



DPC: 25 / 30507164 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 06 January 2025

Origin: International

Latest date for receipt of comments: 15 January 2025

Project No. 2025/00031

Responsible committee: IST/6/-/12 Home Electronic Systems

Interested committees:

Title: BS EN ISO/IEC 14543-4-304 Information technology - Home electronic systems (HES) architecture

Part 4-304: Application protocol for electric vehicle supply equipment (EVSE) charger and discharger and controllers

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

**WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD.
THIS DRAFT IS NOT CURRENT BEYOND 15 January 2025**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <http://standardsdevelopment.bsigroup.com>

Responsible Committee Secretary: **Committee Service Centre (BSI)**
Direct tel: **020 8996 7009**
E-mail: csc@bsigroup.com

AVA Documents
Document Sharing Hub

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



JTC1-SC25/3301/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:
ISO/IEC 14543-4-304 ED1

DATE OF CIRCULATION:
2024-12-20

CLOSING DATE FOR COMMENTS:
2025-02-14

SUPERSEDES DOCUMENTS:
JTC1-SC25/3244/NP, JTC1-SC25/3296/RVN

IEC SC 25 : INTERCONNECTION OF INFORMATION TECHNOLOGY EQUIPMENT	
SECRETARIAT: Germany	SECRETARY: Mr Marco Peter
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 23,TC 69,TC 100	HORIZONTAL FUNCTION(S):
ASPECTS CONCERNED: Digital content	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Information technology – Home Electronic System (HES) architecture - Part-4-304 Application protocol for electric vehicle supply equipment (EVSE) charger and dischargers and controllers

NOTE FROM TC/SC OFFICERS:

Copyright © 2024 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

CONTENTS

1		
2		
3	FOREWORD	4
4	INTRODUCTION	6
5	1 Scope	7
6	2 Normative references	7
7	3 Terms, definitions, and abbreviated terms	7
8	3.1 Terms and definitions	7
9	3.2 Abbreviations	9
10	4 Conformance	9
11	5 Configuration	9
12	6 Application layer	11
13	6.1 General	11
14	6.2 NECD objects	11
15	6.3 NECD services	11
16	6.4 Object-specific NECD properties	12
17	6.5 Application operation	14
18	6.5.1 General	14
19	6.5.2 Continuous requests	14
20	6.5.3 Response wait time value for controllers	14
21	6.5.4 Resending a frame	14
22	6.5.5 Processing object property counter	14
23	6.5.6 Property values of write requests	15
24	6.5.7 Property values of read requests	15
25	7 Normal operation	15
26	7.1 General	15
27	7.2 Start-up operation	16
28	7.2.1 General	16
29	7.2.2 Start-up processing of NECD nodes	16
30	7.2.3 Search processing	17
31	7.2.4 Obtaining NECD attribute information	17
32	7.2.5 Obtaining EVSE charger and discharger attribute information	18
33	7.3 Occasional operation	19
34	7.3.1 General	19
35	7.3.2 Obtaining vehicle connection and chargeable or dischargeable status	19
36	7.3.3 Controlling EVSE charger and discharger when chargeable and not	
37	dischargeable	21
38	7.3.4 Controlling EVSE charger and discharger when dischargeable and not	
39	chargeable	24
40	7.3.5 Controlling EVSE charger and discharger when chargeable and	
41	dischargeable	26
42	7.4 Fault status notification	29
43	8 Remote control	29
44	9 Considerations on controllers	30
45	Annex A (informative) Terms and NECD protocol frame format on ISO/IEC 14543-4-3	
46	and IEC 62394	31
47	A.1 Terms correspondence between ISO/IEC 14543-4-3 and IEC 62394	31

