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Stanovanjski in stavbni elektronski sistemi (HBES) - 6-1. del: Vmesniki - Mrežni vmesnik

Home and Building Electronic Systems (HBES) - Part 6-1: Interfaces - Webservice interface

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97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

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**Home and Building Electronic Systems (HBES) - Part 6-1:
Interfaces - Webservice interface**

Systèmes électroniques pour les foyers domestiques et les
bâtiments (HBES) - Partie 6-1 : Interfaces - Interface de
services web

Elektrische Systemtechnik für Heim und Gebäude (ESHG) -
Teil 6-1: Schnittstellen - Webservice Schnittstelle

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50090-6-1:2017) has been prepared by CLC/TC 205 "Home and Building Electronic Systems (HBES)".

The following dates are fixed:

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Introduction

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1 Scope

This European Standard defines a standardized web service based interface between Home and Building HBES Open Communication System and other information technology (IT) systems.

The standardized interface is encapsulated in a gateway device, the *HBES Gateway*, which is able to communicate with both the Home and Building HBES Open Communication System and the connected IT systems. The HBES Gateway implements a set of encoding standards (see 10.2) as well as various message exchange protocols (see 10.3) to enable remote access to the Home and Building HBES Open Communication System via the Internet or another wide area network (WAN). For this purpose, gateway profiles define different implementation levels (see 10.4).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50090-1:2011, *Home and Building Electronic Systems (HBES) - Part 1: Standardization structure*

EN 50090-3-3, *Home and Building Electronic Systems (HBES) - Part 3-3: Aspects of application - HBES Interworking model and common HBES data types*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50090-1:2011 apply.

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

BAS	Building Automation System
BMS	Building Management System
IoT	Internet of Things
OASIS	Open Building Information Exchange
WS	Web Services

4 Overall introduction

Home and Building HBES Open Communication System is dedicated to the control and monitoring of networked building automation systems (BASs). Currently, Home and Building HBES Open Communication System has limited capability to communicate with other systems, as a result of the use of different protocols, incompatibility or various other restrictions. For the integration of Home and Building HBES Open Communication System and for solving specific problem scenarios, customized solutions are currently on offer. A standard interface between the HBES world and the remaining systems would however constitute a common link to bridge the gap and integrate Home and Building HBES Open Communication System into systems like the traditional Internet or the emerging Internet of Things (IoT).

A standard bridge between Home and Building HBES Open Communication System and IT systems based on Web services (WSs) is currently missing to support upcoming use case scenarios. This standard specifies such a standard interface.

5 General technical introduction to HBES Web Services

The HBES Gateway is an abstract concept, and thus not restricted to any hardware requirements or limitations. Constrained devices can be used as well as enterprise systems as HBES Gateway device. It shall be kept in mind that some configurations may overload the used hardware regarding the mentioned limitations. For example, a computationally intensive message exchange protocol cannot be used in resource-constrained HBES Gateways. However, the HBES Web services specification defines the HBES Gateway in an abstract and platform-independent way irrespective of any particular hardware.

Figure 1 sketches the intended setting containing the Home and Building HBES Open Communication System, the IT systems and the HBES Gateway between these two components.

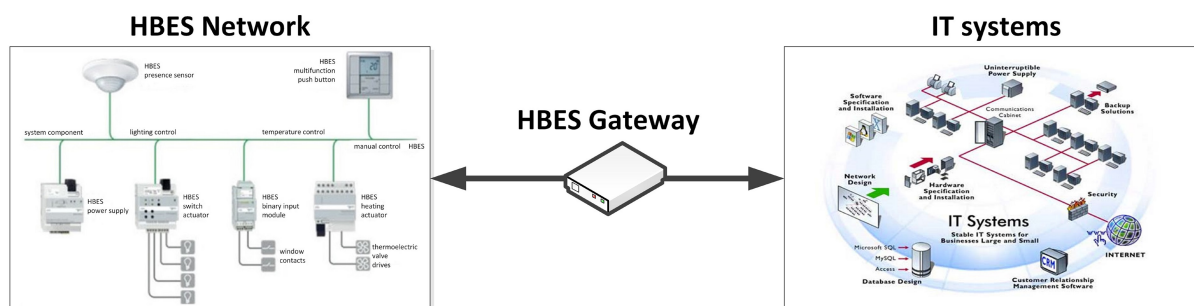


Figure 1 — General intention of the HBES WS interface

In a first version, the HBES Gateway and its WS interface is based on OASIS Open Building Information Exchange (OBIX). The OBIX integration is specified in Clauses 8 and 9.

