

This is a preview - click here to buy the full publication



ISO/IEC 14543-4-2

Edition 1.0 2008-05

# INTERNATIONAL STANDARD

---

**Information technology – Home electronic system (HES) architecture –  
Part 4-2: Communication layers – Transport, network and general parts of data  
link layer for network enhanced control devices of HES Class 1**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

T

---

ICS 35.200

ISBN 2-8318-9815-3

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms, definitions and abbreviations.....	7
3.1 Terms and definitions.....	7
3.2 Abbreviations.....	9
4 Conformance.....	9
5 Frame format of communication layers.....	10
6 Requirements for the physical layer and independent data link layer.....	10
6.1 Requirements for the physical layer.....	10
6.2 Functions of the data link layer.....	11
6.3 Possible media and their impact on layer-2.....	11
6.4 Data link layer services.....	11
6.4.1 Data link header.....	11
6.4.2 Data link address.....	12
6.4.3 Application data counter.....	15
6.4.4 Data link split frames.....	15
6.4.5 Data link data counter.....	16
6.5 Protocol difference absorption processing block.....	16
6.5.1 Overview.....	16
6.5.2 Message receipt/assembly processing.....	17
6.5.3 Message splitting/transmission processing.....	17
6.5.4 Address conversion processing.....	17
6.5.5 Communications type conversion processing.....	18
6.5.6 Common lower-layer communications interface processing.....	18
7 Requirements for the network layer.....	19
7.1 Overview.....	19
7.2 Received message determination processing.....	19
7.2.1 Overview.....	19
7.2.2 Received message identification processing specifications for nodes without the data link router function.....	19
7.2.3 Specifications for the received message identification processing for data link routers.....	20
7.3 Routing processing.....	21
7.3.1 Overview.....	21
7.3.2 Routing processing for nodes without the data link router function.....	21
7.3.3 Routing processing for data link routers.....	21
7.4 Send message creation/management processing.....	24
8 Requirements for the transport layer.....	24
Annex A (informative) API functions.....	25
A.1 API function for application layer.....	25
A.2 API functions for individual lower-layer communications interface.....	25
A.2.1 General.....	25

A.2.2 List of individual low-layer communication interface functions .....	25
A.2.3 Individual lower-layer communication interface detail specifications .....	26
A.2.4 Initial Setting Information Specifications .....	49
Bibliography.....	52
Figure 1 – Relationship between the protocol of ISO/IEC 14543-4 and OSI reference model .....	6
Figure 2 – Data link frame format of communication layers .....	10
Figure 3 – Configuration of DHD .....	11
Figure 4 – Configuration of SDLA and DDLA for individual address.....	12
Figure 5 – DDLA (broadcast-stipulated) address configuration .....	13
Figure 6 – Broadcast target requirement code .....	14
Figure 7 – Node group requirement bit specifications.....	15
Figure 8 – Format for protocol difference absorption processing section .....	15
Figure 9 – Relationship with upper-layer messages .....	16
Figure 10 – Configuration of DDC .....	16
Figure 11 – Subnet connections.....	22
Table 1 – Number of hop counts .....	12
Table 2 – NetID codes .....	13
Table 3 – DDLA (broadcast-stipulated) address configuration .....	14
Table A.1 – List of individual low-layer communication interface functions .....	25
Table A.2 – Node address description map .....	47

## INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

### Part 4-2: Communication layers – Transport, network and general parts of data link layer for network enhanced control devices of HES Class 1

#### FOREWORD

- 1) ISO (International Organization for Standardization) and IEC (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. Their preparation is entrusted to technical committees; any ISO and IEC member body interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with ISO and IEC also participate in this preparation.
- 2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.
- 3) 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 member bodies.
- 4) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 5) In order to promote international uniformity, IEC and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.
- 6) ISO and IEC provide no marking procedure to indicate their approval and cannot be rendered responsible for any equipment declared to be in conformity with an ISO/IEC publication.
- 7) All users should ensure that they have the latest edition of this publication.
- 8) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC or ISO member 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 of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.
- 9) 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.
- 10) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 14543-4-2 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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 web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

## INTRODUCTION

This part of ISO/IEC 14543 specifies the media independent requirements for the data link layer and the requirements for the network layer and the transport layer for Home Electronic System. This standard stipulates the communication stack for providing the services specified in ISO/IEC 14543-4-1. It can be used as the communication stack on the physical layers as specified in ECHONET<sup>1</sup> Specifications. This part of ISO/IEC 14543 is based on ECHONET<sup>1</sup> specifications.

