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Household appliances interworking -- Part 1: Functional specification

Geräte für den Hausgebrauch - Interworking -- Teil 1: Funktionsspezifikation

Interfonctionnement des appareils électrodomestiques -- Partie 1: Spécifications fonctionnelles

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Household appliances interworking - Part 1: Functional specification

Interfonctionnement
des appareils électrodomestiques -
Partie 1: Spécifications fonctionnelles

Geräte für den Hausgebrauch -
Interworking -
Teil 1: Funktionsspezifikation

This European Standard was approved by CENELEC on 2009-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

This European Standard was prepared by the WG 7 of Technical Committee CENELEC TC 59X, Consumer information related to household electrical appliances.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50523-1 on 2009-06-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-06-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2012-06-01

The Working Group CLC/TC 59X/WG 7, Smart house, was initiated by CECED and installed by the decision of the CLC/TC 59 meeting on 2004-09-14/15.

This European Standard has been based on documents developed and provided by the CECED Convergence Working Group.

This Part 1 of EN 50523 defines the interoperability requirements for installation, control and monitoring of household appliances.

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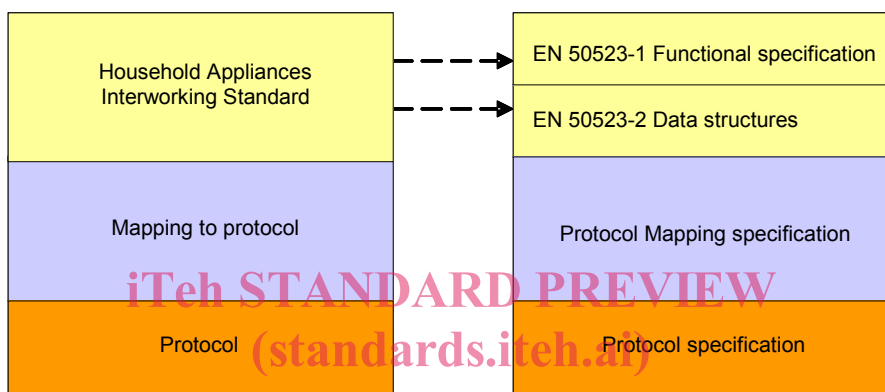
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Introduction

The objective of this European Standard is to specify how sets of products from multiple manufacturers are able to interoperate and be installed with or without the use of a special tool, in the most automatic manner. By meeting this standard, future household appliances will be able to enjoy a significantly larger market.

Figure 1 shows what it takes to obtain interworking between household appliances:

- the Household Appliances Interworking standard. It is highly independent of the underlying protocol;
- a protocol for communication between devices in the home;
- a mapping scheme from the Household Appliances Interworking standard to each selected protocol.



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<https://standards.iteh.ai/catalog/standards/sist-en-50523-1-2010>
Figure 1 – Dependencies of interworking
<https://standards.iteh.ai/catalog/standards/sist-en-50523-1-2010>

EN 50523-1 defines the functionality required for appliances to ensure interoperability.

EN 50523-2 defines the data structures used to implement the interoperable functionality.

The Protocol Mapping specification is a document that describes the mapping of the defined interoperable functionality in terms of a selected protocol that satisfies the requirements of EN 50523-1.

The Protocol specification defines a communication protocol suitable for communication between devices in the home.

1 Scope

This European Standard focuses on interworking of household appliances and describes the necessary control and monitoring. It defines a set of functions of household and similar electrical appliances which are connected together and to other devices by a network in the home.

This European Standard does not deal with safety requirements.

