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Information technology - Home electronic system (HES) - Guidelines for product interoperability -
Part 4: Event encoding

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Information technology – Home electronic system (HES) – Guidelines for product interoperability – Part 4: Event encoding

FOREWORD

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ISO/IEC 18012-4 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-SC25/3270/CDV	JTC1-SC25/3312/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 use of formatting with ***bold italics*** is used throughout this document for data formats as specified in ISO/IEC 18012-3.

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 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 HES 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 built by a variety of manufacturers. 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 that is then exchanged using a private internal network bus protocol using modules that can be built by a variety of manufacturers. 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 home area networks (HANs), and 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. 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 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 ISO/IEC 18012-3. The format of the messages (i.e. the message protocol data unit – PDU) is defined in this document).

0.2 Relation to existing work

The HES gateway system is specified in ISO/IEC 15045-1. Several structural configurations of the HES gateway system are specified in ISO/IEC 15045-4-1. All classes use the HES interoperability system specified 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) that utilizes a set of protocols specified in ISO/IEC 15045-2, which is now known as common language message exchange (HES-CLME).

ISO/IEC 18012-1 introduces the necessity for an interoperability standard among home system applications to ensure that applications 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 ISO/IEC 18012-3 and in this document. All HES gateway structural class configurations use the same interworking functions, including lexicon, and event encoding.

0.3 Lexicon and event encoding

ISO/IEC 18012-3 specifies the standardized HES application objects, functions (actions), and variables, as well as their expression (symbolic encoding) and 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.

This document specifies the specific format of the PDUs for various events to be utilized in serial bus data packet exchange (e.g. HES-CLIP) or direct API exchanges (e.g. HES-CLDPE) within a gateway. The format provides fast reliable message exchanges with low complexity requirements.

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

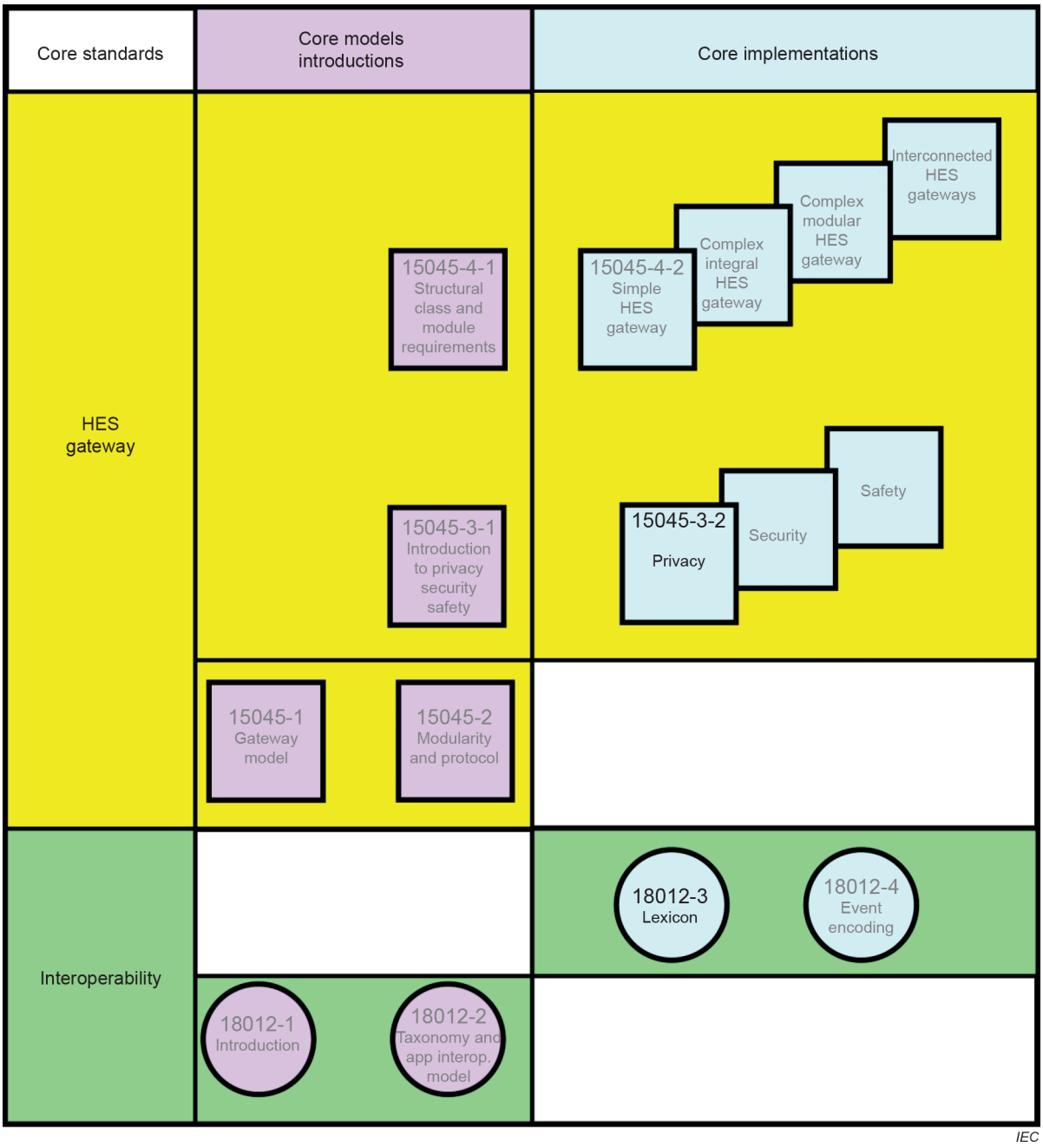


Figure 1 – ISO/IEC 18012-4 within the core interoperability and HES gateway standards

1 Scope

This document specifies an event exchange format that defines the encoding of individual events in the interoperability domain. This event format is used to encode events for exchange across the “event bus” within the interoperability domain.

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 18012-3, *Information technology - Home Electronic System (HES) - Guidelines for product interoperability - Part 3: Lexicon*

IETF RFC 0768, *User Datagram Protocol*

IETF RFC 1918, *Address Allocation for Private Internets*

IETF RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*

IETF RFC 4180, *Common Format and MIME Type for Comma-Separated Values (CSV) Files*

IETF RFC 6762, *Multicast DNS*

IETF RFC 6763, *DNS-Based Service Discovery*

IETF RFC 7252, *The Constrained Application Protocol (CoAP)*

IETF RFC 8085, *UDP Usage Guidelines*

3 Terms, definitions and abbreviated terms

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
comma-separated values
CSV
sequence of values that are separated by commas and records that are separated by carriage returns or line feeds or both as specified in RFC 4180

3.1.2
constrained application protocol
CoAP
transfer protocol for use with nodes with limited capability and on networks with limited capacity or that would limit impact on the networks used as specified in RFC 7252