48	A.2 NECD protocol frame format	31
49	Annex B (informative) Communication link between EVSE charger and discharger and	
50	CEM in IEC 63380-1	33
51	Annex C (informative) Relationship between ISO/IEC 14543-4 series and the HES	
52	gateway, based on ISO/IEC 15045 series and ISO/IEC 18012 series	34
53	Bibliography	37
54		
55	Figure 1 – Relationship between IEC 62394, ISO/IEC 14543-4-3, and	
56	ISO/IEC 14543-4-304	6
57	Figure 2 – Physical configuration, and the path and direction of electricity and	
58	communication	10
59	Figure 3 – Connection configurations	10
60	Figure 4 – Assumed network stack	11
61	Figure 5 – Summary of normal operation sequences	16
62	Figure 6 – Sequence for obtaining NECD attribute information	18
63	Figure 7 – Sequence of obtaining EVSE charger and discharger attribute information	19
64	Figure 8 – Sequence to obtain vehicle connection and chargeable status of EVSE	
65	charger and discharger	21
66	Figure 9 – Sequence to control EVSE charger and discharger when chargeable and	
67	not dischargeable	23
68	Figure 10 – Sequence to control EVSE charger and discharger when dischargeable	
69	and not chargeable	26
70	Figure 11 – Sequence to control EVSE charger and discharger when chargeable and	
71	dischargeable	29
72	Figure 12 – Remote control	29
73	Figure A.1 – NECD protocol frame format	32
74	Figure B.1 – Figure 2 of IEC 63380-1	33
75		
76	Table 1 – NECD objects for EVSE charger and dischargers	11
77	Table 2 – NECD objects for controllers	11
78	Table 3 – NECD services	12
79	Table 4 – NECD properties of device object (super class)	12
80	Table 5 – NECD properties of device object	13
81	Table 6 – Response wait time values for controllers	14
82	Table A.1 – Terms correspondence table between ISO/IEC 14543-4-3 and IEC 62394	31
83	Table C.1 – List of the translation between ISO/IEC 14543-4-304 and	
84	HES gateway lexicon (ISO/IEC 18012-3)	34
85		
86		

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 4-304: Application protocol for electric vehicle supply equipment (EVSE) charger and dischargers and controllers

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
- 2) The formal decisions or agreements of IEC and ISO 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 and ISO National bodies.
- 3) IEC and ISO documents have the form of recommendations for international use and are accepted by IEC and ISO National bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC and ISO documents is accurate, IEC and ISO 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 and ISO National bodies undertake to apply IEC and ISO documents transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC and ISO document and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC and ISO do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC and ISO marks of conformity. IEC and ISO are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this document.
- 7) No liability shall attach to IEC and ISO or their directors, employees, servants or agents including individual experts and members of its technical committees and IEC and ISO National bodies 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 ISO/IEC document or any other IEC and ISO documents.
- 8) Attention is drawn to the Normative references cited in this document. Use of the referenced publications is indispensable for the correct application of this document.
- 9) Attention is drawn to the possibility that some of the elements of this ISO/IEC document may be the subject of patent rights. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 14543-4-304 has been prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology. It is an International Standard.

The list of all currently available parts of the ISO/IEC 14543 series, under the general title *Information technology – Home Electronic System (HES) architecture*, can be found on the IEC website and ISO website.

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

Draft	Report on voting
JTC1/XX/XXXX	JTC1/XX/XXX

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English [change language if necessary].