2 Terms, definitions and abbreviations

2.1 Terms and definitions

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

2.1.1

domain address

identification of a logical network on an open network such as power-line. Domain addresses are used in a frame to insulate it from neighbouring networks

2.1.2

house address

see definition 2.1.1 for domain address

2.1.3

network address

identification of a device in a network

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[SIST EN 50523-1:2010](https://standards.iteh.ai/catalog/standards/sist/3a007621-3866-4cfd-8cc1-38b5cf0f94cd/sist-en-50523-1-2010)

2.1.4

fixed addressing scheme

fixed addressing schemes are used when the network address is a unique identification assigned through an agreement between manufacturers so that no two communicating devices have the same identification, hence the same address

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2.1.5

communication link

logical application link between two devices exchanging messages

2.1.6

installation

installation of all networked devices within a given home unit

2.1.7

configuration data

set of data including network protocol data (domain address and network address) and communication link data

2.1.8

message

application message

2.1.9

local control

direct control of a device through its panel

2.1.10**remote control**

control of device through a network

2.1.11**indoor remote control**

control of device from a device connected to the home network

2.1.12**outdoor remote control**

control of device from a device connected to a residential gateway itself connected to the home network

2.1.13**enable / disable remote control**

authorisation to control a device through a network

2.1.14**Functional Block**

logical grouping of device functions. Consists of one or more functions that belong together and that cannot be separated across two devices. A Functional Block has a well-defined black-box behaviour

2.1.15**wet white goods**

washing machine, dish washer, tumble dryer

2.1.16**hot white goods**

oven, hobs, hood

2.1.17**cold white goods**

refrigerator, freezer, refrigerator-freezer, winecabinet

2.1.18**air conditioner**

this document refers to HVAC mobile devices which can be directly installed by the consumer

2.1.19**water heater**

storage water heater (boiler) or instantaneous water heater

2.1.20**short time**

term used to identify short-length time period in messaging and installation procedures. Equal to 5 s

2.1.21**medium time**

term used to identify medium-length time period in messaging and installation procedures. Equal to 30 s

2.1.22**long time**

term used to identify long-length time period in messaging and installation procedures. More than 30 s

2.1.23**home controller**

home controller is a controller providing the capability for remote control on the household appliances

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2.1.24**residential gateway**

residential gateway is a home controller providing also internet access. It usually provides also the capability for remote control on the household appliances from networks outside the home. Also referred as gateway in this document

2.2 Abbreviations

For the purposes of this document, the abbreviations included in Table 1 apply.

Table 1 – Abbreviations

AC	HVAC mobile device Air Conditioner
DW	Dishwasher
FB	Functional Block
FR	Refrigerator-Freezer
FZ	Freezer
CB	Combi
GO	Gas Oven
GT	Gas Cooktop
HB	Hobs
HBES	Home and Building Electronic Systems
HD	Hood
HVAC	Heating, Ventilation, Air Conditioning
IH	Induction Hobs
MID	Message Interaction Descriptor
MW	Microwave Oven
OID	[Communication] Object Identifier
OV	Electric Oven
RE	Refrigerator
RG	Range Cooker
ST	Steam Oven
TD	Tumble Dryer
WC	Winecabinet
WD	Washer Dryer
WG	White Good, appliance, white good appliance, household appliance
WHI	Instantaneous Water Heater
WHS	Storage Water Heater
WM	Washing Machine

3 Installation of a system

3.1 Definitions

3.1.1 Phases of Installation

Installation of WG appliances with home networking capability consists of two main phases:

- initialising specific network protocol data:
 - **house address** or **domain address**. This value is used on open media (e.g. power-line or RF) to recognise network messages within the same home unit. It is necessary to make sure appliances do not receive messages coming from different homes;
 - **network address** of the appliance being installed. A network address serves as a "unique" identifier for an appliance on a network. Appliances can determine the addresses of other appliances on the network and use these addresses to send messages to each other;
- initialising **communication links data**, basically consisting of the network address of remote devices.

3.1.2 Plug & Play Installation

An installation which is fully automatic, i.e. which does not require user intervention is said to **Plug & Play**.

3.1.3 Plug, Touch & Play Installation

An installation, which is based on a limited sequence of simple user actions (i.e. **Plug, Touch & Play**).