ISO/IEC 14543 *Information technology – Home Electronic System (HES) architecture*, currently consists of 13 parts:

- Part 2-1: *Introduction and device modularity*
- Part 3-1: *Communication layers – Application layer for network based control of HES Class 1*
- Part 3-2: *Communication layers – Transport, network and general parts of data link layer for network based control of HES Class 1*
- Part 3-3: *User process for network based control of HES Class 1*
- Part 3-4: *System management – Management procedures for network based control of HES Class 1*
- Part 3-5: *Media and media dependent layers – Power line for network based control of HES Class 1*
- Part 3-6: *Media and media dependent layers – Twisted pair for network based control of HES Class 1*
- Part 3-7: *Media and media dependent layers – Radio frequency for network based control of HES Class 1*
- Part 4: *Home and building automation in a mixed-use building (technical report)*
- Part 4-1: *Communication layers – Application layer for network enhanced control devices of HES Class 1*
- Part 4-2: *Communication layers – Transport, network and general parts of data link layer for network enhanced control devices of HES Class 1 (this standard)*
- Part 5-1: *Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Core protocol (under consideration)*
- Part 5-2: *Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Device certification (under consideration)*

Additional parts are under preparation.

---

<sup>1</sup> Echonet™ is the trade name of a product supplied by ECHONET Consortium. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC or ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

# INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

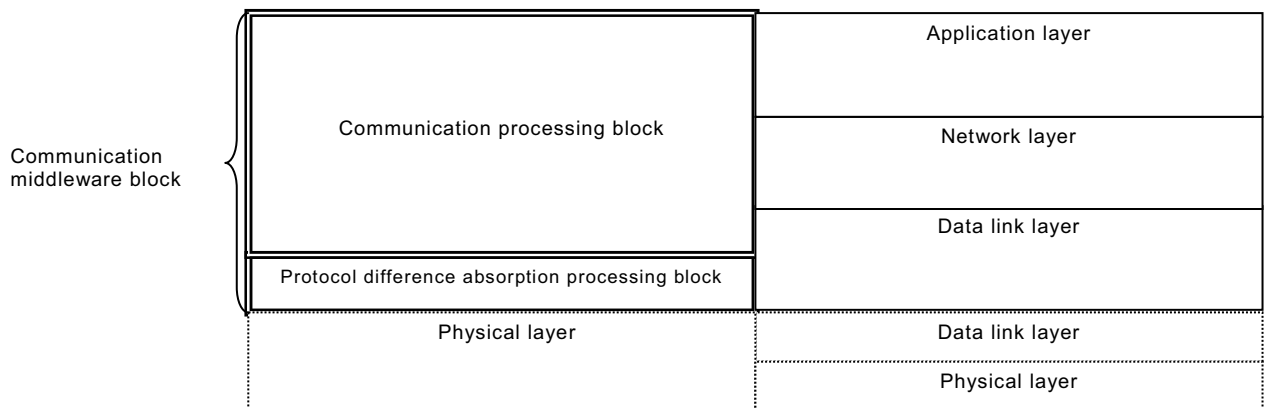
## Part 4-2: Communication layers – Transport, network and general parts of data link layer for network enhanced control devices of HES Class 1

### 1 Scope

This part of ISO/IEC 14543 specifies the services and protocol in a manner independent of the physical layer for the data link layer and for the network layer and the transport layer for usage in network enhanced home electronic systems Class 1.

ISO/IEC 14543-4 is designed to enable the use of power line and wireless protocols as transmission media. Slow transmission speeds discourage large data transfers, and it is desirable to reduce the mounting load on simple devices. In light of this situation, this part of ISO/IEC 14543 specifies the frame format for the communications middleware block to minimize message size while fulfilling the requirements of the communications layer structure.

This part of ISO/IEC 14543 specifies the protocol difference absorption processing block and a part of the communications processing block. Figure 1 shows the relationship between the protocol of ISO/IEC 14543-4 and HES reference model based on ISO/IEC 7498.



**Figure 1 – Relationship between the protocol of ISO/IEC 14543-4 and OSI reference model**

### 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.

ISO/IEC 7498 (all parts), *Information technology – Open systems interconnection – Basic reference model*

ISO/IEC 14543-2-1, *Information technology – Home electronic system (HES) architecture – Part 2-1: Introduction and device modularity*

ISO/IEC 24767-2, *Information technology – Home network security – Part 2: Internal security services (under consideration)*