STS Association

STS 201-2

Edition 1.2

Sept 2023

Standard Transfer Specification – Companion specification – STS interface classes for DLMS/COSEM

CONTENTS

Revision History

Edition	Clause	Date	Change details from previous edition
Ed 1.0 D100		19/12/2019	Initial draft
Ed 1.0 CDV		20/03/2021	Circulate to members for comment and vote
Ed 1.0		30/04/2021	First publication
ED1.1 CDV		23/05/2021	Add attribute for STS certificate number Some editorial corrections Submit to DLMS UA for inclusion into the Blue Book
ED1.1			Published
ED1.2	introduction	Sept 2023	Inclusion into the DLMS Blue Book
	2		Updated STS101-2 reference edition, added DLMS UA 1000-1 reference
	4.1		Added DLMS UA 1000-1 reference

	4.2		removed attributes table and attributes descriptions

STANDARD TRANSFER SPECIFICATION ASSOCIATION

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STANDARD TRANSFER SPECIFICATION –

Companion specification – STS interface classes for DLMS/COSEM

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Standard Transfer Specification STS 201-2 has been prepared by working group 8.

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

CDV	Report on voting
STS 201-2 Ed1.1	

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 STSA Directive STS 2100-1.

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, and 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.

DLMS/COSEM is an internationally recognised communication standard that enables two-way communication within smart metering systems using various communication media such as power line carrier (PLC), radio frequency (RF) and public cellular networks.

Recent editions of the DLMS/COSEM standard include a set of payment metering interface classes that support STS functionality. Furthermore, in 2016, the STS Association published STS101-2, which details how STS tokens can be transported over DLMS/COSEM protocol data units.

Consequently, in recent years, there has been a steady growth in the number smart metering products implementing DLMS/COSEM and STS in a single device. However, these implementations vary, greatly, in how they model STS data elements using the DLMS/COSEM standard. For this reason, there arose a need for COSEM interface classes that act as repositories for STS data elements that are accessible through a DLMS/COSEM communication interface.

This document specifies DLMS/COSEM-compliant interface classes for implementation in a DLMS/COSEM server that supports STS functionality.

The STS Attributes class has now been included into the DLMS UA 1000-1 Part 2 specification. All clauses relating to the *STS Attributes* interface class have been replaced with references to the DLMS UA 1000-1 Parts 1&2 The *STS Attributes* interface class has been renamed to *IEC 62055-41 Attributes* interface class and allocated class ID 116.

STANDARD TRANSFER SPECIFICATION –

Companion specification – STS interface classes for DLMS/COSEM

1 Scope

STS 201-2 specifies DLMS/COSEM-compliant interface classes that act as repositories for STS data elements within a DLMS/COSEM server implementation that incorporates STS functionality.

These interface classes are defined with strict adherence to the object modelling principles set out in the DLMS/COSEM standards and a careful selection of STS data elements necessary to effectively manage and control STS functions through remote and/or local DLMS/COSEM communication interfaces.

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 62056-6-1 Ed. 3.0, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object Identification System (OBIS)*

IEC 62056-6-2 Ed. 3.0, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes*

IEC 62055-41 Ed. 3.0, *Electricity metering – Payment systems – Part 41: Standard transfer specification (STS) – Application layer protocol for one-way token carrier systems*

STS 101-2 Ed. 1.6, *Standard Transfer Specification – Interface specification – Physical layer protocol for a two-way virtual token carrier for remote connection over DLMS/COSEM*

STS 202-5 Ed.1.0, *Addendum to IEC62055-41: Payment systems – Standard transfer specification (STS) – Class 2 token extensions*

DLMS UA 1000-1 ED15 Parts 1&2 – Version 1.0 21 December 2021

3 Terms, definitions and abbreviated terms

3.1 Definitions

For the purposes of this document, the terms and definitions given in IEC 62056-6-1, IEC 62056-6-2, IEC 62055-41 and the following apply.

3.1.1
interface class
abstract entity containing a specific set of attributes and methods and defining their use. Each interface class is identified by its instance_id

[SOURCE: IEC 62051-1:2004, 3.1.61]

3.1.2
(DLMS) server
in a client/server environment, communication entity providing services to a client. In DLMS/COSEM the application process running in a metering equipment plays the role of the server

[SOURCE: IEC 62051-1:2004, 3.1.119]

3.1.3
commodity
utility product delivered to a consumer at a service point on their premises under a contract of supply such as electricity, gas, water, and heat

[SOURCE: IEC 62056-6-2, 3.5.6]

3.2 Abbreviated terms

DLMS UA	DLMS User Association
IC	Interface Class
STS	Standard Transfer Specification
STSA	STS Association

4 STS interface classes

4.1 General

The IEC 62055-41 Attributes IC is mandatory for all DLMS servers that implement STS functionality, while the STS token extension IC is only mandatory in DLMS servers that support STS Class 2 extensions in accordance with STS 202-5.

It is mandatory for DLMS servers implementing an IEC 62055-41 Attributes object to implement at least a single instance of the Account IC, Credit IC, Charge IC and the Token Gateway IC specified in IEC 62056-6-2. The Token Gateway IC shall be instantiated in accordance with [DLMS UA 1000-1 ED15 Part 2].

4.2 IEC 62055-41 Attributes IC

An instance of the IEC 62055-41 Attributes IC presents a selection of STS data elements necessary to setup and manage STS functions implemented within a DLMS server. This interface class is fully specified in the DLMS Blue Book [DLMS UA 1000-1 ED15 Part 2].

4.3 STS Class 2 token extension arrays IC (class_id = 32850, version =0)

An instance of the STS token extensions arrays presents data elements of the FlagArray and the ControlArray as defined in STS 202-5.