3.2 Rationale for Installation in WG Appliances

3.2.1 Installation Approach for Household Appliances

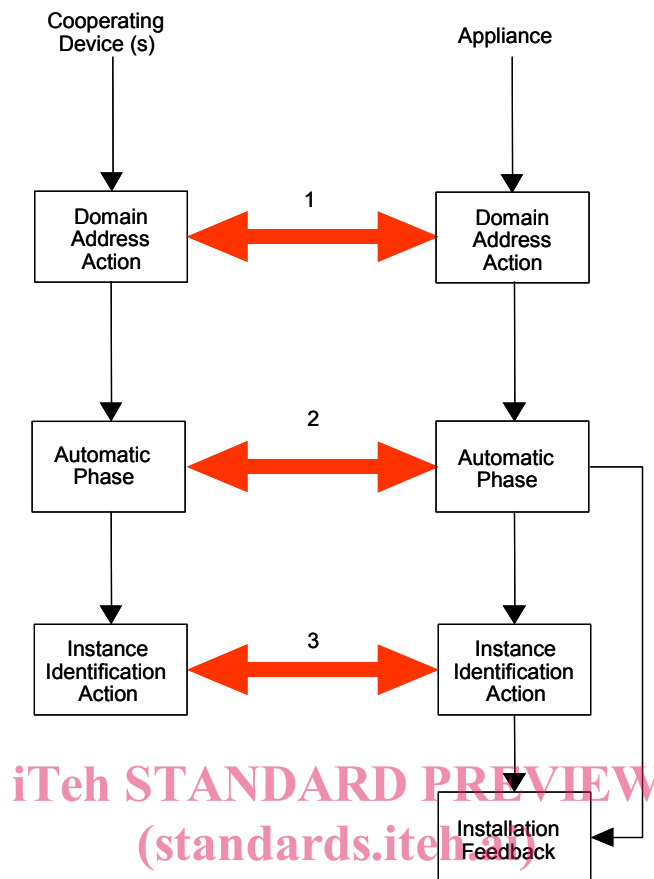
In general, it is expected that WG appliances installation will be simple, protected and secure. The installation procedures should be such that the user without the intervention of a specialised installer can perform it. In particular, it could be either fully automatic (i.e. Plug & Play), or explicitly started and handled in a simple way by the user, for example using a combination of buttons to start the procedure and relying on some LED feedback (i.e. Plug, Touch & Play).

The limited sequence of user actions will typically be used for two purposes:

- getting the domain address. To this end, a touch sequence or another interaction will be typically available to the user. The objective of the touch sequence is to direct another appliance to provide the domain address information. In principle any already installed appliance can provide this information. In practice, a dedicated appliance such as a gateway will be used for this purpose;
- handling the case of more than one WG appliance of the same type in the same home (e.g. two washing machines). When such a case happens, there is a need to distinguish the appliances from a networking point of view, in order to allow a home controller to access individually. This function is called "Instance Identification". To this end, a touch sequence will be typically available to the user or another mechanism in order to indicate it.

The figure below shows the interactions which are expected during installation. To achieve installation, the appliance is interacting with another cooperating device. It will be involved in four phases, shown in rectangles:

- 1) getting the domain address;
- 2) automatic installation phase;
- 3) optional instance identification;
- 4) providing installation feedback.



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Figure 2 – Expected Interactions during Installation
<https://standards.itel.net/catalog/standards/sist/5a007021-5000-4cfd-8cc1-38b5cf094cd/sist-en-50523-1-2010>

The implementation of these four phases is completely open to the manufacturer. It is recommended that

- the sequence of actions to get the domain address should conform to the related protocol (interaction 1 in Figure 2),
- the automatic part should conform to the related protocol (interaction 2 in Figure 2). Note that the figure was simplified as the automatic procedure could also take place before and after the sequence of actions,
- the section of actions to implement instance identification should conform to the related protocol (interaction 3 in Figure 2),
- the semantics of the feedback display should conform to the semantics of the installation protocol.

