

INTERNATIONAL STANDARD

**Alarm and electronic security systems –
Part 11-5: Electronic access control systems – Open supervised device protocol
(OSDP)**





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2020 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

INTERNATIONAL STANDARD

**Alarm and electronic security systems –
Part 11-5: Electronic access control systems – Open supervised device protocol
(OSDP)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 13.320

ISBN 978-2-8322-8480-3

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	11
3 Terms, definitions and abbreviated terms	11
3.1 Terms and definitions.....	11
3.2 Abbreviated terms.....	12
4 Overview	12
5 Communication settings.....	13
5.1 Physical interface	13
5.2 Signaling.....	13
5.3 Character encoding.....	13
5.4 Channel access	13
5.5 Multi-byte data encoding	13
5.6 Packet size limits	14
5.7 Timing.....	14
5.8 Message synchronization.....	14
5.9 Packet format	15
5.10 Multi-part messages.....	17
5.10.1 General	17
5.10.2 Multi-part message usage rules	17
5.11 Smartcard handling.....	18
6 Commands	19
6.1 General.....	19
6.2 Poll request (osdp_POLL).....	19
6.3 ID report request (osdp_ID).....	19
6.4 Peripheral device capabilities request (osdp_CAP)	20
6.5 Local status report request (osdp_LSTAT)	20
6.6 Input status report request (osdp_ISTAT).....	20
6.7 Output status report request (osdp_OSTAT)	21
6.8 Reader status report request (osdp_RSTAT).....	21
6.9 Output control command (osdp_OUT)	21
6.10 Reader LED control command (osdp_LED)	22
6.11 Reader buzzer control command (osdp_BUZ)	24
6.12 Reader text output command (osdp_TEXT).....	25
6.13 Communication configuration command (osdp_COMSET).....	26
6.14 Scan and send biometric data (osdp_BIOREAD).....	27
6.15 Scan and match biometric template (osdp_BIOMATCH).....	28
6.16 Encryption key set (osdp_KEYSET)	29
6.17 Challenge and secure session initialization request (osdp_CHLNG).....	29
6.18 Server's random number and server cryptogram (osdp_SCRIPT).....	29
6.19 Manufacturer specific command (osdp_MFG)	29
6.20 ACU receive size (osdp_ACURXSIZE)	30
6.21 Keep reader active (osdp_KEEPACTIVE).....	30
6.22 Abort current operation (osdp_ABORT).....	31
6.23 Get PIV data (osdp_PIVDATA).....	31

6.24	General authenticate (osdp_GENAUTH)	31
6.25	Authentication challenge (osdp_CRAUTH)	32
6.26	File transfer command (osdp_FILETRANSFER)	33
6.27	Extended write data (osdp_XWR)	33
6.27.1	General	33
6.27.2	Mode set command	34
6.27.3	Mode-00 read setting	35
6.27.4	Mode specific command codes for XRW_MODE=1	35
6.27.5	Mode-01 transparent content send request	35
6.27.6	Mode-01 connection done	35
6.27.7	Mode-01 request secure PIN entry command	36
6.27.8	Mode-01 smartcard scan	37
7	Replies	37
7.1	General	37
7.2	General acknowledge – Nothing to report (osdp_ACK)	38
7.3	Negative acknowledge – Error response (osdp_NAK)	38
7.4	Device identification report (osdp_PDID)	39
7.5	Device capabilities report (osdp_PDCAP)	40
7.6	Local status report (osdp_LSTATR)	41
7.7	Input status report (osdp_ISTATR)	41
7.8	Output status report (osdp_OSTATR)	41
7.9	Reader tamper status report (osdp_RSTATR)	42
7.10	Card data report, raw bit array (osdp_RAW)	42
7.11	Card data report, character array (osdp_FMT)	43
7.12	Keypad data report (osdp_KEYPAD)	43
7.13	Communication configuration report (osdp_COM)	44
7.14	Scan and send biometric data (osdp_BIOREADR)	44
7.15	Scan and match biometric template (osdp_BIOMATCHR)	45
7.16	Client's ID and client's random number (osdp_CCRYPT)	45
7.17	Client cryptogram packet and the initial R-MAC (osdp_RMAC_I)	46
7.18	Manufacturer specific reply (osdp_MFGREP)	46
7.19	PD busy reply (osdp_BUSY)	46
7.20	PIV data reply (osdp_PIVDATAR)	46
7.21	osdp_GENAUTHR	47
7.22	Response to challenge (osdp_CRAUTHR)	47
7.23	Manufacturer specific status reply (osdp_MFGSTATR)	48
7.24	Manufacturer specific error reply (osdp_MFGERRR)	48
7.25	File transfer status (osdp_FTSTAT)	48
7.26	Extended read reply (osdp_XRD)	49
7.26.1	General	49
7.26.2	Mode specific reply codes for XRW_MODE=0	50
7.26.3	Mode-00 error reply (osdp_PR00ERROR)	50
7.26.4	Mode setting report (osdp_PR00REQR)	50
7.26.5	Card information report (osdp_PR00CIRR)	51
7.26.6	Mode specific reply codes for XRW_MODE=1	51
7.26.7	Mode-01 NAK or error reply (osdp_PR01ERROR)	52
7.26.8	Card present notification reply (osdp_PR01PRES)	52
7.26.9	Transparent card data reply (osdp_PR01SCREP)	52
7.26.10	Secure PIN entry complete reply (osdp_PR01SPER)	53

