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Part 3: Lexicon

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Information technology - Home electronic system (HES) - Guidelines for product interoperability - Part 3: Lexicon

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.
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ISO/IEC 18012-3 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 text of this International Standard is based on the following documents:

Draft	Report on voting
JTC1-SC25/3269/CDV	JTC1-SC25/3311/RVC

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.

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

A list of all parts in the ISO/IEC 18012 series, published under the general title *Information technology – Home Electronic System (HES) – Guidelines for product interoperability*, can be found on the IEC and ISO websites.

The data formats in 3.3 are formatted with ***bold italics*** and used throughout this document for data related specifications.

INTRODUCTION

0.1 Overview

The Home Electronic System (HES) is a set of standards that supports communication, control, and monitoring applications for homes and buildings. However, homes and buildings present a heterogeneous and evolving networked environment, where many of these networks and applications (including some that are based on HES standards) are not directly interoperable with each other. HES standards achieve interoperability through the ISO/IEC 15045 series, which relies on the ISO/IEC 18012 series to support functional interworking among the dissimilar home devices, applications, protocols, and networks found in this environment. The ISO/IEC 15045 series and ISO/IEC 18012 series were created to render all protocols interoperable.

The HES gateway enables an open and adaptable market for incompatible products by specifying a standardized modular system intended to provide interoperability among the diversity of networks found in homes and buildings. The HES interoperability process does not require modification of the various networks, applications, or protocols that use it. Appropriate interworking functions translate network messages through interface modules to a common lexicon expression, which is then exchanged using a private internal network bus protocol. A protected application platform using a bus protocol supports an expanding array of services for both the applications and the network.

In summary, the ISO/IEC 15045 series specifies a standardized modular dedicated private internal network system that includes:

- interfaces (i.e. interface modules) for communications and semantic translation among dissimilar local area networks (LANs) in homes or buildings – such networks are often called home area networks (HANs),
- interfaces (i.e. interface modules) for communications and semantic translation between a HAN and external wide area networks (WANs),
- a platform for supporting a variety of application services (i.e. service modules), and
- a secure communication path among these modular elements with access restricted to the appropriate elements in order to protect data, safety and privacy.

Interworking is achieved with a translation process by which a message between devices on two networks that use different protocols (including different application languages) is first converted into a common HES (internal) linguistic expression and then back into an equivalent message for the other network. The semantic meaning of messages within these network protocols is either specified by a HAN lexicon specification or by a generic HAN specification. More details are included in Annex E. This conversion is accomplished by an interworking function *(*IWF) residing in interface modules for each network. These messages are initiated by changes-of-state relating to objects associated with devices connected to the networks, and are known as events. The HES common language message exchange (HES-CLME) event messages employ a standardized syntax and semantic expressions defined by the HES lexicon specified in this document. The format of the messages, (i.e. the message protocol data unit – PDU) is defined in ISO/IEC 18012-4.

0.2 Relation to existing work

The HES gateway is specified in ISO/IEC 15045-1. Several structural configurations of the HES gateway are specified in ISO/IEC 15045-4-1. All classes use the HES interoperability system described above; however, in some that use physically separated HES gateway modules, communication among modular elements is provided by a dedicated private internet serial bus (based on Ethernet, see RFC 1918) and utilizes a set of protocols specified in ISO/IEC 15045-2, which is now known as common language messaging exchange (HES-CLME).

ISO/IEC 18012-1 introduces the necessity for an interoperability standard among home system applications to ensure that applications can interoperate in a safe, reliable, predictable and consistent manner. The interworking function (IWF) is specified in ISO/IEC 18012-2. The message content (protocol data unit or PDU) is defined in this document and in ISO/IEC 18012-4. All HES gateway structural class configurations use the same interworking functions, including lexicon, and event encoding.

0.3 Lexicon and event encoding

This document specifies the standardized HES application objects, functions (actions), and variables, as well as their expression (symbolic encoding), their semantic meaning, and their syntactic usage. These are the elements to construct IWFs for each specific network. Because of the dynamic heterogeneous nature of the home and building networking environment, it is intended that these elements, including the IWFs for each network, be maintained in a standardized online metadata registry to allow for future expansion while maintaining semantic interoperability. As the HES lexicon is expanded, there will be coordination with the appropriate trade or standards organizations to ensure the semantic meanings cover the range of applications and systems of those industries.

In addition, standardized test procedures, plugfests, and technical guidance reports are anticipated in the future to prove completeness and ensure interoperability among the range of applications and systems.

ISO/IEC 18012-4 defines the specific format of the PDUs for various events to be utilized in data packets (e.g. HES-CLIP) or direct API exchanges (e.g. HES-CLPDE) within a gateway.

Figure 1 shows the core interoperability and ISO/IEC 15045 series of standards and where this document fits into the series.

