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Electricity metering – Payment systems – Part 52: Standard transfer specification (STS) – Physical layer protocol for a two-way virtual token carrier for direct local connection

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

FOREWORD 5
INTRODUCTION 7

1 Scope 9
2 Normative references 9
3 Terms, definitions and abbreviations 10
3.1 Terms and definitions 10
3.2 Abbreviations 10
3.3 Notation and terminology 11
3.4 Numbering conventions 12
4 STS protocol reference model 12
5 POSToTokenCarrierInterface: Physical layer protocol 13
6 TokenCarrierToMeterInterface: Physical layer protocol 13
6.1 TCDU 13
6.1.1 General 13
6.1.2 TokenData 13
6.1.3 AuthenticationResult 14
6.1.4 ValidationResult 14
6.1.5 TokenResult 14
6.2 Physical connection and signal interfaces 14
6.2.1 Interface options 14
6.2.2 Option 1: Optical interface 14
6.2.3 Option 2: Current loop interface 14
6.2.4 Option 3: Voltage interface 14
6.3 Character transmission 14
6.3.1 Transmission type 14
6.3.2 Transmission format 15
6.3.3 Transmission speed 15
6.3.4 Character encoding 15
6.4 Message syntax definitions 17
6.4.1 General 17
6.4.2 IDRequest message 17
6.4.3 IDResponse message 17
6.4.4 ReadCommand message 17
6.4.5 WriteCommand message 18
6.4.6 BreakCommand message 18
6.4.7 ACK: Acknowledge message 18
6.4.8 NAK: NegativeAcknowledge message 18
6.4.9 Data message 18
6.5 Message field definitions 19
6.6 Physical layer protocol functions 21
6.6.1 Server protocol flow diagram 21
6.6.2 IDRequestProcessing function 22
6.6.3 ReadCommandProcessing function 23
6.6.4 WriteCommandProcessing function 24
6.6.5 BreakCommandProcessing function 25

6.6.6 Undefined command processing 26
6.6.7 TokenLockout function 27
6.7 Server timing requirements 27
6.7.1 Inter-message and inter-character timing 27
6.7.2 Transmission error timing 28
6.7.3 Message execution timing 29
6.8 RegisterTable 30
6.8.1 RegisterTable interface class 30
6.8.2 Register interface class 31
6.8.3 Predefined Registers and registerID values 32
6.9 Companion specifications and RegisterTable instantiations 43
7 Maintenance of STS entities and related services 43
7.1 General 43
7.2 RegisterTable maintenance 44
7.3 Register maintenance 44
7.4 tableID maintenance 44
7.5 FOIN maintenance 45
7.6 protocolVersion maintenance 45
7.7 serverStatus maintenance 45
7.8 tokenStatus maintenance 45
7.9 softwareVersion maintenance 45

Annex A (normative) Server state diagrams for request message processing 46

Bibliography 51

Figure 1 – Physical layers of the STS protocol stack 12
Figure 2 – Character transmission format 15
Figure 3– Server protocol flow diagram 21
Figure 4 – Inter-message timing responses 28
Figure 5 –Transmission error timing 29
Figure A.1 – Server state diagram for IDRequestProcessing function 46
Figure A.2 – Server state diagram for ReadCommandProcessing function 47
Figure A.3 – Server state diagram for WriteCommandProcessing function 48
Figure A.4 – Server state diagram for BreakCommandProcessing function 49
Figure A.5 – Server state diagram for undefined command 50

Table 1 – Data elements in the TCDU 13
Table 2 – Bit-encoding of a 7-bit character code 15
Table 3 – Character encoding example of a 14-bit binary number 16
Table 4 – Character encoding example of a 4-digit hexadecimal number 16
Table 5 – Character encoding example of a 4-digit decimal number 17
Table 6 – Message field definitions 19
Table 7 – Request messages supported by the server 22
Table 8 – Response messages supported by the server 22
Table 9 – Functions supported by the server 22

Table 10 – Server timing requirements to respond to a request message 28
Table 11 – Inter-character timing requirements 28
Table 12 – Transmission error recovery wait period 29
Table 13 – Generic format for RegisterTable 30
Table 14 – Generic format for Register 31
Table 15 – Predefined Registers and registerID values 32
Table 16 – Instance format for ProtocolVersion register 33
Table 17 – Defined protocolVersion values 34
Table 18 – Instance format for TableID register 34
Table 19 – Instance format for ServerStatus register 35
Table 20 – Defined serverStatus values 36
Table 21 – Instance format for SoftwareVersion register 37
Table 22 – Instance format for BinaryTokenEntry register 38
Table 23 – Instance format for TokenStatus register 39
Table 24 – Defined tokenStatus values 40
Table 25 – Instance format for TokenLockoutTimeRemaining register 42
Table 26 – Entities/services requiring maintenance service 44

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICITY METERING – PAYMENT SYSTEMS –

Part 52: Standard transfer specification (STS) – Physical layer protocol for a two-way virtual token carrier for direct local connection

FOREWORD

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The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of a maintenance service concerning encryption key management and the stack of protocols on which the present International Standard IEC 62055-41 is based. [See Clause C.1 of IEC 62055-41.] The IEC takes no position concerning the evidence, validity and scope of this maintenance service.