Annex A (normative) Command and reply code numbers commands	54
A.1 Commands	54
A.2 Replies	55
Annex B (normative) Function code definitions list	56
B.1 General.....	56
B.2 Function code 1 – Contact status monitoring.....	56
B.3 Function code 2 – Output control	57
B.4 Function code 3 – Card data format	57
B.5 Function code 4 – Reader LED control.....	57
B.6 Function code 5 – Reader audible output	58
B.7 Function code 6 – Reader text output.....	58
B.8 Function code 7 – Time keeping	58
B.9 Function code 8 – Check character support	58
B.10 Function code 9 – Communication security	59
B.11 Function code 10 – Receive bufferSize	59
B.12 Function code 11 – Largest combined message size.....	59
B.13 Function code 12 – Smart card support.....	59
B.14 Function code 13 – Readers	60
B.15 Function code 14 – Biometrics	60
B.16 Function code 15 – Secure PIN entry support	60
B.17 Function code 16 – OSDP version	60
Annex C (normative) CRC definition	61
Annex D (normative) Encryption.....	64
D.1 Encryption method: OSDP-SC	64
D.1.1 General	64
D.1.2 Overview	65
D.1.3 The process.....	65
D.1.4 Secure channel session connection sequence (SCS-CS).....	65
D.1.5 Communication during a secure channel session.....	67
D.1.6 SCS_16 PD->ACU	67
D.1.7 SCS_17 ACU->PD	67
D.1.8 SCS_18 PD->ACU	67
D.2 Command	67
D.2.1 Encryption key set (osdp_KEYSET).....	67
D.2.2 Challenge and secure session initialization request (osdp_CHLNG)	68
D.2.3 Server's random number and server cryptogram (osdp_SCRIPT)	68
D.3 Replies	68
D.3.1 Client's ID and client's random number (osdp_CCRYPT)	68
D.3.2 Client cryptogram packet and the initial R-MAC (osdp_RMAC_I)	69
D.4 Algorithms and support functions	69
D.4.1 Session key derivation.....	69
D.4.2 Key diversification	69
D.4.3 Client cryptogram	70
D.4.4 Server cryptogram	70
D.4.5 Padding	70
D.5 Message authentication code (MAC) generation	70
D.5.1 General	70
D.5.2 The wrap operation for security block types SCS_15, SCS-16, SCS_17, and SCS_18	71

D.5.3 The unwrap operation	72
D.6 Error recovery	72
D.7 Field deployment and configuration	72
Annex E (normative) Test vectors	74
Annex F (informative) Mapping of mandatory functions in IEC 60839-11-1	75
Bibliography	85
Figure 1 – Schematic overview of an OSDP connection	12
Figure D.1 – MAC algorithm	71
Table 1 – Packet format	15
Table 2 – Message control information	16
Table 3 – The security block (SB)	17
Table 4 – Multi-part message structure	17
Table 5 – Behaviour modes	18
Table 6 – Poll request	19
Table 7 – ID report request	20
Table 8 – Peripheral device capabilities request	20
Table 9 – Local status report request	20
Table 10 – Input status report request	20
Table 11 – Output status report request	21
Table 12 – Reader status report request	21
Table 13 – Output control command	22
Table 14 – Control code values	22
Table 15 – Reader LED control command	23
Table 16 – Temporary control code values	24
Table 17 – Permanent control code values	24
Table 18 – Color values	24
Table 19 – Reader buzzer control command (osdp_BUZ)	25
Table 20 – Reader text output command (osdp_TEXT)	26
Table 21 – Text command values	26
Table 22 – Communication configuration command (osdp_COMSET)	27
Table 23 – Read and send biometric data (osdp_BIOREAD)	27
Table 24 – Biometric types	28
Table 25 – Fingerprint formats	28
Table 26 – Command structure: 6-byte header followed by a variable length template	29
Table 27 – Manufacturer specific commands (osdp_MFG)	30
Table 28 – ACU receive size (osdp_ACURXSIZE)	30
Table 29 – Keep reader active (osdp_KEEPACTIVE)	30
Table 30 – Abort current operation (osdp_ABORT)	31
Table 31 – Get PIV data (osdp_PIVDATA)	31
Table 32 – General authenticate (osdp_GENAUTH) fragment	32
Table 33 – Authentication challenge (osdp_CRAUTH) fragment	32