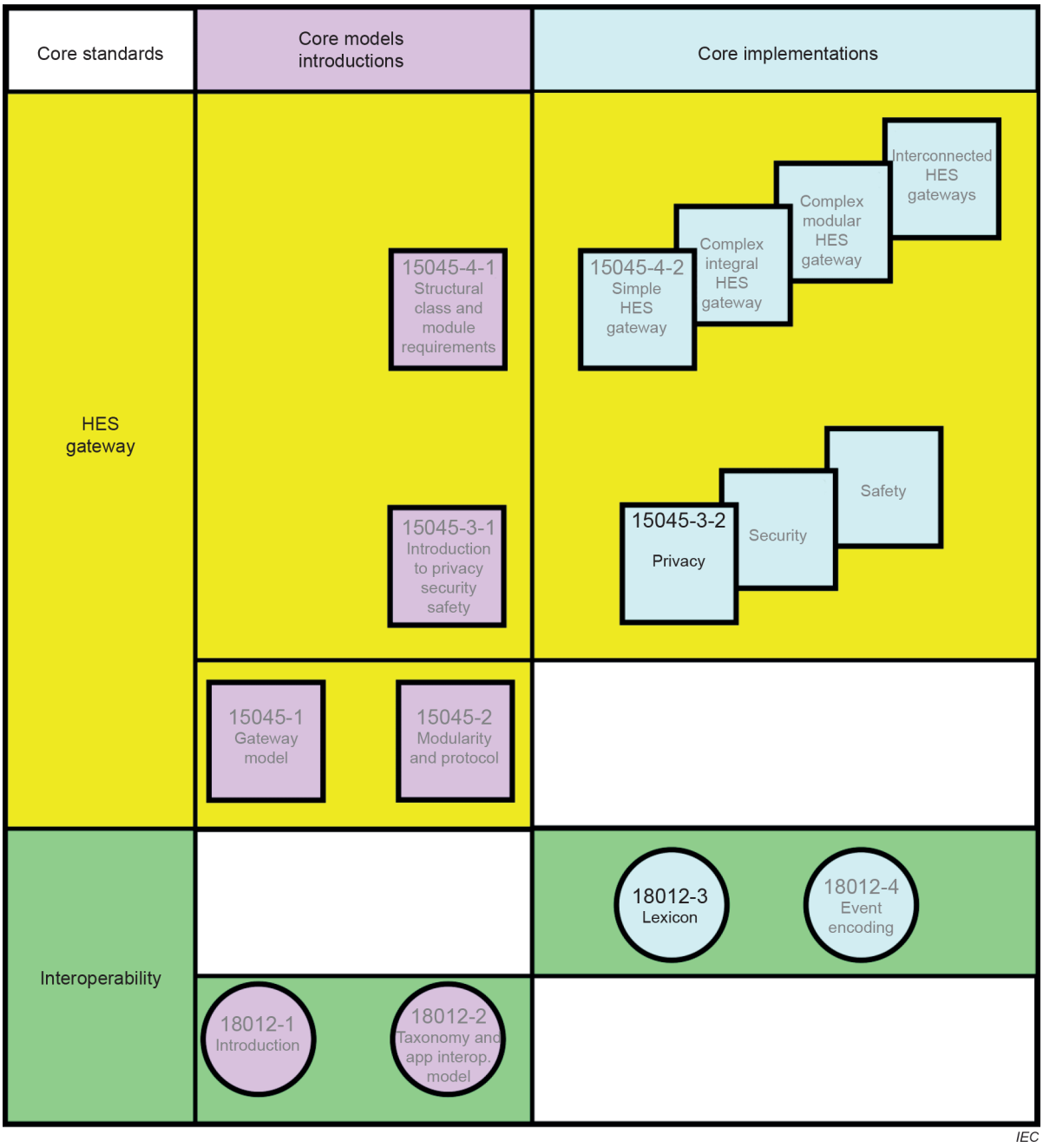


Figure 1 – ISO/IEC 18012-3 within the core interoperability and HES gateway standards

1 Scope

This document specifies a lexicon of objects for the interoperability domain (ID). This document specifies ID base objects and their associated properties and input/output event types (i.e. in the form of a list of ID sensor, actuator, and control objects), and object state actions, which can be used to define interoperable application models.

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 8601-1:2019, *Date and time - Representations for information interchange - Part 1: Basic rules*

ISO/IEC 15045-3-1, *Information technology - Home Electronic System (HES) gateway - Part 3-1: Privacy, security, and safety - Introduction*

ISO/IEC 15045-3-2, *Information technology - Home Electronic System (HES) gateway - Part 3-2: Privacy, security, and safety - Privacy framework*

ISO/IEC 15045-4-1, *Information technology - Home Electronic System (HES) gateway - Part 4-1: Structure - Structural class and module requirements*

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
atomic data
data at the lowest level of detail that cannot be further divided

3.1.2
binding
logical association between objects

[SOURCE: ISO/IEC 15045-4-1:2024, 3.1.1]

3.1.3
bus
common or shared path for communications or power

3.1.4
channel
subdivision of wide area network connection