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

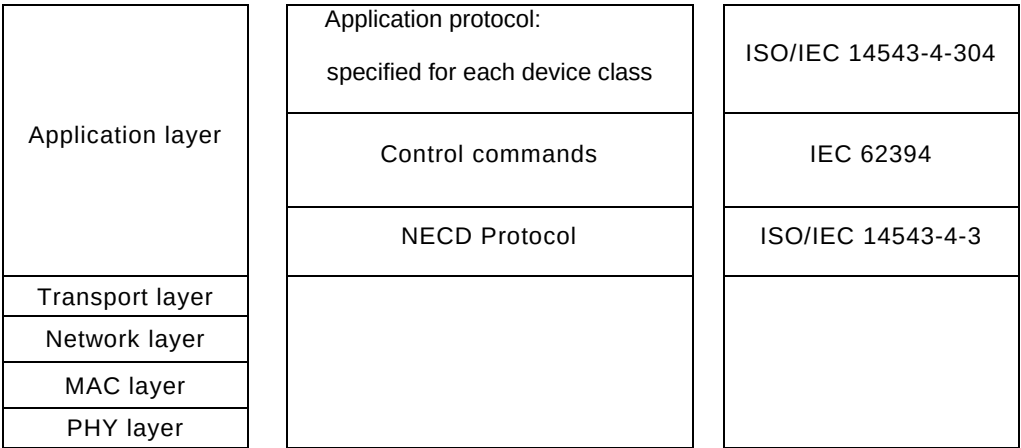
IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

142

INTRODUCTION

143 The ISO/IEC 14543 series provides networking capability for a wide range of appliances,
144 equipment, and sensors etc. in the home, including lighting and heating/cooling. This part of
145 ISO/IEC 14543 specifies the detailed procedures and behaviours of both electric vehicle supply
146 equipment (EVSE) charger and dischargers and controllers at the application level of
147 communications based on ISO/IEC 14543-4-3. This document specifies the message structure,
148 sequences, and protocol of the application layer for networked enhanced control devices (NECD)
149 used in the Home Electronic System (HES). Some services are targeted for communications
150 between devices. Other services are exclusively reserved for management purposes. Some
151 services can be used for both management and run-time communications. This document is
152 applicable for energy management services involving EVSE charger and dischargers and
153 related devices.

154 Figure 1 shows the relationship between IEC 62394, ISO/IEC 14543-4-3, and ISO/IEC 14543-
155 4-304. ISO/IEC 14543-4-3 specifies the message structure, sequences and protocol for
156 general-purpose communications used in network enhanced control devices of the Home
157 Electronic System (HES) Class 1. ISO/IEC 14543-4-3 provides the common interfaces for the
158 use-level process and the services such as energy management, remote maintenance, and
159 other services for easily building a system consisting of multi-vendor devices and equipment.
160 IEC 62394 specifies the detailed lists of control commands on NECD objects (see
161 ISO/IEC 14543-4-3). Annex A shows terms and NECD protocol frame format on ISO/IEC 14543-
162 4-3 and IEC 62394.



163 **Figure 1 – Relationship between IEC 62394, ISO/IEC 14543-4-3, and ISO/IEC 14543-4-304**

164 ISO/IEC 14543-4-3 is a general-purpose communications specification that applies to a variety
165 of devices. ISO/IEC 14543-4-3 is the basis for this document, which specifies detailed
166 procedures and behaviours for pre-packaged system solutions that include EVSE charger and
167 dischargers and related devices. The procedures and behaviours specified in this document
168 can be used for energy flow inside a home or energy flow between the grid and a home.

169 In order to enhance interoperability, it is important to specify how to implement ISO/IEC 14543-
170 4-3 for each device and controller at the application level such as command sequences, timeout
171 requirements, required combinations of acceptable commands, etc.

172 This document applies to the communication link in yellow between charging station (EVSE
173 charger and discharger) and EMS as shown in Figure 2 of IEC 63380-1. Annex B shows the
174 Figure 2 of IEC 63380-1.

175

176

177

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 4-304: Application protocols for electric vehicle supply equipment (EVSE) charger and dischargers and controllers

1 Scope

This part of the ISO/IEC 14543 series specifies an application-layer protocol important for ensuring interoperability among the products of various manufacturers regarding communications between electric vehicle supply equipment (EVSE) charger and dischargers and controllers. It uses the network enhanced communications device (NECD) protocol specified in ISO/IEC 14543-4-3. This protocol is based on UDP using IPv4 or IPv6 (TCP is optional).

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.