The HBES Gateway shall allow browsing of information on the Home and Building HBES Open Communication System and reading or modifying runtime data of devices, Data points, Functional Blocks, Interface Objects or channels. Thus, any high-level management use case to manipulate or monitor the underlying Home and Building HBES Open Communication System is covered by this standard and can be implemented using the presented interfaces.

By default, the HBES Gateway is intended for two target groups:

- Web Client developers use the defined interface to implement Web Clients, which are remote applications for accessing Home and Building HBES Open Communication System. These applications are not limited to Web technologies (e.g. HTML5), but also other applications can use the introduced WSs. Thanks to the standard interface, Web Client developers require no HBES expert knowledge. Interactions with the HBES Gateway are handled via common WS calls. However, the Web Client developers need to understand the structure of a BAS and the possible ways of interacting with its elements to implement management applications.
- Gateway manufacturers have to provide the Web Client developers with the common and standardized interface. In addition, they are faced with the integration of information from Home and Building HBES Open Communication System into the HBES Gateway. Gateway manufacturers need knowledge on the HBES Specification as given in the EN 50090 series as well as on implementing and providing WSs. The HBES knowledge is needed for the realization of a communication interface between the HBES Gateway and the Home and Building HBES Open Communication System.

There are three interfaces on the boundaries of the specified HBES Gateway that shall be implemented.

- First, the HBES Information model interface defines the structure of the input model to integrate a representation of the Home and Building HBES Open Communication System into the HBES Gateway. All available elements and their representation are specified by this interface. Depending on the used technology in the HBES Gateway, mappings of the information to the technology-specific representation is required.
- Secondly, the HBES Web interface between the HBES Gateway and the remote IT systems describes the available access points and the structure of the data both provided and expected by the services of the HBES Gateway.
- Thirdly, the Home and Building HBES Open Communication System access interface is required to connect the HBES Gateway with the Home and Building HBES Open Communication System to enable message exchange and routing requests from and to the remote IT systems.

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This HBES Web services specification covers the first and the second interface while the third one is left to the gateway manufacturer responsible for establishing an adequate link to the Home and Building HBES Open Communication System.

6 Overview

6.1 General architecture

The overall architecture of the HBES Web services consists of nine main components, which are illustrated in Figure 2. This overview is used throughout this standard to specify in detail the different components and interfaces. Moreover, a workflow from the Home and Building HBES Open Communication System to the final integration into the HBES Gateway is illustrated in this figure. The following list describes the components in general terms.

1. **Home and Building HBES Open Communication System** covers all kinds of HBES installations. Twisted Pair (TP) as well as the Internet Protocol (IP) or USB connections can be used to establish a link to the HBES Gateway component.
2. All settings and configuration actions in Home and Building HBES Open Communication Systems are done by means of appropriate tools. Afterwards export functionality can be used to provide the available data of the Home and Building HBES Open Communication System for further processing. However, this component is not mandatory. If the data can be obtained from another information source, the tool export does not need to be used (cf. the following component).
3. **Additional information** illustrates an extra information source besides the configuration tool. Similarly, information is modelled by means of the HBES Information model. This modelling step

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can be done either automatically by any tool support or manually by editing the model prior to its integration into the HBES Gateway device.

