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

ICS 35.240.67

ISBN 2-8318-9815-3

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

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 [1] Specifications. This part of ISO/IEC 14543 is based on ECHONET[1] 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.

---

1 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 lo 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.

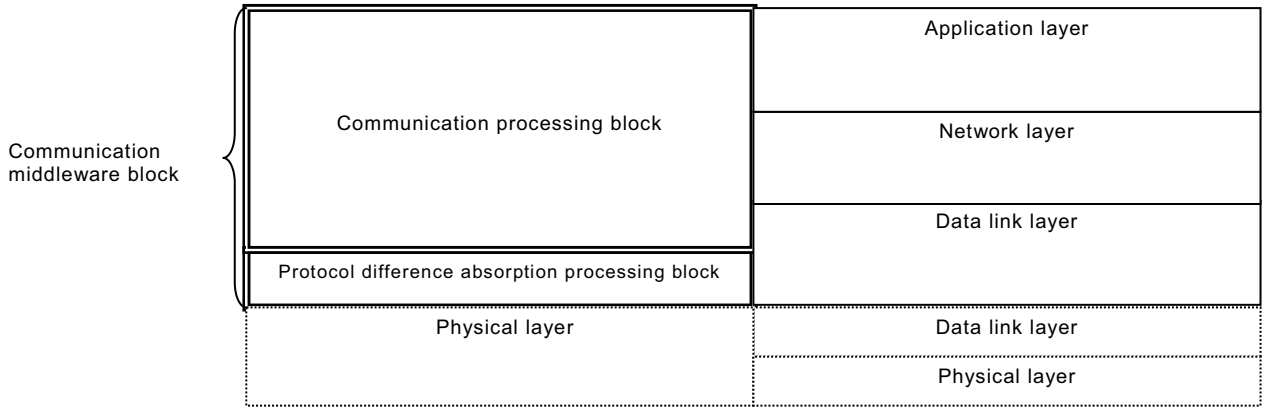

Figure 1 – Relationship between the protocol of ISO/IEC 14543-4 and OSI reference model

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)