STS Association

STS202-5

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Addendum to IEC62055- 41: Payment Systems - Standard Transfer Specification (STS) - Class 2 token extentions

CONTENTS

Revision History:

Revision	Clause	Date	Change details from previous Edition
1.0		Nov 2017	Initial Revision
1.1	4.4	April 2022	Corrected spelling of 'commissioning' in index 10

Field Code Changed

INTRODUCTION

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.

It is the intention of the STSA (Standard Transfer Specification Association) to, from time to time, increase the functionality of payment meters with the addition of tokens to the defined token space by making use of previously reserved token classes and subclasses.

This Addendum is intended for use by manufacturers of payment meters that have to accept tokens that comply with the STS and also by manufacturers of POS systems that have to produce STS-compliant tokens and is to be read in conjunction with the IEC 62055-5x series.

1 Scope

This addendum to IEC 62055-41 specifies additions to Class 2, SubClass 10 tokens.

Two pseudo registers are introduced: FlagArray having 512 single-bit flags and ControlArray having 63 10-bit values. Two token types are defined that allow control of these array elements.

A third and fourth token are introduced as Class 1, SubClass 2 that allows displaying the content of FlagArray and ControlArray.

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 62051, *Electricity metering – Glossary of terms*

IEC 62055-41, *ELECTRICITY METERING – PAYMENT SYSTEMS – Part 41: Standard transfer specification (STS) – Application layer protocol for one-way token carrier systems*

IEC62055-31, *ELECTRICITY METERING – PAYMENT SYSTEMS – Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)*

3 Terms, definitions and abbreviations

For the purposes of this standard, the terms and definitions given in IEC 62055-41, IEC 62051, IEC 62055-31 and the following terms apply.

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

The term “meter” is used interchangeably with “payment meter”, “prepayment meter” and “decoder”, where the decoder is a sub-part of a payment meter or a multi-part payment meter.

4 Token field definition

4.1 General

All fields in the token definition below remain as defined in IEC62055-41. Control and flag fields are introduced in this token set.Two types of token are defined as described below.Implementation of the tokens described in this specification are optional. If any of the tokens in 4.2 or 4.3 are implemented, then the implementation of the tokens in 5.1 and/or 5.2 respectively is mandatory. If any of the tokens in 4.2 or 4.3 are implemented, then the implementation of the first token in each supported set (Index 0 in Table3 and Table4) is mandatory.

4.2 SetFlag token

Sets the value of a flag (identified by ArrayIndex) in FlagArray (see Table 3) to the value specified in FlagValue.

Table 1 - SetFlag token

Class	Subclass	RND	TID	Index	FlagIndex	FlagValue	CRC
2 bits	**4 bits**	**4 bits**	**24 bits**	**6 bits**	**9 bits**	**1 bit**	**16 bits**
2	10			63	0-511	0 or 1	

Commented [FP1]: We should change this name. The value is not reserved - it has a value

4.3 SetControlElement token

Sets the value of an element (identified by ArrayIndex) in ControlArray (see Table 4) to the value specified in ControlValue.

Table 2 - SetControlElement token

Class	Subclass	RND	TID	Index	ControlValue	CRC
2 bits	**4 bits**	**4 bits**	**24 bits**	**6 bits**	**10 bits**	**16 bits**
2	10			0 - 62	0 - 1023	

4.4 FlagArray

An array of 512 1-bit flags performing the functions as defined in Table 3

Table 3 - FlagArray

Index	Function	Description	Action
0	SetFlagCTSTest	Reserved for CTS testing	0 = reset flag 1 = set flag

