

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Service diagnostic interface for consumer electronics products and networks –  
Implementation for echonet**

**Interface de diagnostic de service pour produits et réseaux électroniques grand  
public – Implémentation pour echonet**

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

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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## CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references.....	10
3 Terms, definitions and abbreviations.....	10
3.1 Terms and definitions.....	10
3.2 Abbreviations.....	11
4 Different types of service diagnostics.....	12
4.1 Stand-alone products.....	12
4.2 Facilities or household appliances network.....	12
4.3 Remote diagnosis.....	12
5 SDI requirements.....	12
5.1 General.....	12
5.2 Hardware.....	12
5.3 Software.....	13
6 Tester software requirements.....	14
6.1 Reading the property diagnostic unit.....	14
6.2 General information (product identification).....	14
6.3 Diagnosis information.....	14
7 Control protocol 1 <sup>st</sup> .....	14
7.1 General.....	14
7.2 Frame format.....	14
8 Control protocol 2 <sup>nd</sup> .....	42
8.1 General.....	42
8.2 Frame format.....	42
9 ECHONET objects: detailed specifications.....	55
9.1 Basic concept.....	55
9.2 ECHONET properties: basic specifications.....	56
9.3 Device object super class specifications.....	58
9.4 Temperature sensor class specifications.....	70
9.5 Humidity sensor class specifications.....	70
9.6 Illuminance sensor class specifications.....	71
9.7 Human detection sensor class specifications.....	72
9.8 Electric energy sensor class specifications.....	73
9.9 Open/close sensor class specifications.....	74
9.10 Current value sensor class specifications.....	76
9.11 Air speed sensor class specifications.....	77
9.12 Water flow rate sensor class specifications.....	78
9.13 Home air conditioner class specifications.....	79
9.14 Ventilation fan class specifications.....	99
9.15 Air purifier class specifications.....	100
9.16 Humidifier class specifications.....	101
9.17 Electrically operated shade class specifications.....	104
9.18 Electric water heater class specifications.....	105
9.19 Household solar power generation class specifications.....	111

9.20	Floor heater class specifications.....	113
9.21	Fuel cell class specifications .....	118
9.22	Storage battery class specifications.....	125
9.23	Electric vehicle charge-discharge system class specifications .....	133
9.24	Water flow meter class specifications .....	142
9.25	Power distribution board metering class specifications .....	146
9.26	Smart electric meter class specifications .....	166
9.27	Smart gas meter class specifications.....	177
9.28	General light class specifications.....	184
9.29	Refrigerator class specifications .....	187
9.30	Microwave oven class specifications .....	197
9.31	Washer and dryer class specifications .....	213
9.32	Clothes dryer class specifications.....	235
9.33	Cooking heater class specifications.....	237
9.34	Switch class specifications .....	243
10	Property map description format.....	244
	Bibliography.....	245
	Figure 1 – ECHONET frame for plain data format.....	15
	Figure 2 – EHD detailed specifications.....	16
	Figure 3 – Configuration of SEA and DEA when an individual address is specified .....	17
	Figure 4 – DEA (broadcast-stipulated) address configuration .....	17
	Figure 5 – Broadcast target stipulation code.....	18
	Figure 6 – Node group stipulation bit specifications.....	18
	Figure 7 – OHD detailed specifications.....	19
	Figure 8 – EOJ detailed specifications.....	19
	Figure 9 – EPC detailed specifications.....	21
	Figure 10 – ESV detailed specifications.....	21
	Figure 11 – EDATA configuration in property value write service .....	25
	Figure 12 – EDATA configuration in property value read service .....	25
	Figure 13 – EDATA configuration in property value notification service .....	26
	Figure 14 – EDATA configuration in property value element-stipulated write service .....	27
	Figure 15 – EDATA configuration in property value element-stipulated read service .....	28
	Figure 16 – EDATA configuration in property value element-stipulated notification service.....	29
	Figure 17 – EDATA configuration in property value element-stipulated addition .....	30
	Figure 18 – EDATA configuration in property value element-stipulated deletion .....	31
	Figure 19 – EDATA configuration in property value element-stipulated existence confirmation.....	32
	Figure 20 – EDATA configuration in property value element addition .....	33
	Figure 21 – EDATA configuration in property value notification (response required).....	33
	Figure 22 – EDATA configuration in property value element-stipulated notification (response required) .....	34
	Figure 23 – CpESV configuration .....	35
	Figure 24 – Relationship between write request (requiring no response) and write "process-not-possible" response.....	38

