment metering systems or sub-systems, but that it should provide guidelines for defining several such standards according to the specific needs of the industry as and when these are identified.

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The standardization work of TC13 WG15 should follow the guidelines given in this technical report in order to present such standards in a coherent and systematic way that meets the above objectives.

The IEC 62055 series covers payment systems, encompassing the customer information systems, point of sales systems, token carriers, payment meters and the respective interfaces that exist between these entities.

ELECTRICITY METERING – PAYMENT SYSTEMS –

Part 21: Framework for standardization

1 Scope

This technical report sets out a framework for the integration of standards into a system specification for electricity payment metering systems. It addresses the payment metering system application process, generic processes, generic functions, data elements, system entities and interfaces that exist in present payment metering systems. The approach taken in the framework is sufficiently generic to payment metering systems so that it should be equally applicable to future systems.

NOTE 1 This technical report excludes the application of coin-operated meters in payment systems.

NOTE 2 This technical report specifically covers electricity metering payment systems. However, it is recognised that payment metering is an established requirement in other utility services and the general framework for standardization in this technical report can be applied to such other utility services.

NOTE 3 Contract functions are confined to single bi-lateral supply agreements between a supplier and a customer and specifically exclude related third party agreements such as may be found in the deregulated markets.

NOTE 4 Future aspects are considered in Clause 9.

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2 References

IEC 60050-300: *International Electrotechnical Vocabulary (IEV) – Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

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IEC 62051:1999, *Electricity metering – Glossary of terms*

IEC 62055-31, *Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)* [1]

IEC/PAS 62055-41:2003, *Electricity Metering – Payment metering systems – Part 41: Standard Transfer Specification*

— NRS 009-6-6: *Interface Standards – Standard Transfer Specification / Credit dispensing unit – Electricity dispenser – Categories of tokens and transaction data fields*

— NRS 009-6-7: *Interface Standards – Standard Transfer Specification / Credit dispensing unit – Electricity dispenser – Token encoding and data encryption and decryption*

— NRS 009-6-8: *Interface Standards – Standard Transfer Specification / Disposable magnetic token technology – Token encoding format and physical token definition*

— NRS 009-6-9: *Interface Standards – Standard Transfer Specification / Numeric token technology – Token encoding format and physical token definition*

— NRS 009-7: *Standard transfer specification / The management of cryptographic keys*

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[1] To be published.

IEC 62055-41, *Electricity Metering – Payment metering systems – Part 41: Standard Transfer Specification – Application layer for one-way token carrier systems* [1]

IEC 62055-51, *Electricity Metering – Payment metering systems – Part 51: Standard Transfer Specification – Physical layer for one-way numeric and magnetic card token carrier systems* [1]

IEC 62056-21:2001, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*

IEC 62056-46:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol*

IEC 62056-47, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 47: COSEM transport layers for IPv4 networks*[2]

IEC 62056-53:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM application layer*

IEC 62056-61:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: Object identification system (OBIS)*

3 Terms and definitions

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For the purposes of this document, the definitions and terms given in IEC 60050-300, IEC 62051, IEC 62055-31 and the following terms apply.

Where there is a difference between the definitions in this technical report and those contained in other referenced IEC standards, then those defined in this technical report shall take precedence.

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3.1 Definitions

3.1.1
token
subset of data elements, containing information that is present in the APDU of the application layer of the POS_to_Token_Carrier_Interface, and which is also transferred to the meter by means of a token carrier, and which is finally presented to the meter application process

The converse is also true in the case of a token being sent from the meter to the POS.

3.1.2
token carrier
medium that is used in the physical layer of the POS_to_Token_Carrier_Interface, onto which the token is modulated or encoded, and which serves to carry the token from the point where it is generated to the remote meter, where it is received

3.1.3
location
geographical area, clearly distinguishable from another adjacent area, on which the payment meter is installed

Examples of such locations are: consumer's premises, building, street or pavement.

3.1.4
local
term defined in relation to the physical location of the payment meter installation

Any device that is on the same location as the payment meter is considered to be local.

3.1.5
remote
term defined in relation to the physical location of the payment meter installation

Any device that is not on the same location as the payment meter is considered to be remote.

3.1.6
supplier
legal entity that enters into a contractual supply agreement with a customer to effect delivery of electrical energy or other utilities

NOTE Other definitions of “supplier” may be relevant in deregulated markets.