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1	DetectTamper	Enable or disable tamper detection in the payment meter	0 = disable 1 = enable
2	DisconnectService	Disconnect the service delivery or enable service reconnection	0 = enable reconnection of service 1 = disconnect service
3	DisconnectOnTamper	Enable or disable disconnection of service delivery of the payment meter on detection of a tamper event	0 = disable 1 = enable
4	DisconnectOnPowerLimit	Enable or disable disconnection of the service delivery due to the power measured by the payment meter exceeding the limit set in the MaximumPowerLimit register in the payment meter	0 = disable 1 = enable
5	DisconnectOnUnderFrequency	Enable or disable disconnection of the service delivery due to the frequency measured by the payment meter falling below the lower limits set in the corresponding register in the payment meter. See also Table 4	0 = disable 1 = enable
6	SetElectricityPaymentMode	Set the electricity payment meter into post or pre-payment mode	0 = post payment 1 = pre- payment
7	SetWaterPaymentMode	Set the water payment meter into post or pre-payment mode	0 = post payment 1 = pre-payment
8	SetGasPaymentMode	Set the gas payment meter into post or pre-payment mode	0 = post payment 1 = pre-payment
9	SetTimePaymentMode	Set the time payment meter into post or pre-payment mode	0 = post payment 1 = pre-payment
10	SetCommissioningMode	Set the payment meter into a commissioning mode	0 = set 1 = unset
11	EnableTIFallbackPowerLimit	Enable or disable the TariffIndex (TI) linked fallback power limit functionality	0 = disable 1 = enable
12 - 511	Reserved	Reserved for STS use	x

4.5 ControlArray

An array of 63 10-bit values.

Table 4 - ControlArray

Index	Function	Action	Resolution	Range
0	SetControlCTSTest	Reserved for CTS testing	1	0-1023
1	SetPowerLimitDuration	Set the power limit duration of the payment meter to the value specified in ControlValue	0.1 min	0 - 102.3 min

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2	SetUnderFrequencyLimit	Set the under frequency limit of the payment meter to the value specified in ControlValue, see Table 5	0.1 Hz	48.0-60.0Hz
3	SetUnderFrequencyDuration	Set the under frequency limit duration of the payment meter to the value specified in ControlValue	0.1 min	0-102.3 min
4	SetElectricityCreditPreWarningLevel	Set the electricity credit pre-warning level of the payment meter to the value specified in ControlValue	10 kWh	0-10230 kWh
5	SetElectricityCreditWarningLevel	Set the electricity credit warning level of the payment meter to the value specified in ControlValue	10 kWh	0-10230 kWh
6	SetElectricityCreditLimit	Set the maximum electricity credit limit allowed in the payment meter to the value specified in ControlValue	1000 kwh	0 - 1023000 kWh
7	SetWaterCreditPreWarningLevel	Set the water credit pre-warning level of the payment meter to the value specified in ControlValue	0.1 kl	0-102.3 kl
8	SetWaterCreditWarningLevel	Set the water credit warning level of the payment meter to the value specified in ControlValue	0.1 kl	0-102.3 kl
9	SetWaterCreditLimit	Set the maximum water credit limit allowed in the payment meter to the value specified in ControlValue	1 kl	0-1023 kl
10	SetGasCreditPreWarningLevel	Set the gas credit pre-warning level of the payment meter to the value specified in ControlValue	0.1 m^3	0-102.3 m^3
11	SetGasCreditWarningLevel	Set the water credit warning level of the payment meter to the value specified in ControlValue	0.1 m^3	0-102.3 m^3
12	SetGasCreditLimit	Set the maximum gas credit limit allowed in the payment meter to the value specified in ControlValue	1 m^3	0-1023 m^3
13	SetTimeCreditPreWarningLevel	Set the time credit pre-warning level of the payment meter to the value specified in ControlValue	10 min	0-10230 min
14	SetTimeCreditWarningLevel	Set the time credit warning level of the payment meter to the value specified in ControlValue	10 min	0-10230 min
15	SetTimeCreditLimit	Set the maximum time credit limit allowed in the payment meter to the value specified in ControlValue	100 min	0 - 102300 min
16	SetElectricityEmergencyCreditLimit	Set the amount that the payment meter can deplete credit past the zero value to the value specified in ControlValue	1 kWh	0 - 1023 kWh
17	SetWaterEmergencyCreditLimit	Set the amount that the payment meter can deplete credit past the zero value to the value specified	1 kl	0 - 1023 kl