The provider of the maintenance service has assured the IEC that he is willing to provide services under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the provider of the maintenance service is registered with the IEC. Information may be obtained from

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International Standard IEC 62055-52 has been prepared by working group 15, of IEC technical committee 13: Electrical energy measurement, tariff and load control.

IEC 62055-52 is complementary to, and should be read in conjunction with, IEC 62055-41.

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

FDIS	Report on voting
13/1424/FDIS	13/1428/RVD

Full information on the voting for the approval of this standard 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.

A list of all parts of IEC 62055 series, published under the general title *Electricity metering – Payment systems,* can be found on the IEC website.

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.

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

INTRODUCTION

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. At the time of preparation of this part, IEC 62055 comprised 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(STS) – Application layer protocol for one-way token carrier systems

Part 51: Standard transfer specification(STS) – Physical layer protocol for one-way numeric and magnetic card token carriers

Part 52: Standard transfer specification(STS) – Physical layer protocol for a two-way virtual token carrier for direct local connection

The *Part 4x series* specifies application layer protocols and the *Part 5x series* specifies physical layer protocols.

The protocol in this International Standard is based on the IEC 62056-21 communication protocol and has been simplified by removing features from the IEC 62056-21 protocol, which are not required for the current requirements of data exchange between the VTC07 client device and the payment meter server.

The main design objective in establishing the protocol has been the requirement to reduce the complexity of the software that is needed to implement this protocol in the payment meter. This directly relates to a smaller memory size that can be translated into a cost saving or the ability to include additional software features for a given memory size.

The Standard Transfer Specification (STS) is a secure message protocol that allows information to be carried between point of sale (POS) equipment and payment meters and it caters for several message types such as credit, configuration control, display and test instructions. It further specifies devices and Codes Of Practice that allows for the secure management (generation, storage, retrieval and transportation) of cryptographic keys used within the system.

The national electricity utility in South Africa (Eskom) first developed and published the STS in 1993 and transferred ownership to the STS Association in 1998 for management and further development.

Prior to the development of the STS, a variety of proprietary payment meters and POS equipment had been developed, which were however not compatible with each other. This gave rise to a definite need among the major users to move towards standardized solutions in addressing operational problems experienced where various types of payment meter and POS equipment had to be operated simultaneously. The Standard Transfer Specification was developed that would allow for the application and inter-operability of payment meters and POS equipment from multiple manufacturers in a payment metering installation.

The TokenCarrier is the physical medium used to transport information from a POS or the management system to the payment meter, or from the payment meter to the POS or management system. This part of IEC 62055 specifies a virtual token carrier as embodied in a direct local connection between a management device client and a payment meter server. It has been assigned identification code 07 by the STS Association and is also generally referred to as VTC07. New token carriers can be proposed as new work items through the National Committees or through the STS Association.

Although the main implementation of the STS is in the electricity supply industry, it inherently provides for the management of other utility services like water and gas. Future revisions of

the STS may allow for other token carrier technologies like smart cards and memory keys with two-way functionality.

The STS Association has established D-type liaison with working group 15 of IEC TC 13 for the development of standards within the scope of the STS, and is thus responsible for the maintenance of any such IEC standards that might be developed as a result of this liaison.

The STS Association is also registered with the IEC as a Registration Authority for providing maintenance services in support of the STS (see Clause C.1 of IEC 62055-41 for more information).

ELECTRICITY METERING – PAYMENT SYSTEMS –

Part 52: Standard transfer specification (STS) – Physical layer protocol for a two-way virtual token carrier for direct local connection

1 Scope

This part of IEC 62055 specifies a physical layer protocol of the STS for transferring units of credit and other management information between a client (typically a HHU) and a server (an STS-compliant electricity payment meter), typically over a direct local connection. It is complementary to the application layer protocol specified in IEC 62055-41 and should be used in conjunction with that standard.

This standard is not applicable to payment metering systems employing monetary-based tokens, complex tariffs and currency-mode accounting functions. It is only intended to support the STS functionality as defined in IEC 62055-41 and it does not support the additional functionality required for extended use that includes monetary-based tokens and complex meter functions such as tariffs, real time clocks and currency-mode accounting. If such extended use were required in the future, then it would need new work on this part of IEC 62055 as well as on IEC 62055-41.

It is intended for use across a range of payment meters developed by different manufacturers and to ensure compatibility between these products and other client devices.

It specifies a client/server communications protocol that:

- transfers STS-compliant tokens from a client device to a payment meter server;
- reads the result from the payment meter after transfer and execution of the token;
- transfers management data from the client device to the payment meter server;
- reads management data from the payment meter server and transfers same to the client device.

NOTE Although developed for payment systems for electricity, this standard can also be applied to other utility services, such as water and gas.

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 60050-300, *International Electrotechnical Vocabulary – 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*

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

IEC TR 62055-21:2005, *Electricity metering – Payment systems – Part 21: Framework for standardization*

IEC 62055-31:2005, *Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)*

IEC 62055-41, *Electricity metering – Payment systems – Part 41: Standard transfer specification – Application layer protocol for one-way token carrier systems*

IEC 62055-51, *Electricity metering – Payment systems Part 51: Standard transfer specification – Physical layer protocol for one-way numeric and magnetic card token carriers*

IEC 62056-21:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*

STS 101-1, *Standard transfer specification (STS) – Interface specification – Physical layer mechanical and electrical interface for virtual token carriers*[1]

1 To be published