Therefore, it is expected that in practice there will still be many different approaches used for installation:

- the way to accomplish the installation actions at the level of the appliance could change from one appliance to another, as long as the objective of such actions and the related protocol are the same (e.g. a different combination of touch buttons is used);
- the actions to take at the level of other devices could be very different. They could involve different devices from one installation to another (e.g. a specific controlling device with a user interface, a gateway with specific installation buttons, a specific temporary tool), as long as the achieved objective and the involved protocol are the same. For instance, it is possible that within the home system an Installer device can be used to supervise installation and operations of other appliances. This specific device could then be responsible for domain address provision, for the handling of multiple appliances of the same kind (for example two washing machines on the same system). It could further support some routine to verify that a new appliance is not installed on different or wrong environments (for example an appliance being installed on the neighbour system).

Consequently, even though user intervention could be different for each manufacturer, it should use the same network management protocol. This will ensure that interoperability can be insured.

3.2.2 Constraints

It is expected that a number of constraints related to installation procedures will be typically met in order to put Household Appliances with networking capability on the market.

- Appliances with networking capability should also work even when they are used as autonomous system without communication during their lifetime. The transition from and to autonomous modes must be transparent to the user and should not require user interventions.
- Installation procedures
 - should not depend on specific communication technology aspects,
 - should be clearly presented (for instance in the case of combination of buttons),
 - should allow the manufacturer to be free in the choice in their implementation,
 - should support domain address acquisition. Without this capability, a filter separating communication would be needed in each home ¹⁾,
 - should give a chance to every appliance to be linked,
 - should have a duration that is minimised,
 - should take into account appliances that may be switched off (such as washing machines).
- User interfaces for installation procedures
 - should be easily accessible,
 - should have minimised costs. As an example, a solution based on one push button and one LED seems to be correct from the point of view of the price.
- Regular checking of communication links integrity is expected in order to maintain consistent configuration data upon events such as appliance removal, switch on or communication failure (note that it is not obvious to distinguish such events). This point is particularly difficult because it is application related and therefore seems to be difficult to standardise.

3.3 Key Installation Events and related User Functions

Household Appliance installation procedures shall follow a common scenario and common rules. More precisely, the procedures shall be described through the same list of key events concerning the whole installation. Each key event shall be associated with user functions.

The following table defines the key events concerning the whole installation.

¹⁾ Even then, cross talking could happen.

Table 2 – Key Installation Events

Key event	Description
First installation	First time communicating appliances are installed in a home. For instance, a gateway and a washing machine are installed.
Power Up	Powering up one or several appliances (e.g. powering up the whole installation after power failure).
Appliance is added	A new appliance is added to the home installation. In some cases the appliance could have been used in an autonomous mode (i.e. without networking capability) for some time.
Appliance is removed	An existing appliance is removed from the home installation (this could be because the appliance is physically removed or because the appliance gets back in an autonomous mode without networking capability).
Appliance Re-installation	Part of the installation is re-installed.
Re-installation	The whole home installation is re-installed.
De-installation	The home installation is de-installed. This could take place when persons are moving out from their home.
Monitoring of Communication Links	A verification of the communication links is performed.

The following user functions in Table 3 are associated with each key event. In the following configuration, data refer to network protocol data and configuration links data.

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Table 3 – User Functions associated with Key Installation Events
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Key event	User function
First installation	Installation creation The overall installation is created and personalised (i.e. a domain address is assigned). An installation feedback is provided to the user.
	Communication function is enabled with optional feedback to the user.
Power Up	Automatic power up verification After power up of one or several appliances, a short automatic start-up phase takes place, involving the verification of its configuration.
Appliance is added	Adding an appliance The installation configuration is updated with a new communicating appliance (i.e. configuration data of appliances are updated).
Appliance is removed	Removing an appliance The installation configuration is updated to take into account removal (i.e. configuration data of appliances are updated).
Re-installation	Re-installation Network configuration data is changed in all the appliances or in a subset (i.e. get domain address and dependent data).
De-installation	De-installation Network configuration data are removed from all appliances in the installation (i.e. remove domain address and dependent data).
Monitoring of the Communication links	Verification of configuration data Configuration data are verified.
	Removing a specific communication link In some cases, communication links might be considered as frozen once they are set (this would be the case of an appliance that is usually switched off). It is therefore necessary to specifically indicate when an actual removal has taken place (e.g. with an appliance that is switched off).