IEC SRD 63426

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SYSTEMS REFERENCE DELIVERABLE

Reference standards portfolio (RSP) on interoperability and connectivity for active assisted living (AAL) in the connected home environment (CHE)

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INTERNATIONAL
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REFERENCE STANDARDS PORTFOLIO (RSP) ON INTEROPERABILITY AND CONNECTIVITY FOR ACTIVE ASSISTED LIVING (AAL) IN THE CONNECTED HOME ENVIRONMENT (CHE)

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IEC SRD 63426 has been prepared by IEC systems committee AAL: Active Assisted Living. It is a Systems Resource Deliverable.

The text of this Systems Resource Deliverable is based on the following documents:

Draft	Report on voting
SyCAAL/334/DTS	SyCAAL/361/RVDTS

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 Systems Resource Deliverable 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 ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

This document provides reference standards to active assisted living connected home environment (AAL CHE) system and device vendors about how to achieve interoperability and connectivity between AAL CHE elements and instances. An element defined in this document is a sub-component of an AAL CHE system component, which is made up of devices, services and systems classified in each AAL CHE system component. An instance is a specific example of elements, used in AAL CHE.

This document reflects contributions and discussions by systems committee active assisted living (SyC AAL) experts, mirror committees and liaison members. This document also contains material gathered from reports, AAL research projects and group output from the SyC AAL meetings in October 2020 (virtual meeting), October 2021 (virtual meeting), as well as information obtained during various web meetings.

This reference standards portfolio will be revised as additional standards and specifications are identified and added.

The documents listed in Clause 5 also include specifications and protocols that are not International Standards.

The applicable versions of the standards/specifications listed in Clause 5 can be found on the IEC Mapping platform:

* https://mapping.iec.ch/#/maps/52

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

* AAL users and service provider personnel who intend to learn about AAL user needs and how to operate AAL systems;
* vendors who intend to develop systems and devices for AAL CHE.

This document identifies standardization needs and new standardization opportunities specific to the use of the AAL CHE element.

REFERENCE STANDARDS PORTFOLIO (RSP) ON INTEROPERABILITY AND CONNECTIVITY FOR ACTIVE ASSISTED LIVING (AAL) IN THE CONNECTED HOME ENVIRONMENT (CHE)

1 Scope

This document classifies elements suitable for an AAL connected home environment based on AAL system components. This document defines instances which are specific examples of elements used in an AAL connected home environment (AAL CHE).

An element defined in this document is a specialized and subdivided classification of a connected home environment. An instance is a specific example of an element used in an AAL CHE.

This document lists standards applicable to AAL CHE elements and AAL CHE instances, with a focus on interoperability and connectivity.

NOTE: IEC SRD 63473 relates to this document.

2 Normative references

There are no normative references in this document.

3 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
AAL
active assisted living
concepts, products, services, and systems combining technologies and social environment with the aim of improving the quality of people's lives

[SOURCE: IEC 60050-871:2018, 871-01-02, modified – deprecated term omitted.]

3.2
CHE
connected home environment
home environment that provides a home network (IEV 732-10-01) so that devices within the home can communicate to one another and to devices outside the home

Note 1 to entry: AAL connected homes and smart homes share some commonalities.

[SOURCE: IEC 60050-871:2023, 871-05-10, modified – Abbreviated term added.]

3.3
AAL CHE
active assisted living connected home environment
connected home environment with features to support AAL users

3.4
AAL CHE system component
device(s), service(s), system(s), gateway(s) and backend system that make up a CHE

3.5
AAL CHE device
device used in an AAL CHE service

3.6
AAL CHE application and service
action or function of an AAL CHE system creating an added value for customers

3.7
AAL CHE information system
collection of technical and human resources that provide the storage, computing, distribution, and communication for the information required by an AAL CHE service

3.8
AAL CHE gateway
functional unit that connects two computer networks with different network architectures and protocols

3.9
AAL CHE element
sub-component of an AAL CHE system component, which is made up of devices, services and systems classified in each AAL CHE system component

EXAMPLE   Personal health devices, comfort devices, etc.