4. **Remote access** covers all access activities from Web Clients, which use various message exchange protocols (e.g. HTTP, CoAP, or WebSocket). Data for requests and responses can be encoded in different formats (e.g. XML, EXI, JSON, or CBOR).
5. **HBES Gateway** specifies the component that shall enable the link between the Home and Building HBES Open Communication System and the Web Clients. Its interfaces shall be the *HBES Information model* for the import of network configuration information as well as the *Home and Building HBES Open Communication System access* and the *HBES Web interface* as service interfaces for Web Client access to the Home and Building HBES Open Communication System.
6. **HBES Information model** specifies the interface that consolidates the configuration data and the information of additional data sources. This model is based on a common vocabulary (*tag vocabulary*) defining a list of tags and relations between these tags. The HBES Information model is independent of both the data source of the Home and Building HBES Open Communication System (i.e. input sources to the model) and the technology used to implement the HBES Gateway (i.e. OBIX). The generated model is the source for integration of Home and Building HBES Open Communication System information into the HBES Gateway. This interface is used for configuration purposes while the subsequently described Home and Building HBES Open Communication System access and HBES Web interface provide their services at runtime of the HBES Gateway.
7. **Home and Building HBES Open Communication System access** is consigned to handle the message exchange between the HBES Gateway and the connected Home and Building HBES Open Communication System.
8. **HBES Web interface**, on the other hand, provides services for Web Clients via common Web protocols. The messages can be encoded by using different formats. The HBES Web interfaces according to the various HBES Gateway technologies are described throughout this standard.
9. **Tag vocabulary** defines a list of available tags to specify entities in the HBES Information model. Additionally, relationships between tags are defined in the vocabulary in order to structure the tags. First, the tag vocabulary is used during the creation of the HBES Information model. Second, the HBES Web interface uses this vocabulary to transform the internal data representation into the format expected by Web Clients.

6.2 General Home and Building HBES Open Communication System structure

This schematic representation should facilitate the understanding of modelling a Home and Building HBES Open Communication System at the HBES Gateway interfaces. An overview of this model is depicted in Figure 3. This abstract model is independent from the used HBES Gateway technology (OBIX). Moreover, it is intentionally kept abstract using an intuitive notation in order to give a first overview of the various elements.

The top element of the model is an *installation*, which contains a set of views. Each *view* is linked to other view elements and to devices, functionalities, or data points.

A topology view will represent the topological structure of the network with its hierarchy of subnets and devices. A building view will create a structure of building parts and corresponding devices, and trades categorize the devices of a network in different application domains (e.g. lighting). A *device* is linked with functionality elements or is directly connected with its data points. A *functionality* element is a container for various data points combined in order to reach a common goal or to describe a common task. Examples for functionality elements are Functional Blocks or channels. Finally, a *data point* has one or multiple *access methods* to interact with the underlying Home and Building HBES Open Communication System.