ISO/IEC 14543-4-3, *Information technology – Home Electronic System (HES) architecture – Part 4-3: Application layer interface to lower communications layers for network enhanced control devices of HES Class 1*

IEC 62394, *Service diagnostic interface for consumer electronics products and networks – Implementation for ECHONET*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

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

3.1.1 controller

NECD node that sends NECD requests (Get and SetC) to another NECD nodes

Note 1 to entry: a controller in this document can be used as a part of CEM specified in IEC 63380-1

Note 2 to entry: a controller in this document can be used with an EMA specified in ISO/IEC 15067-3

3.1.2 device object

network enhanced control device (NECD) object other than a node profile object

[SOURCE: ISO/IEC 14543-4-302]

Note 1 to entry: In this document, "device object" refers to electric vehicle charger/discharger object only.

3.1.3**electric vehicle****EV**

vehicle that is powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source

Note 1 to entry: In this document, it refers to both of a vehicle that is only powered by an electric motor that draws electricity from a battery and a vehicle that is powered by an electric motor that draws electricity from a battery and by an internal combustion engine.

Note 2 to entry: In this document it refers to both of a vehicle that contains a device that converts alternating current (AC) voltage to direct current (DC) voltage or DC voltage to AC voltage (e.g., inverter) and a vehicle that does not contain a device that converts AC voltage to DC voltage or DC voltage to AC voltage.

3.1.4**electric vehicle supply equipment****EVSE**

device that transfers electricity between EV and home or grid

Note 1 to entry: In this document, it refers to both of a device that contains a device that converts AC voltage to DC voltage or DC voltage to AC voltage (e.g., inverter) and a device that does not contain a device that converts AC voltage to DC voltage or DC voltage to AC voltage.

Note 2 to entry: In this document it refers to a device that supports primarily single family residential applications.

Note 3 to entry: This document does not specify any requirement about the connector, data, and electricity between EV and EVSE. Any type of connector, data, electricity can be used between EV and EVSE that is referred in this document.

3.1.5**electric vehicle supply equipment charger and discharger****EVSE charger and discharger**

EVSE that includes a communications interface of NECD protocol and is capable of transferring electricity both from home or grid to EV and from EV to home or grid

3.1.6**NECD protocol**

protocol used in network enhanced control device (NECD) communications

[SOURCE: ISO/IEC 14543-4-302]

3.1.7**node profile**

description of objects implemented in each node

[SOURCE: ISO/IEC 14543-4-302]

3.1.8**remote control**

control from outside the home

[SOURCE: ISO/IEC 14543-4-302]

3.1.9**response wait time**

time between a controller request to and the response from an EVSE charger and discharger

3.1.10**super class**

properties that are inherited and implemented in all device objects

[SOURCE: ISO/IEC 14543-4-302]

3.2 Abbreviations

AC	alternating current
DC	direct current
DNOJ	destination NECD object
EV	electric vehicle
EVSE	electric vehicle supply equipment
IP	internet protocol
NDATA	NECD data
NDT	NECD property value data
NECD	network enhanced control device
NHD	NECD header
NPC	NECD property code
NSV	NECD service
OPC	object property counter
PDC	property data counter
SNOJ	source NECD object
TID	transaction ID
UDP	user datagram protocol

4 Conformance

EVSE charger and dischargers and controllers of HES Class 1 that claim conformance to this document shall:

- send, receive, and process sequences and procedures as specified in Clause 7.
- provide application services and properties specified in 6.2, 6.3, and 6.4 as needed by EVSE charger and dischargers and controllers for which the application is intended.

5 Configuration

This document is necessary for ensuring interoperability between the products of different manufacturers in connection with application communications between EVSE charger and dischargers and controllers, using the NECD protocol as an application protocol via UDP (TCP)/IPv6 communications.

Figure 2 shows the physical configuration in this document and the path and direction of electricity and communication. As shown in Figure 2, this document mentions the electricity that is transferred both from home or grid to EV and from EV to home or grid.