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		in ControlValue		
18	SetGasEmergencyCreditLimit	Set the amount that the payment meter can deplete credit past the zero value to the value specified in ControlValue	1 m^3	0-1023 m^3
19	SetTimeEmergencyCreditLimit	Set the amount that the payment meter can deplete credit past the zero value to the value specified in ControlValue	10 min	0-10230 min
20	SetOverCurrentLimitPhase1	Set the maximum current that the payment meter can accept on phase 1 to the value specified in ControlValue	1 amp	0-1023 amps
21	SetOverCurrentLimitPhase2	Set the maximum current that the payment meter can accept on phase 2 to the value specified in ControlValue	1 amp	0-1023 amps
22	SetOverCurrentLimitPhase3	Set the maximum current that the payment meter can accept on phase 3 to the value specified in ControlValue	1 amp	0-1023 amps
23	SetOverVoltageLimitPhase1	Set the overvoltage limit for phase 1, to the value specified in ControlValue	1 volt	0-1023 volts
24	SetOverVoltageLimitPhase2	Set the overvoltage limit for phase 2, to the value specified in ControlValue	1 volt	0-1023 volts
25	SetOverVoltageLimitPhase3	Set the overvoltage limit for phase 3, to the value specified in ControlValue	1 volt	0-1023 volts
26	SetUnderVoltageLimitPhase1	Set the undervoltage limit for phase 1, to the value specified in ControlValue	1 volt	0-1023 volts
27	SetUnderVoltageLimitPhase2	Set the undervoltage limit for phase 2, to the value specified in ControlValue	1 volt	0-1023 volts
28	SetUnderVoltageLimitPhase3	Set the undervoltage limit for phase 3, to the value specified in ControlValue	1 volt	0-1023 volts
29	SetTIFallbackPowerLimit	Set the fallback power limit to the value specified in ControlValue, only when a keychange is performed on the payment meter that changes the TariffIndex (TI) of the payment meter. Note that this power limit is the sum of the power in all phases.	0.I kW	0-102.3 kW
30	SetOverallPowerLimit	Set the combined power limit of the payment meter, as the sum of the power of all phases, in a polyphase meter. This function shall not be implemented in a single phase payment meter	1 kW	0-1023 kW
31- 62	Reserved	x	x	X

Field Code Changed

Table 5 - Under-frequency settings

Under-frequency setting	Control value
00.0 to 47.9	0 to 479 - Invalid - token rejected
48.0 - 60.0	480 to 600 - valid
60.1 to 102.3	601 to 1023 - Invalid - token rejected

4.6 Acceptance and rejection

All the token acceptance and rejection criteria apply as defined in IEC62055-41, unless otherwise stated in this specification.

If any of the tokens defined in this specification are not supported, the payment meter shall reject the token as defined in IEC62055-41 for unsupported functions.

Behaviour of the payment meter after acceptance of the token defined in this specification is subject to the supply agreement between the payment meter manufacturer and the utility.

Payment meter behaviour may be subject to legal, metrological, or safety requirements, which requirements shall not be overridden by the acceptance of any of these tokens.

5 DisplayPaymentMeterSetting tokens

5.1 General

The following tokens allow the payment meter to display the settings of all implemented flags and control elements, whether the token is entered via a virtual token carrier or a physical token carrier.

5.2 DisplayFlag token

Instructs the meter to display the value of a flag (identified by FlagArrayIndex) of FlagArray (see Table 3)

Class (2 bits)	Subclass (4 bits)	RESA (6 bits)	FlagArrayIndex (9 bits)	RESB (29 bits)	CRC (16 bits)
1	2	63 0-62 reserved	0 reserved (note 1)	0	x

Note 1: The display of the flag bits functions as follows:
The display always starts with index 0 as the right most displayed flag. The display ends with the last supported flag. All flags between index zero and the last supported flag must be displayed. Any unsupported flags between the start index and the last supported flag must be indicated by the '-' character. The zero index flag must always be supported if any of the flags tokens are supported, so the value returned for index zero will be whatever that flag is set for. The default for this flag shall be zero.

Example (assuming all flags set to '1' and the '-' character indicating an unsupported flag):
Payment meter supports flags 0,1, 3, 4, 11, with flags 2, 5-10 unsupported.
Returned flags display: 1------11-11

Field Code Changed

5.3 DisplayControlElement token

Instructs the meter to display the value of an element (identified by ControlArrayIndex) in ControlArray (see Table 4).

Class (2 bits)	Subclass (4 bits)	ControlArrayIndex (6 bits)	RESC (38 bits)	CRC (16 bits)
1	2	0 - 62 63 reserved	0	x