Figure 25 – Relationship between write request (requiring a response), write "accepted" response, and write "process-not-possible" response.....	39
Figure 26 – Relationship between read request (requiring a response), read "accepted" response, and read "process-not-possible" response .....	40
Figure 27 – Notification message format .....	41
Figure 28 – Relationship between property value notification (requiring a response) and property value notification response.....	41
Figure 29 – Processing target property counter for three requests .....	42
Figure 30 – Property data counter.....	42
Figure 31 – ECHONET Lite frame format .....	43
Figure 32 – Detailed specifications of ELHD1 .....	43
Figure 33 – Detailed specifications of ELHD2 .....	44
Figure 34 – Detailed specifications of EOJ code .....	44
Figure 35 – ELSV code detailed specifications.....	45
Figure 36 – ELDATA configuration for property value write service (no response required).....	48
Figure 37 – ELDATA configuration for property value write service (response required).....	49
Figure 38 – ELDATA configuration for property value read service.....	50
Figure 39 – ELDATA configuration for property value write and read service .....	51
Figure 40 – ELDATA configuration for property value notification service.....	52
Figure 41 – ELDATA configuration for property value notification (response required) service.....	53
Figure 42 – EPC detailed specifications.....	54
Figure 43 – ECHONET Lite Property data counter .....	55
Figure 44 – Example of array elements.....	57
Figure 45 – Example of property value element deletion .....	58
Figure 46 – Example of property value element addition .....	58
Figure 47 – Data structure of "identification number" property.....	64
Figure 48 – Data structure of "manufacturer's fault code" property.....	65
Figure 49 – Air flow direction (vertical) setting .....	90
Figure 50 – Air flow direction (horizontal) setting .....	91
Figure 51 – Mounted air cleaning method .....	93
Figure 52 – Air purifier function setting .....	94
Figure 53 – Air refresh method.....	94
Figure 54 – Air refresher function setting .....	95
Figure 55 – Self-cleaning method.....	95
Figure 56 – Self-cleaning function setting .....	96
Figure 57 – Implemented ion emission method .....	104
Figure 58 – Daily timer setting .....	117
Figure 59 – Stove .....	240
Table 1 – Bit pattern for hop count.....	16
Table 2 – List of class group codes.....	20
Table 3 – List of ESV codes for requests .....	23
Table 4 – List of ESV codes for response/notification.....	23

Table 5 – List of ESV codes for “response-not-possible” responses .....	24
Table 6 – List of CpESV codes for request/notification .....	36
Table 7 – List of CpESV codes for “accepted” response .....	37
Table 8 – List of CpESV codes for “process-not-possible” response .....	37
Table 9 – List of class group codes .....	45
Table 10 – List of service codes for request .....	47
Table 11 – List of ELSV codes for response/notification .....	47
Table 12 – List of ELSV codes for “response not possible” .....	48
Table 13 – EPC code allocation table .....	54
Table 14 – Data types, data sizes, and overflow/underflow codes .....	57
Table 15 – List of device object super class configuration properties .....	59
Table 16 – Installation location (space) types and the bit values assigned to them .....	63
Table 17 – Fault-content property value assignments .....	67
Table 18 – List of temperature sensor properties .....	70
Table 19 – List of humidity sensor properties .....	71
Table 20 – List of illuminance sensor properties .....	71
Table 21 – List of human detection sensor properties .....	72
Table 22 – List of electric energy sensor properties .....	73
Table 23 – List of open/close sensor properties .....	75
Table 24 – List of current value sensor properties .....	76
Table 25 – List of air speed sensor properties .....	77
Table 26 – List of water flow rate sensor properties .....	78
Table 27 – List of home air conditioner properties .....	79
Table 28 – Air flow direction (horizontal) setting .....	91
Table 29 – List of ventilation fan properties .....	99
Table 30 – List of air purifier properties .....	100
Table 31 – List of humidifier properties .....	102
Table 32 – List of electrically operated shade properties .....	105
Table 33 – List of electric water heater properties .....	106
Table 34 – List of household solar power generation properties .....	111
Table 35 – List of floor heater properties .....	114
Table 36 – List of fuel cell properties .....	119
Table 37 – List of storage battery properties .....	126
Table 38 – List of electric vehicle charge-discharge system properties .....	133
Table 39 – List of water flow meter properties .....	142
Table 40 – List of power distribution board metering properties .....	146
Table 41 – List of smart electric meter properties .....	167
Table 42 – List of smart gas meter properties .....	177
Table 43 – Security data information property .....	182
Table 44 – gas consumption log information property .....	184
Table 45 – List of general light properties .....	184
Table 46 – List of refrigerator properties .....	187
Table 47 – List of microwave oven properties .....	198