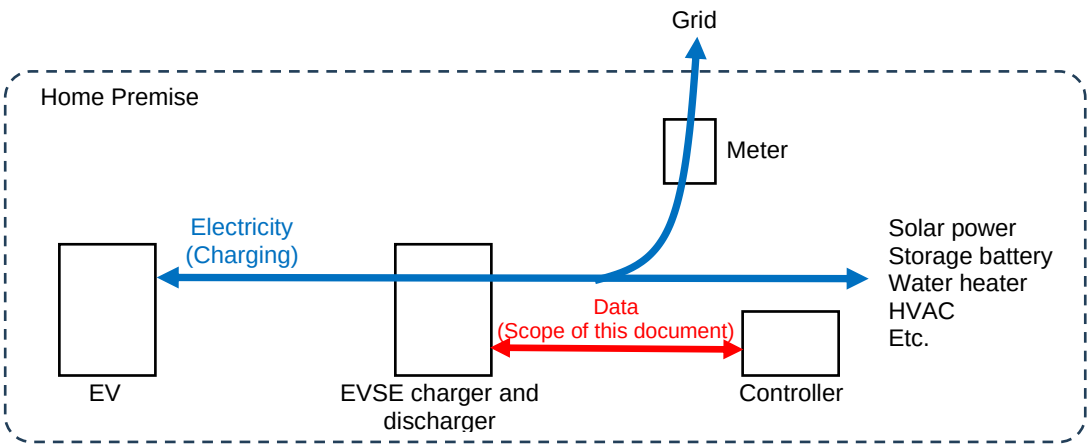
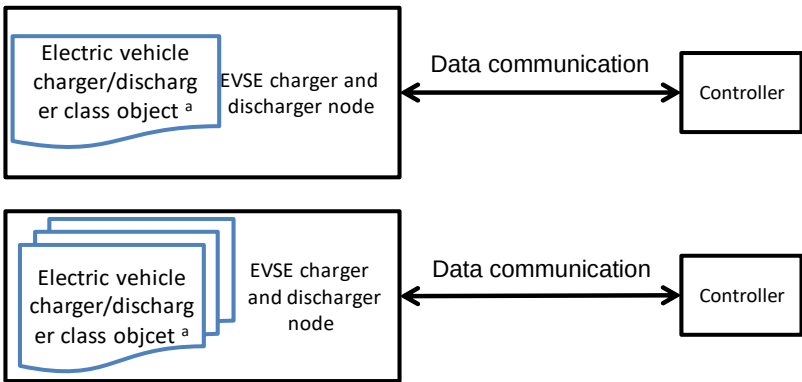


Figure 2 – Physical configuration, and the path and direction of electricity and communication

Figure 3 shows the configurations assumed under this specification.



^a "Electric vehicle charger/discharger class object" is a device object specified in IEC 62394.

Figure 3 – Connection configurations

The upper illustration in Figure 3 shows the case where a single device object is installed in a single node. The lower illustration shows the case where multiple device objects are installed in a single node. The latter case occurs when multiple EVSE charger and discharger units are attached to a single communications unit. In this case, there are multiple electric vehicle charger/discharger class objects in a single EVSE charger and discharger node (i.e. at a single IP address). Controllers shall support nodes that configure multiple device objects in a single node.

Controllers shall be capable of handling multiple nodes and objects. The maximum number of nodes and objects to be handled is implementation-dependent on the controllers. In the environment where multiple controllers exist in the same network, an EVSE charger and discharger shall respond to the latest command from any controller.

Figure 4 shows the assumed network stack for operating the NECD protocol in this document. NECD protocol operation is assumed as an application protocol on UDP(TCP)/IPv6. Note that TCP installation is optional. As a rule, the stack uses IPv6; however, IPv4 is allowed depending on the market trends for migration from IPv4 to IPv6.