3.10
AAL CHE instance
specific example of CHE elements

EXAMPLE   Glucose meter, thermometer, etc.

3.11
personal health device
PHD
device used in personal health applications

[SOURCE: ISO/IEEE 11073-20601:2022, 3.1, modified – Abbreviated term added.]

3.12
multimedia device
tool or piece of equipment that allows AAL users to experience several types of digital media at once

[SOURCE: https://www.reference.com/world-view/multimedia-device-ae8f673a461354c7, modified, – "a user" replaced by "AAL users".]

3.13
comfort device
home appliance made to provide comfort to users

3.14
AAL robot
robot or robot system that provides AAL users with such services as monitoring, communication support, activity support, mobile support, and information and data management in the CHE

4 AAL CHE elements in a sub-component of an AAL CHE system component and AAL CHE instances

Figure 1 shows AAL CHE elements and AAL CHE instances with data communications between them.
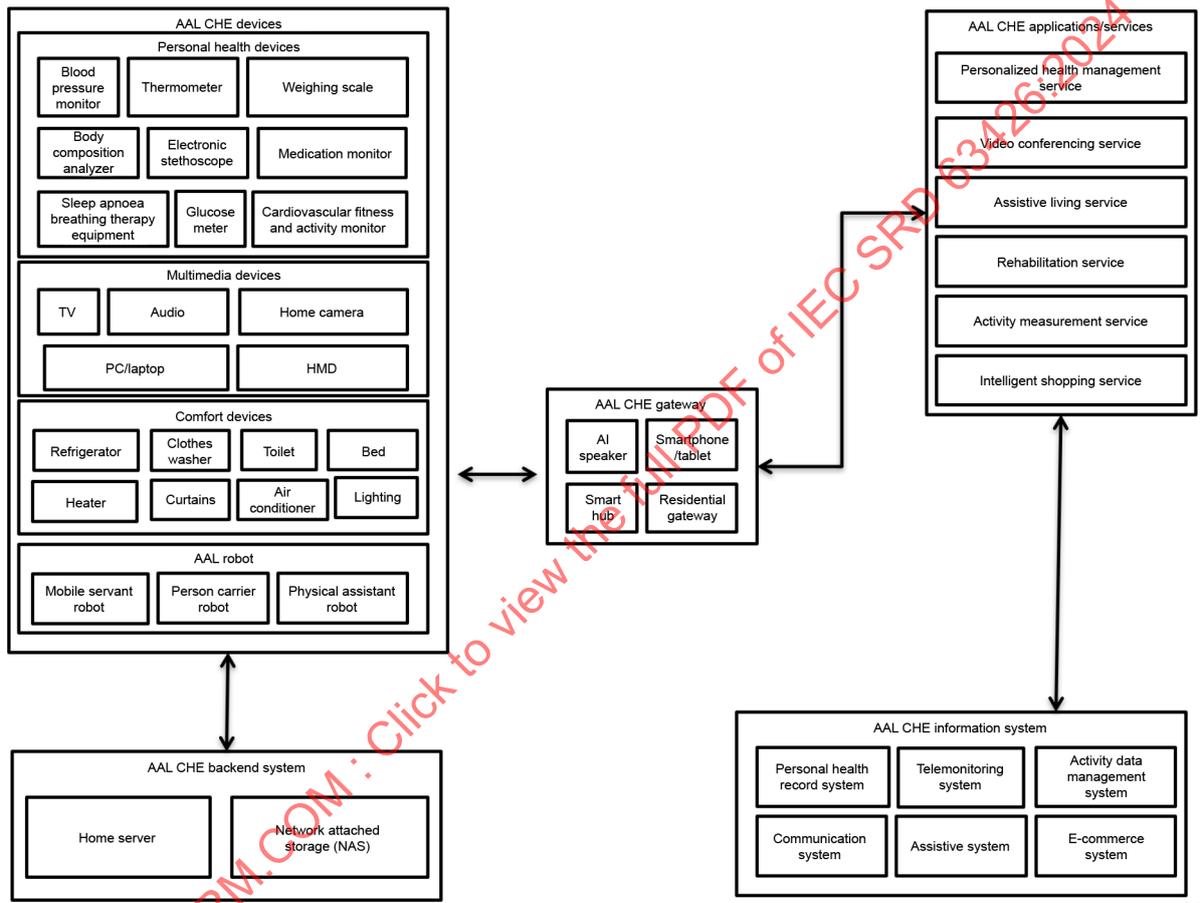
Figure 1 – AAL CHE elements and AAL CHE instances with data communications