STS Class 2 token extension arrays		**0..n**	**class_id = 32850 , version = 0**			
Attributes		***Data type***	***Min.***	***Max.***	***Def.***	**Short name**
1. logical_name	(static)	octet-string				x
2. token_extensions_flag _array	(dynamic)	array				x + 0x08
3. token_extensions_control _array	(dynamic)	array				x + 0x10
Specific methods		***m/o***				

Attribute description	
logical_name	Identifies the STS Class 2 token extension arrays object instance.
token_extensions_flag_array	Provides information about the status of the extended tokens FlagArray as per 4.4 in STS202-5. flag_array ::= array enum: (0) disabled

	(1) enabled (2) not implemented The number of elements in the flag_array shall match the number of assigned indexes in Table 3 of STS202-5 (the first element in the *flag_array* refers to index 0 in Table 3, the second element refers to index 1 in Table 3 and so forth). Where an implementation includes both an instance of Account interface class (class_id = 111) and STS Class 2 token extension arrays, the *set_electricity_payment_mode* index shall not be implemented. This attribute shall only be updated through the insertion of a SetFlag token.

token_extensions_control_array	Provides information about the status of the extended token ControlArray as per 4.5 of STS202-5.
	
	array control_array_element
	
	control_array_element ::= structure
	{
	index: long-unsigned
	value: CHOICE
	{
	-- for indexes 1-3, 7-8, 10-12 and 29
	float32 [23]
	
	-- for indexes 0, 4-6, 9, 13-28 and 30
	long-unsigned [18]
	}
	}
	
	Implementation of index 0 is mandatory.
	
	The *set_overall_power_limit* element shall not be implemented in single-phase meters.
	
	This attribute shall only be updated through the insertion of a SetControlElement token.

5 Relation to OBIS

5.1 STSA-specific identifiers

Table 1 specifies the use of value group D STSA-specific applications as assigned by the DLMS UA.

Table 1 – Value group D codes – Consortia-specific identifiers

Value group D Consortia-specific identifiers (A = any, C = 93)	
1	STS Association
2…255	Reserved for future assignment by DLMS UA

Furthermore, the DLMS UA has assigned the user group class_id 32 850…32 860 to the STSA.

5.2 Use of STSA-specific identifiers

The range of class_id and OBIS codes assigned by the DLMS UA shall be used by the STSA as specified in Table 2 and Table 3.

Table 2 – List of STSA interface classes by class_id

Interface class name	class_id	version
STS Class 2 token extension arrays	32 850	0
Reserved for future assignment by the STSA	32 851…32 860	-

Table 3 – STSA OBIS codes

List of objects - Abstract	OBIS code					
	A	B	C	D	E	F
STS Class 2 token extension arrays	0	0…64	93	1	1	255
Reserved for future allocation by STSA	0, 1, 4…9, 15	0…64	93	1	2…255	255

Annex A
(informative)

Considerations for STS compliance testing

A.1 Considerations for STS compliance testing

A.1.1 Introduction

The IEC 62055-41 Attributes interface class defined in DLMS UA 1000-1 ED15 Part 2 clause 4.6.6 is intended for use in a DLMS server implementation and in general such implementations already include functionality such as load limiting and tamper detection, implemented using standard DLMS/COSEM interface classes. Such interface classes have already been assigned standard OBIS codes by the DLMS UA. For this reason, the compliance test tool used to evaluate compliance to the requirements of this standard in relation to broader STS compliance requirements can utilise the existing OBIS codes. That is, there is no need, herein, to define particular attributes and/or interface classes to enable the testing of optional STS functional requirements. An explanation is given below on how standard DLMS/COSEM ICs can be used to test for STS compliance.

A.1.2 General testing requirements

In general, STS compliance will require the reading of the “Available Credit” and/or the “Token Credit”. To address these requirements, this standard mandates the implementation of at least a single instance of the COSEM Account IC, Credit IC and Charge IC. Thus the “Available Credit” can be read from the 5th attribute of the Account object and the “Token Credit” can be read from the 2nd attribute of the Credit object. The applicable standard OBIS codes are given in 6.2.17 of IEC 62056-6-2.

It may also be required to know the commodity type (i.e. electricity, water, gas or time) of the meter under test. This can be determined by reading the *currency_unit* element of the Account object’s *currency* attribute and the *commodity* attribute the IEC 62055-41 Attributes object (see clause 4.6.6.2.3 of DLMS UA 1000-1 ED15 Part 2).

To further assist the testing process, this standard also mandates the implementation of at least a single instance of the Token Gateway IC in accordance with STS101-2. This enables the reading of the last token’s TokenClass, TokenSubClass, TID and TokenAmount through the *token_description* attribute of the Token Gateway object.

A.1.3 Processing clear tamper condition token

Where implemented, the tamper status of the meter can be determined by reading the applicable DLMS/COSEM alarm register. The manufacturer should declare the meaning of the data contained within their implementation of the alarm register when submitting a meter for testing. The standard range of OBIS codes for alarm registers is provided in 6.2.59 of IEC 62056-6-2.

A.1.4 Processing set maximum power limit and set phase unbalance limits

Generally power limiting functionality (also known as *Demand Supervision*), in a DLMS server, is implemented using instances of the Limiter IC and/or Register Monitor IC. Thus the result of the processing of SetMaximumPowerLimit and SetMaximumPhasePowerUnbalanceLimit tokens can be determined by reading the threshold attribute of the relevant Limiter object and/or Register Monitor object(s), as applicable. The meter manufacturer needs to declare the details of the Limiter and Register Monitor object(s) to be read when a meter is submitted for testing. The standard range of OBIS codes for Limiter and Register Monitor objects are provided in 6.2.15 and 6.2.13 of IEC 62056-6-2, respectively.