IEC 63240-2

Edition 1.0 2020-11

INTERNATIONAL STANDARD

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Active assisted living (AAL) reference architecture and architecture model – Part 2: Architecture model

IEC 63240-2:2020-11(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 11.020.99; 11.180

ISBN 978-2-8322-9081-1

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ACTIVE ASSISTED LIVING (AAL) REFERENCE ARCHITECTURE AND ARCHITECTURE MODEL –

Part 2: Architecture model

FOREWORD

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International Standard IEC 63240-2 has been prepared by IEC systems committee AAL: Active Assisted Living.

The text of this International Standard is based on the following documents:

Draft	Report on voting
SyCAAL/177/CDV	SyCAAL/191/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 63240 series, published under the general title *Active assisted living reference architecture and architecture model*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

IEC SyC AAL is developing an architecture model and a reference architecture for AAL to guide the development and deployment of AAL services and technologies. IEC 63240 consists of the following parts, under the general title Active assisted living (AAL) reference architecture and architecture model:

- Part 1: Reference architecture;
- Part 2: Architecture model.

This document provides information to ensure usability and accessibility from the earliest stages of design and provides guidance to developers on how to incorporate these requirements. Additional requirements such as security, privacy, and trustworthiness are introduced and considered.

This document captures the results the work of SyC AAL on architecture and interoperability. This document reflects contributions and discussions by SyC AAL experts, mirror committees and liaison members. This document also contains material gathered from reports and group output from the SyC AAL meetings in November 2015 (Tokyo), April 2016 (Wellington), October 2016 (Frankfurt), April 2017 (Beijing), September 2017 (Cleveland), December 2017 (Eindhoven), May 2018 (Tokyo), October 2018 (Seoul), June 2019 (Frankfurt) and October 2019 (Shanghai), as well as information obtained during various web meetings.

Experts from liaison organizations and the following national committees have contributed: CA, CH, CN, DE, GB, IN, JP, KR, NL, NZ, SE, US.

The target audience for this document includes the following stakeholders who have an interest in the AAL system:

- AAL users and service provider personnel who can learn about AAL user needs and how to operate AAL systems;
- consumer electronics and information and communication technology device manufacturers who want to understand AAL devices and interface and interoperability requirements;
- stakeholders who are interested in the usability, accessibility and performance of the AAL system as well as AAL operators who need to understand the system requirements;
- regulators who are responsible for developing and supervising AAL and related regulations.

ACTIVE ASSISTED LIVING (AAL) REFERENCE ARCHITECTURE AND ARCHITECTURE MODEL –

Part 2: Architecture model

1 Scope

This document specifies the AAL architecture model.

This document defines concepts and introduces terminology. IEC 63240-1 provides generic rules for designers of AAL systems and services with the aim to facilitate systems design and enable interoperability between components. This document provides a framework to analyse use cases on a common view and terminology, which is a foundation for communication to discuss the interoperability of the components of the AAL system. This document allows for the mapping of defined AAL use cases and supports the identification of interoperability issues and gap analysis of the standards.

This document also identifies safety, security, privacy, and other requirements for AAL systems such as usability, accessibility, and trustworthiness (reliability, resilience).

2 Normative references

There are no normative references in this document.

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 terminological databases for use in standardization at the following addresses:

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

3.1.1
IADL
instrumental activity of daily living
human action that involves physical/social/cognitive skills related to independent living in addition to ADL

Note 1 to entry: IADL includes various actions: transportation, communication (i.e. use of telephone, emails), shopping, meal preparation, housekeeping, managing medications and managing personal finances.

Note 2 to entry: See also ISO/IWA 18:2016 [1], 3.3.

3.1.2
IADL assistance
assistance with instrumental activities of daily living

3.1.3
ADL
activity of daily living
most basic human action that involves physical self-maintenance ability

Note 1 to entry: ADL comprises the following six areas: transferring, bathing, eating, dressing, continence and grooming and toileting.

Note 2 to entry: See also ISO/IWA 18:2016 [1], 3.3.

3.1.4
ADL assistance
assistance with activities of daily living

3.1.5
AAL device
material element or assembly of such elements intended to perform a required function used in an AAL service (IEV 871-01-04).

Note 1 to entry: There are 1) medical devices (IEV 871-06-06), as defined by regulatory agencies, 2) personal health devices and sensors (IEV 871-04-29) for fitness, well-being, personal comfort and personal security and 3) devices which can serve as aggregators of personal data produced by the user of the device.

[SOURCE: IEC 60050-151:2001 [2], 151-11-20, modified – The term "device" has been replaced by "AAL device". In the definition, "used in an AAL service" has been added.]

3.1.6
AAL gateway
functional unit that connects two computer networks with different network architectures and protocols used in an AAL service (IEV 871-01-04)

Note 1 to entry: The computer networks may be local area networks, wide area networks, or other types of networks.

Note 2 to entry: Examples of gateways are a LAN gateway, a mail gateway used in an AAL service.

[SOURCE: IEC 60050-732:2010 [3], 732-01-17, modified – The term "gateway" has been replaced by "AAL gateway". In the definition and in Note 2 to entry, "used in an AAL service" has been added.]

3.1.7
AAL platform backend system
AAL backend system
system that houses a number of components (functionalities) in order to collect the data from AAL gateways or AAL devices directly over a wide area network connection, and that can also implement components for the remote management of AAL gateway or AAL device (e.g. firmware update) and components for interfacing with AAL information systems or other information systems

3.1.8
AAL applications and services
AAL application
program or application that interacts with the AAL users or within the network infrastructure to transmit or exchange data and information in the network

[SOURCE: IEC 61907:2009 [4], 3.1.13 – modified. The term in the source entry is "(network) service function". In the definition, "network users" has been replaced by "AAL users".]