Table 48 – Heating status property .....	204
Table 49 – Automatic heating setting property .....	205
Table 50 – Automatic heating cycle codes .....	206
Table 51 – Prompt message codes .....	210
Table 52 – 2 bytes bitmap definition for each accessory .....	211
Table 53 – List of washer and dryer properties.....	213
Table 54 – washer and dryer setting property .....	219
Table 55 – washer and dryer cycle option list 1 property.....	225
Table 56 – Washer and dryer cycle option list 2 property .....	225
Table 57 – Washer and dryer cycle option list 3 property .....	226
Table 58 – Current stage of washer and dryer cycle property.....	229
Table 59 – List of clothes dryer properties .....	236
Table 60 – List of cooking heater properties.....	238
Table 61 – List of switch properties.....	243
Table 62 – Property map description format.....	244

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SERVICE DIAGNOSTIC INTERFACE FOR CONSUMER  
ELECTRONICS PRODUCTS AND NETWORKS –  
IMPLEMENTATION FOR ECHONET**

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International Standard IEC 62394 has been prepared by technical area 9: Audio, video and multimedia applications for end-user network, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition cancels and replaces the first edition, published in 2006, and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- addition of new message structure (frame format);
- updates of the device object super class specifications for the property configurations shared by all device objects;
- addition of the property configurations defined by each device object;
- updates of normative references.

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

FDIS	Report on voting
100/2182/FDIS	100/2214/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.

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## INTRODUCTION

Consumer products are often repaired by service workshops, which service a wide range of products developed by different manufacturers.

For highly complex products, fault diagnosis becomes increasingly difficult and time consuming.

To facilitate diagnosis, manufacturers often develop built-in diagnostic software that communicates with an external diagnostic unit through a service diagnostic interface (SDI).

To avoid the need for a service workshop to purchase several different diagnostic units from different manufacturers for different products, a standardized SDI is proposed for use by all manufacturers of any products requiring a diagnostic interface. The result will be that only one SDI is needed in the service workshops.

The SDI should be suitable for diagnosis in a facilities or household appliances network in which different products from different manufacturers are connected together. The interface should also allow for future development.

The standard SDI should

- be usable in future products,
- be easily connectable to a product or a network,
- be inexpensive,
- not limit product design.

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# SERVICE DIAGNOSTIC INTERFACE FOR CONSUMER ELECTRONICS PRODUCTS AND NETWORKS – IMPLEMENTATION FOR ECHONET

## 1 Scope

This International Standard specifies requirements for service diagnostic software to be implemented in products that incorporate a digital interface. It does not specify requirements for carrying out remote diagnosis or for manufacturer-dependent software.

The SDI (Service Diagnostic Interface) requires an external controller (exclusive or general-purpose/PC) into which service diagnostic software can be loaded. Part of the controller software should be standardized while another part of this controller software should be unique to the manufacturer.

To reach a common approach in servicing all products from all manufacturers, it is necessary to standardize specific items to be tested in products and in controllers' diagnostic software.

The SDI is based upon the ECHONET specification version 2.11, ECHONET Lite specification version 1.01 and APPENDIX Detailed Requirements for ECHONET Device objects Release B because this interface will be used in future products. The use of this connection and existing communication protocols enable implementation in products at low cost, with maximum flexibility and efficiency.

The SDI consists of

- specific hardware and software requirements of the device under test (DUT);
- specific requirements of the controller:
  - the service software;
  - an ECHONET interface;
- the connection between the controller and the DUT.

This standard provides the minimal requirements necessary to carry out computerized diagnosis. It covers the standardized software of the controller as well as the standardized software and provisions in the DUT.

## 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.

(void)

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1.1****ECHONET specifications**

specifications designed to enable the use of various kinds of transmission media (for example, power line, low-power radiofrequency, ETHERNET, Bluetooth<sup>1</sup>)

**3.1.2****remote diagnosis**

diagnosis of a product via telephone, Internet, etc.