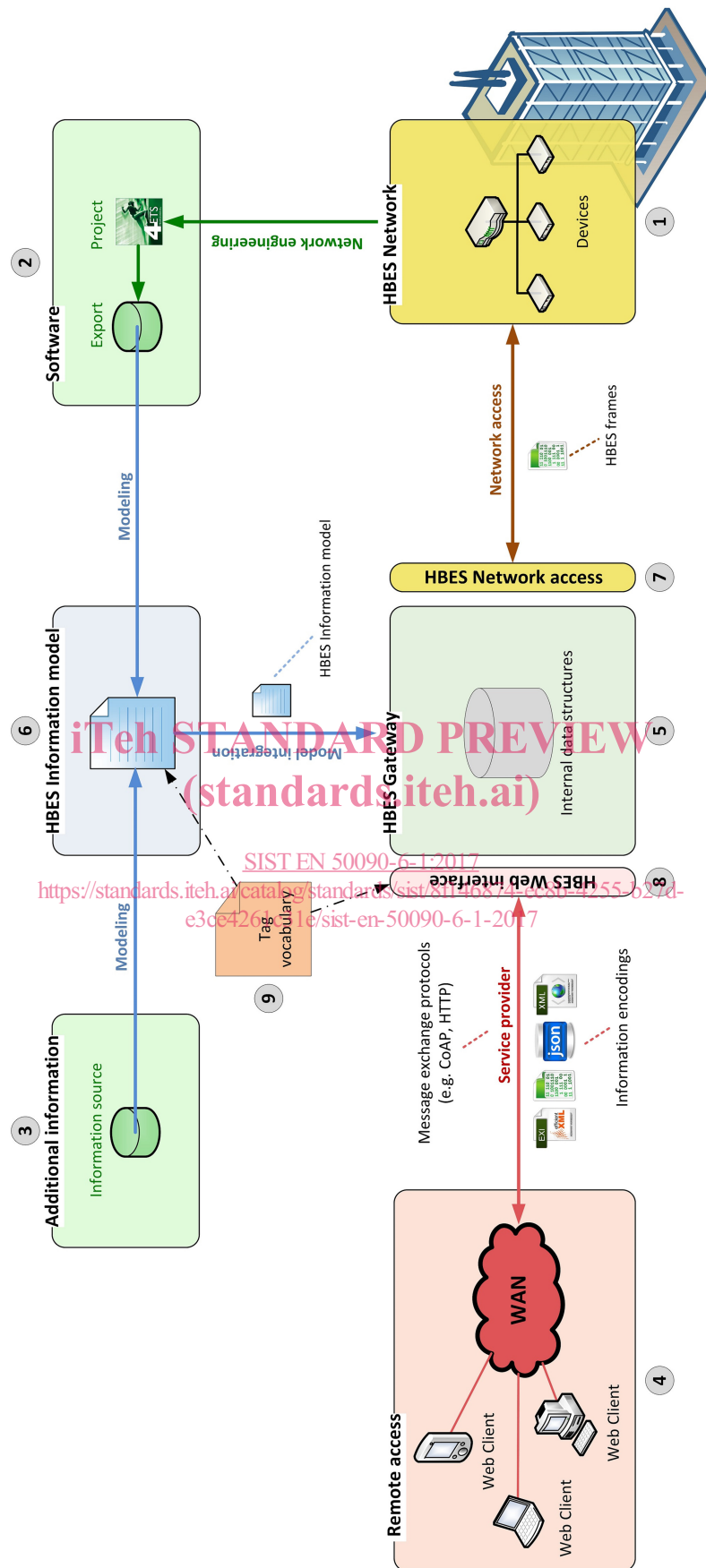


Figure 2 — General architecture

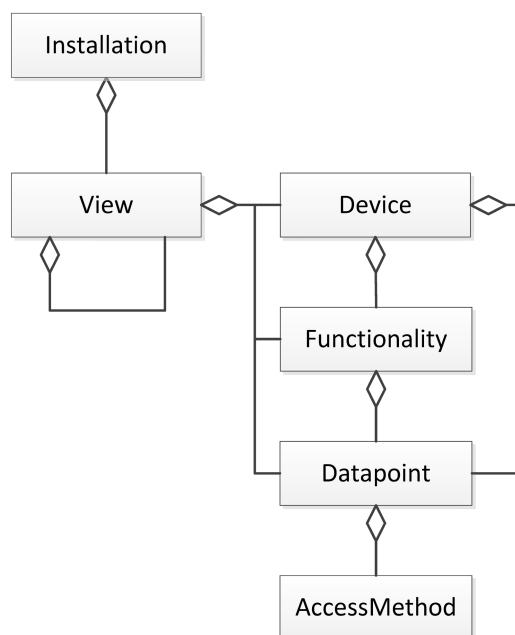


Figure 3 — Abstract model

6.3 Structure of this document

In the following clauses, the interfaces 6 (HBES Information model) and 8 (HBES Web interface) are specified. First, the HBES Information model and the corresponding tag vocabulary are defined (see Clause 7). The internal processing (model integration) and storage (internal data structures) of the HBES Information model in the HBES Gateway is manufacturer-specific. Thus, there is enough freedom in designing HBES Gateways. Second, the HBES Web interface for the HBES Gateway technologies OBIX (see Clause 8) is specified. Here mappings from the tag vocabulary and the HBES Information model to the technology-specific Web interface are addressed. In Clause 9, characteristics of the OBIX gateway technology are presented.

In summary, this standard focuses on the interfaces for the Web Clients (HBES Web interface) and the HBES Gateway manufacturers (HBES Web interface, HBES Information model). Issues regarding internal data processing, network access, and data storage are out of scope and left to the manufacturers.

7 HBES Information model

7.1 Introduction

The HBES Information model specifies the input data of the HBES Gateway on interface 6 (cf. Figure 2). This model conforms to a list of tags stored in a common *tag vocabulary*. In order to provide a structured vocabulary, a meta-model specifies the characteristics of tags and their relations to each other. Gateway manufacturers shall use the HBES Information model and its vocabulary to integrate information from the Home and Building HBES Open Communication System into the HBES Gateway. The HBES Information model based on tags of the vocabulary defines the Home and Building HBES Open Communication System in a neutral and flexible way independent of any HBES Gateway technology. The model describes the static structure of a Home and Building HBES Open Communication System and semantic information while runtime information such as actual values of data points is modelled at interface 8 and within the HBES Gateway implementation. Compared to a restrictive object model specifying classes and their attributes, a vocabulary of tags is more easily to extend to future needs.

All HBES Gateway devices shall be able to handle the full HBES Information model and its vocabulary for the integration of Home and Building HBES Open Communication Systems. The HBES