3.1.7
transaction record
group of data elements describing the necessary attributes of a financial transaction

This would normally include items like transaction amount, purchase item identifier, kWh value, payment type, receipt number, customer reference number, operator number, shift batch number, sales batch number, banking batch number, etc.

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3.1.8
shift batch
group of transaction records created during a single working shift of a particular POS operator

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3.1.9
shift batch summary
summary of transactions in a shift batch, summarized by transaction type and optionally by service type and by the supplier

NOTE It is common practice for an agent to perform the receipting function for several supply companies, thus requiring transaction records to be separated per supplier. A single supplier such as a municipality that supplies water and electricity also requires transaction records to be separated per service type.

3.1.10
sales batch
group of shift batches

3.1.11
sales batch summary
summary of transactions in a sales batch, summarized by shift batch and by transaction type and optionally by service type and by the supplier

3.1.12
banking batch
group of sales batches

3.1.13
banking batch summary
summary of transactions in a banking batch, summarized by sales batch, by shift batch and by transaction type and optionally by service type and by the supplier.

It includes bankable amounts totalled by payment type (and optionally by service type and by the supplier) in preparation for bank depositing and settlement with each supplier.

3.1.14
process
logically linked sequence of tasks that enables the system to achieve particular objectives

For definition of various processes, see Clause 10.

3.1.15
function
encapsulation of a defined capability or functionality of the system

For definition of various functions, see Clause 11.

3.2 Abbreviated terms

3DES	Triple DES (see also DES); Data Encryption Standard applied 3 times
AES	Advanced Encryption Standard
AMR	Automatic Meter Reading
APDU	Application Protocol Data Unit
ASN	Abstract Syntax Notation
BS	British Standard
CDROM	Compact disc read-only memory
CDU	Credit Dispensing Unit (see also POS)
CIS	Customer_Information_System
CRC	Cyclic_Redundancy_Code
CRT	Cathode-ray tube
C/S	Client / Server
DES	Data Encryption Standard
DIN	Deutsches Institut für Normung; a Germany-based standards organization
DLMS	Device Language Message Specification
ED	Electricity Dispenser or Energy Dispenser; used in Annex A interchangeably with “meter”
GMT	Greenwich Mean Time
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
HO	high-order portion of a number
HTML	Hyper Text Mark-up Language; a standard format for web documents
ID	Identifier or identification
IEC	International Electrotechnical Commission
IEC/PAS	IEC – Publicly Available Specification
ISO	International Standards Organization
kWh	kilo-watt hour
LAN	Local Area Network
LCD	Liquid-crystal display
LED	Light emitting diode
LO	low-order portion of a number

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NRS	National Rationalized user Specification; a South African industry standard
OSI	Open System Interconnection; a reference model for communication protocols
PAN	Primary_Account_Number
PLC	Power Line Carrier
POD	Point_Of_Delivery
POS	Point_Of_Sale (see also CDU)
PSTN	Public Switched Telephone Network
RAM	Random Access Memory
RAS	Remote Access Server
RSA	A public key cryptography standard; Authors: Rivest, Shamir and Adelman
STS	Standard Transfer Specification
STT	Standard Token Translator; converts an STS format token into a specified proprietary format token
TC13	IEC Technical Committee 13
TCP/IP	Transmission Control Protocol / Internet Protocol
TID	Token_Identifier
TV	Television
WAN	Wide Area Network
WG15	Working Group 15 of IEC TC13
X.25	A standard for packet switching networks; layers 1, 2 and 3 in OSI model
XML	Extensible Mark-up Language; a standard format for data exchange

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3.3 Notation and terminology

Throughout this technical report the following rules are observed regarding the naming of terms:

- entity names, data element names, function names and process names are treated as generic object classes and are given names in terms of nouns, which are capitalized and joined with an underscore to signify a single entity. Examples are: Supply_Group_Code as a data element name, Encryption_Algorithm as a function name and Installation_ Connection as a process name;
- direct (specific) reference to a named class of object uses the capitalized form, while general (non-specific) reference uses the small caps form without underscore joining. A direct reference example is: “The Supply_Group_Code is linked to a group of meters”, while an indirect reference example is: “A supply group code links to a vending key”;
- other terms use the generally accepted abbreviated forms like PSTN for Public Switched Telephone Network.