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Information technology – Home electronic system (HES) architecture –
Part 2-1: Introduction and device modularity

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INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 2-1: Introduction and device modularity

FOREWORD

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

ISO/IEC 14543-2-1 cancels and replaces ISO/IEC TR 14543-1 and ISO/IEC TR 14543-2, published in 2000. It constitutes a complete revision of the principles outlined in ISO/IEC TR 14543-1 and ISO/IEC TR 14543-2 and provides the specifications essential for an international standard.

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 title page.

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

INTRODUCTION

Various electrically controlled devices are used in homes and similar environments for many different applications. Examples of such applications are lighting, heating, food preparation, washing, energy management, water control, fire alarms, blinds control, different forms of security control and entertainment (audio and video).

When several such devices are able to interwork via a common internal network (in this document called a home network), the resulting total system is called a home control system. When a home control system follows all the specifications in the ISO/IEC HES Standards, it is called a Home Electronic System (HES).

Three different classes of HES are defined. Class 1 has transport capabilities for telecontrol applications only. Class 2 includes Class 1, but also supports switched medium bandwidth data channels. Class 3 includes Classes 1 and 2 and, in addition, supports high bandwidth switched data channels.

A home network may be based on one or more different media (for example power line, balanced cables, infrared or radio) and may also be connected to outside networks (for example telephone, cable television, power and alarm networks).

The implementation of a specific Home Electronic System will typically be assembled by a consumer by adding one application at a time, starting from single applications like lighting control, security control or audio and video control, to develop into an integrated multi-application system. The cost of adding an application depends on whether rewiring of the house is needed and whether existing cables and prefitted ducts or other media can be used. Hence the HES standards and supplementary technical reports will also give guidance to architects and builders as well as to users on how to share such resources.

[ISO/IEC 14543-2-1:2006](http://www.iso-iec-14543-2-1-2006)

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

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

ISO/IEC 18012, “Guidelines for product interoperability,” specifies how applications can cooperate across different protocols. To facilitate interoperability of various protocols, amendments to published standards may be needed.

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 2-1: Introduction and device modularity

1 Scope

This part of ISO/IEC 14543 specifies the general features and architecture of the HES.

The object is to

- define new terms for use in the ISO/IEC 14543 series,
- give general information and advice on the required HES features and its architecture,
- specify the HES model,
- specify the basic functional structure of an HES with its interfaces.

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 7498-1, *Information technology – Open systems interconnection – Basic Reference Model – Part 1: The Basic Model*

<https://standards.iso.org/standards/catalog/standards/sist/752c64f6-39b9-4701-a924-238c3e1241e5/iso-iec-14543-2-1-2006>

ISO/IEC 10192-1, *Information technology – Home electronic system (HES) interfaces – Part 1: Universal interface class 1*

3 Definitions and abbreviations

For the purpose of this standard the following definitions apply.

3.1 Definitions from ISO/IEC 7498-1

3.1.1

application entity

active element, within the application process, embodying a set of capabilities which is pertinent to OSI and which is defined for the application layer, that corresponds to a specific application-entity type (without any extra capabilities being used)

[ISO/IEC 7498-1, 7.1.1.1]

3.1.2

application process

element within a real open system which performs the information processing for a particular application

[ISO/IEC 7498-1, 4.1.4]

3.1.3

connection-mode transmission

(N)-data-transmission in the context of an (N)-connection

[ISO/IEC 7498-1, 5.3.1.17]

3.1.4

connectionless-mode transmission

(N)-data-transmission not in the context of an (N)-connection and not required to maintain any logical relationship between (N)-service-data-units

[ISO/IEC 7498-1, 5.3.1.18]

3.1.5

(N)-service-data-unit, (N)-SDU

amount of information whose identity is preserved when transferred between peer-(N+1)-entities and which is not interpreted by the supporting (N)-entities.

[ISO/IEC 7498-1, 5.6.1.4]

3.1.6

flow control

function which controls the flow of data within a layer or between adjacent layers

[ISO/IEC 7498-1, 5.8.1.8]

3.1.7

OSI environment, OSIE

abstract representation of the set of concepts, elements, functions, services, protocols, etc., as defined by the OSI reference model and the derived specific standards which, when applied, enable communications among open systems

[ISO/IEC 7498-1, 4.1.5]

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3.1.8

segmenting

function performed by an (N)-entity to map multiple (N)-service-data-unit into multiple (N)-protocol-data-units

[ISO/IEC 7498-1, 5.8.1.9]

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3.1.9

(N)-service access point, (N)-SAP

point at which (N)-services are provided by an (N)-entity to an(N+1)-entity

[ISO/IEC 7498-1, 5.2.1.8]

3.2 Additional definitions

3.2.1

application

field of use of an HES

NOTE An HES may support more than one application.