3.1.9
AAL service
action or function of an AAL system creating an added value for customers

EXAMPLE 1 Configuration and maintenance of AAL systems.

EXAMPLE 2 Assistant systems to support the home and living environment.

Note 1 to entry: An AAL service can consist of several individual services.

[SOURCE: IEC 60050-871:2018 [5], 871-01-04]

3.1.10
AAL information system
collection of technical and human resources that provide the storage, computing, distribution, and communication for the information required by an AAL service (IEV 871-01-04)

Note 1 to entry: An AAL information system can contain various types of personal information.

Note 2 to entry: See http://whatis.techtarget.com/definition/IS-information-system-or-information-services [accessed 2020-10-20]. The definition is based on the first sentence in which "IS (information system) is the " was omitted and "all or some part of an enterprise" was replaced by "an AAL service (871-01-04). Note 1 to entry was added.

3.1.11
other information system
collection of technical and human resources that provide the storage, computing, distribution, and communication for the information not specific to AAL services

Note 1 to entry: Health information system (HIS) can be part of another information system. Examples of HIS include

- electronic health records (IEV 871-06-01),
- primary care practice electronic medical records (EMRs),
- pharmacy systems, and
- laboratory information systems.

Note 2 to entry: It is possible that AAL care recipients' data need to be shared with other information systems. For example, in the context of an AAL care recipient who is suffering from chronic diseases and is monitored at home by a telemonitoring system, it is possible that a vital signs summary report needs to be shared with the primary care physician's EMR.

Note 3 to entry: See http://whatis.techtarget.com/definition/IS-information-system-or-information-services [accessed 2020-10-20]. The definition is based on the first sentence in which "IS (information system) is the " was omitted and "required by all or some part of an enterprise" was replaced by "not specific to AAL services". Notes 1 and 2 to entry were added.

3.1.12
actor layer
layer of an architecture model in which the content is derived from the use case information on actors

Note 1 to entry: Actors can be persons, technical components, or organizations that can be associated to domains (Levels of assistance: X-axis) relevant for the underlying use case. In the same manner the hierarchical zones (System component composition: Y-axis) can be identified indicating where individual actors reside.

Note 2 to entry: See CEN-CENELEC-ETSI Smart Grid Coordination Group, Smart Grid Reference Architecture, November 2012, 7.3.3.2. The definition has been derived from the first sentence in which "The content of the component layer is" has been replaced by "layer of architecture model in which the content is". Note 1 to entry was added.

3.1.13
communication layer
layer of an architecture model that describes protocols and actions for the interoperable exchange of information between the actors of a use case

Note 1 to entry: See CEN-CENELEC-ETSI Smart Grid Coordination Group, Smart Grid Reference Architecture, November 2012, 7.3.3.6. The definition has been derived from the first sentence in which "The emphasis of the communication layer is to describe" has been replaced by "layer of an architecture model that describes" and "the use case actors" has been replaced by "the actors of a use case". "mechanisms" has been replaced by "actions"

3.1.14
information layer
layer of an architecture model that describes the information that is being used and exchanged between functions, services and actors

Note 1 to entry: See CEN-CENELEC-ETSI Smart Grid Coordination Group, Smart Grid Reference Architecture, November 2012, 7.3.3.5. The definition has been derived from the first sentence in which "The information layer describes" has been replaced by "layer of an architecture model that describes" and "components" has been replaced by "actors".

3.1.15
function layer
layer of an architecture model that represents the functions described in the use cases

Note 1 to entry: See CEN-CENELEC-ETSI Smart Grid Coordination Group, Smart Grid Reference Architecture, November 2012, 7.3.3.4. The definition has been derived from the first sentence in which "The function layer is intended to represent functions and their interrelations" has been replaced by "layer of an architecture model that represents the functions described in the use cases".

3.1.16
stakeholder layer
layer of an architecture model to represent the different stakeholders involved in providing the applications and services described in the use cases

3.1.17
business layer
layer of an architecture model that represents the business models, including business objectives, economic and regulatory constraints

Note 1 to entry: See CEN-CENELEC-ETSI Smart Grid Coordination Group, Smart Grid Reference Architecture, November 2012, 7.3.3.3. The definition has been derived from the first sentence in which "The business layer is intended to host" has been replaced by "layer of an architecture model that represents" and "processes" has been replaced by "models". "services and organizations linked to the use cases" has been deleted.

3.2 Abbreviated terms

AAL active assisted living

ADL activities of daily living

IADL instrumental activities of daily living

IoT Internet of Things

4 General

New challenges are raised in system engineering due to the complexity of the AAL field. To cope with the specific characteristics and the individuality of demands of ambient intelligence, new approaches need to be adopted. These systems are demanding in matters of performance, time and quality as they answer to the needs of the elderly population. Moreover, they acquire awareness of the user's environment, the adjustability to its needs and the diversity of the provided services. The architecture model aims at the integration of different domains and systems.

Additionally, as interoperability has become a major issue in system development, standardization has emerged to manifest the compatibility between the system components. As of our knowledge, there is a lack of formulations, guidelines, rules and specifications in the context of AAL to guide the achievement of a common and optimum use of the architectural elements. The main purpose of the architecture model defined in this document is to provide a guide to analyse use cases on a common view and terminology, identify areas of possible lack of interoperability and allow for use case mapping and for conducting a standard gap analysis.