**3.2 Abbreviations**

CpESV	Compound ECHONET service
DEA	Destination ECHONET address
DEOJ	Destination ECHONET object
DUT	Device under test
EBC	ECHONET byte counter
EDATA	ECHONET DATA
EDT	ECHONET property value data
EHD	ECHONET headers
ELDATA	ECHONET Lite DATA
ELHD	ECHONET Lite headers
ELPDC	ECHONET Lite Property data counter
ELSV	ECHONET Lite service
EOJ	ECHONET objects
EPC	ECHONET property
ESV	ECHONET service
EVPS	Electric Vehicle Power System
LSB	Least Significant Bit
MSB	Most Significant Bit
OEM	Original equipment manufacturer
OHD	Object message header
OPC	Processing target property counter
PC	Personal computer
PDC	Property data counter
PEDATA	Plane EDATA (Plane ECHONET data)
ROM	Read-only memory
SDI	Service diagnostic interface
SEA	Source ECHONET address
SEOJ	Source ECHONET object
SOC	State of Charge
TID	Transaction ID
V2H	Vehicle to Home

<sup>1</sup> ETHERNET is the trademark of a product supplied by Xerox Corporation.  
Bluetooth is the trademark of a product supplied by Bluetooth SIG, Inc.

## 4 Different types of service diagnostics

### 4.1 Stand-alone products

For stand-alone products, a connection is made between the diagnostic controller and the DUT, where the DUT is from any manufacturer and of any type.

### 4.2 Facilities or household appliances network

In a facilities or household appliances network, a connection is made between the diagnostic controller and a network of facilities or household appliances. Several different facilities or household appliances are interconnected and not all of them are necessarily from the same manufacturer.

In this case, the SDI shall list the products on the network, detect which facilities or appliances are causing problem, and diagnose the product concerned.

### 4.3 Remote diagnosis

In addition to the configurations described in 4.1 and 4.2, a link can be made (for example, via telephone, the Internet, etc.) between the diagnostic controller in the workshop and a DUT/network at the customer's home. Therefore, if a product has both an ECHONET interface and a remote connection capability, this product should be able to transfer the diagnostic data, as described in this standard, through the remote connection.

## 5 SDI requirements

### 5.1 General

The SDI consists of

- hardware and software, both in the DUT and in the test equipment (“tester”);
- the connection between the tester and the DUT.

The total SDI can be divided into the parts described in 5.2 and 5.3.

### 5.2 Hardware

#### 5.2.1 Tester hardware

The hardware used for testing shall be a controller exclusive computer or general-purpose controller (for example, desktop or laptop PC) provided with at least one suitable network interface which enables the transfer of the ECHONET frame, as specified in 7.2, and running the necessary diagnostic software.

NOTE The minimum requirements for the tester hardware depend on the respective tester platform.

#### 5.2.2 Facilities or household appliances network

For the connection between the tester and the DUT, the “facilities or household appliances network” shall be used. For the diagnosis of the DUT using the network, the tester shall be connected to the facilities or household appliances network that conforms to the requirements of 7.1.

### 5.2.3 DUT hardware

#### 5.2.3.1 General

The DUT shall be provided with at least one network interface which enables the transfer of the ECHONET frame as specified in 7.2.

#### 5.2.3.2 Facilities or household appliances network

For diagnosis on a network, the tester shall, where possible, be connected to a “facilities or household appliances network” that conforms to the requirements of 7.1.

### 5.3 Software

#### 5.3.1 General

The software for the SDI can be divided into two parts (tester and DUT) of which each part again can be divided into mandatory (SDI common) software and non-mandatory (manufacturer-dependent) software.

#### 5.3.2 Tester software

The software platform of the tester shall be able to handle the ECHONET frame as specified in 7.2.

The SDI common software on the tester shall have the following functionalities:

- a) initiate a service of “property value read request”, as specified in 7.2.9;
- b) read out the service of “property value read response” and “property value notification” of all products, as specified in 7.2.9;
- c) display a list of all products connected to the facilities or household appliances network to which the tester is connected. On the display shall be listed the
  - manufacturer code property,
  - place-of-business code property,
  - product code property,
  - serial number property,
  - date-of-manufacture property;
- d) display an indication of the fault status property which describes the occurrence of an error in an actual device. The property code used as a property value is  $0 \times 41$  when an error exists or  $0 \times 42$  when no error exists and is found to be “OK” or “Not OK” as specified in 9.3.6;
- e) display an indication of the fault content property which describes the content of an error in an actual device as specified in 9.3.6.

#### 5.3.3 DUT software requirements for the SDI

The DUT shall be able to handle the ECHONET frame as specified in 7.2.

In addition, the SDI common software in the DUT shall be able to

- a) run a self-test routine;
- b) receive a service of “property value read request” as specified in 7.2.9 which is initiated by the tester and response a service of “property value read response” as specified in 7.2.9;
- c) initiate a service of “property value notification” as specified in 7.2.9.