3.2.2

application object

an HES object located within the HES device application process

3.2.3

application process

an element within an HES which performs the information processing for a particular application

3.2.4

application protocol

standardized protocol for the exchange of information between application processes in an HES; it is transported without interpretation by the home network resources

3.2.5 connection

association established between functional units for data transmission across a network (or part of a network) for the purpose of communication between the units; the association is explicitly established at some point in time and exists until explicitly ended

NOTE Data transmission includes, in this context, audio, video and other information in either analogue or digital form.

3.2.6 control channel

communication channel that is established between two or more entities for the primary purpose of exchange of HES control and monitoring messages

3.2.7 device

physical implementation of functions belonging to one or more functional groupings providing a service directly for an end-user

3.2.8 device application process

element within a device that performs information processing for a particular application; device application processes can represent manual, automated, computerised or physical processes

3.2.9 device modularity

property of devices that specifies the extent to which they have been composed out of separate parts called modules

3.2.10 domain

range of validity

NOTE When the term is used for a more specific concept, it should be qualified. Two examples are the application domain (the range including OSI layer seven and above) and the user domain (the range above OSI layer seven).

3.2.11 HES-application

field of use of an HES

NOTE An HES may support more than one application.

3.2.12 HES application object

an HES application object is an HES-object located within the HES device application process

3.2.13 device application process

an element within a device which performs information processing for a particular application; it can represent a manual, automated, computerised or physical process

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3.2.14

HES class 1

HES with transport capabilities for telecontrol applications such as:

- Control,
- Monitoring,
- Measurement,
- Alarm,
- Low speed data transfer

NOTE These capabilities are typically provided for by the single packet-mode low bandwidth channel and the digital transmission.

3.2.15

HES class 2

HES with capabilities for switched voice or other information transfer with similar bandwidth

NOTE These capabilities are typically provided for by a class 1 system, enhanced with multiple switched medium bandwidth channels and analogue or digital transmission or both. In principle, all class 2 capabilities may be supported by a single class 2 channel.

For practical reasons, however, HES class 2 may contain a separate channel or use a separate medium to support class 1 capabilities.

3.2.16

HES class 3

HES with capabilities for switched high quality sound and video transfer and high speed data transfer

NOTE These capabilities are typically provided for by a class 2 system enhanced with multiple switched medium bandwidth channels and analogue or digital transmission or both.

In principle all class 3 capabilities may be supported on a single class 3 channel. For practical reasons, however, HES class 3 may contain a separate channel or use a separate medium to support class 1 and class 2 capabilities.

3.2.17

HES device application process

the part of a device application process which is accessible through the HES communication network

NOTE 1 An HES device application process is built up with application objects.

NOTE 2 The functionality of the HES device application process is defined in this series of standards or in the appropriate product standards.

3.2.18

HES-object

set of data with associated functions applicable to it

NOTE An HES-object can be implemented in various ways.

3.2.19

HES user process

the part of the HES device application process belonging to the user domain of the HES

3.2.20

home electronic system (HES)

various electronic devices are used in homes, buildings and similar environments (including their immediate surroundings) for several applications relevant to the home and/or building

NOTE The expression "Home Electronic System" (HES) covers any combination of electronic devices linked via a digital transmission network. The HES includes a specification for this communication network. There are three classes of HES, depending on the transmission throughput capabilities.

3.2.21**home network**

internal network for digital and analogue information transport in a home or on business premises of similar complexity, providing defined access points and using one or more media in any topology

3.2.22**information channel**

a communication channel established between two or more entities for the primary purpose of exchange of information other than HES control and monitoring messages

NOTE Examples of such information are audio or video data, facsimile data and analogue speech signals.

3.2.23**interface**

shared boundary between two implementations of functions belonging to one or more functional groupings

3.2.24**interoperability**

the ability of devices to exchange information via the higher layers resulting in meaningful actions; this includes aspects of the application domain which, by definition, is beyond the OSI domain

3.2.25**local application process**

the part of an application process within a device which is not accessible through the HES communication network, it is located inside the user domain

3.2.26**network access unit (NAU)**

piece of equipment which comprises the mechanical, electrical and communicational functions for an HES connection

NOTE The NAU corresponds to one network service access point (NSAP) and can be uniquely identified by one or more network addresses.

3.2.27**network segment**

part of an HES network that is within the domain of a single link layer instance

3.2.28**reference model**

model that describes the general principles of interconnections in a system and the network architecture resulting from those principles

3.2.29**repeater**

unit that regenerates or amplifies signals in order to extend the range of transmission between medium attachment points or to interconnect two network segments that use the same protocols

3.2.30**topology**

the structure of the communication paths between the medium attachment points

NOTE Examples of topologies are: bus, ring, star, tree.