Table 34 – File transfer command	33
Table 35 – Extended write command structure	34
Table 36 – Mode set command	34
Table 37 – Mode 0 configuration	34
Table 38 – Mode 1 configuration	34
Table 39 – Read setting request	35
Table 40 – Mode specific command codes	35
Table 41 – Transparent content send request	35
Table 42 – Smartcard connection done	36
Table 43 – Request secure PIN entry command	36
Table 44 – Smartcard scan	37
Table 45 – General acknowledge (osdp_ACK)	38
Table 46 – Negative acknowledge (osdp_NAK)	38
Table 47 – Error codes	39
Table 48 – Device identification report (osdp_PDID)	40
Table 49 – Device capabilities report (osdp_PDCAP)	40
Table 50 – Local status report (osdp_LSTATR)	41
Table 51 – Input status report (osdp_ISTATR)	41
Table 52 – Output status report (osdp_OSTATR)	42
Table 53 – Reader tamper status report (osdp_RSTATR)	42
Table 54 – Card data report, raw bit array (osdp_RAW)	43
Table 55 – Card data report, character array (osdp_CMT)	43
Table 56 – Keypad data report (osdp_KEYPAD)	44
Table 57 – Communication configuration report (osdp_COM)	44
Table 58 – Scan and send biometric data (osdp_BIOREADR)	45
Table 59 – Scan and match biometric template (osdp_BIOMATCHR)	45
Table 60 – Manufacturer specific reply (osdp_MFGREP)	46
Table 61 – PD busy reply (osdp_BUSY)	46
Table 62 – PIV data reply (osdp_PIVDATAR)	47
Table 63 – General authenticate response (osdp_GENAUTHR)	47
Table 64 – Response to challenge (osdp_CRAUTHR)	48
Table 65 – Manufacturer specific status reply (osdp_MFGSTATR)	48
Table 66 – Manufacturer specific error reply (osdp_MFGERRR)	48
Table 67 – File transfer status (osdp_FTSTAT)	49
Table 68 – Extended read reply	50
Table 69 – Mode specific reply codes	50
Table 70 – Error reply	50
Table 71 – Mode setting report	51
Table 72 – Card information report	51
Table 73 – Mode specific reply codes	51
Table 74 – Error reply	52
Table 75 – Card present notification reply	52
Table 76 – Transparent card data reply	52

Table 77 – Transparent card data reply.....	53
Table A.1 – Commands code numbers.....	54
Table A.2 – Replies code numbers.....	55
Table B.1 – Function codes	56
Table D.1 – SEC_BLK_TYPE assignment.....	64
Table D.2 – Command structure: 2-byte header followed by variable length data.....	67
Table D.3 – Command structure: 8-byte random number as the “challenge”.....	68
Table D.4 – Command structure: 16-byte server cryptogram.....	68
Table D.5 – Command structure: 32-byte structure.....	69
Table D.6 – Command structure: 16-byte structure.....	70
Table F.1 – Access point interface requirements.....	76
Table F.2 – Indication and annunciation requirements	77
Table F.3 – Recognition requirements.....	80
Table F.4 – Duress signalling requirements	81
Table F.5 – Overriding requirements.....	81
Table F.6 – System self-protection requirements	82

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ALARM AND ELECTRONIC SECURITY SYSTEMS –**Part 11-5: Electronic access control systems –
Open supervised device protocol (OSDP)**

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use, and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, accept to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60839-11-5 has been prepared by IEC technical committee 79: Alarm and electronic security systems.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
79/634/FDIS	79/636/RVD

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.

A list of all parts in the IEC 60839 series, published under the general title *Alarm and electronic security systems*, 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.

INTRODUCTION

This document describes the communication protocol for interfacing one or more Peripheral Devices (PD) to an Access Control Unit (ACU). This document specifies the protocol implementation over a two-wire RS-485 multi-drop serial communication channel.

This document is based upon the work done by the Security Industry Association OSDP Working Group.

ALARM AND ELECTRONIC SECURITY SYSTEMS –

Part 11-5: Electronic access control systems – Open supervised device protocol (OSDP)

1 Scope

This part of IEC 60839 specifies the Open supervised device protocol (OSDP) for electronic access control systems. This includes communication settings, commands and replies between the ACU and the peripheral devices. It also includes a mapping of mandatory and optional requirements as per IEC 60839-11-1:2013 as covered by Annex F.

This document applies to physical security only. Physical security prevents unauthorized personnel, attackers or accidental intruders from physically accessing a building, room, etc.

This document does not in any way limit a manufacturer to add other commands to the protocol defined here.

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 60839-11-1:2013, *Alarm and electronic security systems – Part 11-1: Electronic access control systems – System and components requirements*

IEC 60839-11-2:2014, *Alarm and electronic security systems – Part 11-2: Electronic access control systems – Application guidelines*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document the terms and definitions given in IEC 60839-11-1 and IEC 60839-11-2, as well as 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>

3.1.1

client

service requester

EXAMPLE User interface, etc.

3.1.2

server

service provider