An AAL CHE device is used in an AAL CHE service and is classified into the following categories: personal health devices, multimedia devices, comfort devices, AAL robots, and others.

Personal health devices include but are not limited to:

– blood pressure monitor;

– thermometer;

– weighing scale,

– glucose meter,

– sleep apnoea breathing therapy equipment,

– body composition analyser,

– electronic stethoscope,

– cardiovascular fitness and activity monitor,

– medication monitor.

Multimedia devices include but are not limited to:

– TV,

– audio,

– home camera,

– PC/laptop

– HMD (head mount display).

Comfort devices include but are not limited to:

– refrigerator,

– clothes washing machine,

– curtains,

– toilet,

– bed,

– heater,

– air conditioner,

– lighting.

AAL robots' functions include but are not limited to:

– monitoring service (function)

– communication support (function)

– activity support (function)

– mobility support (function).

An AAL CHE application and service is an action or function of an AAL CHE system creating an added value for customers. AAL CHE applications and services can be classified into one of the following categories: personalized health management service, video conferencing service, assistive living service, rehabilitation service, activity measurement service, and intelligent shopping service. A personalized health management service provides functions such that individuals take the initiative in integrating and managing their own health data and the individual has tailored care based on their personal health record.

An AAL CHE information system is a collection of technical and human resources that provide the storage, computing, distribution, and communication for the information required by an AAL CHE service. AAL CHE information systems can be classified into one of the following categories: personal health record system, telemonitoring system, communication system, assistive system, activity data management system, e-commerce system, and others.

An AAL CHE gateway is a functional unit that connects two computer networks with different network architectures and protocols. AAL CHE gateways can be classified into one of the following categories: smart hub, AI speaker, residential gateway, broadband router, smart phones, and tablets.

An AAL CHE backend system is a system that houses a number of components (functionalities) in order to collect data from AAL CHE gateways or AAL CHE devices directly over a wide area network connection. AAL CHE backend systems can be classified into the following categories: home servers, and network attached storage (NAS).

5 Reference standards

5.1 General

This Clause 5 lists the reference standards which can be adopted into AAL CHE elements and AAL CHE instances, with a focus on interoperability and connectivity. This document does not consider standards on safety, security and privacy aspects. Medical device regulation is also outside the scope of this document.

This document does not include an all-inclusive list of relevant standards and specifications. Additional standards and specifications may also be applicable. The documents listed in this Clause 5 also include specifications and protocols that are not International Standards.

This reference standards portfolio will be revised as addition standards and specifications are identified and added. The applicable editions of the standards and specifications listed in this Clause 5 can be found in the IEC Mapping platform at the following link:

- https://mapping.iec.ch/#/maps/52

5.2 Communication between AAL CHE devices and AAL CHE gateway

5.2.1 Communication between personal health devices and AAL CHE gateway

See Table 1 for communication between personal health devices and AAL CHE gateway.

Table 1 – Communication between personal health devices and AAL CHE gateway

Designation	Title	Standards development organization (SDO)
IEC TR 80001-2-3	*Application of risk management for IT-networks incorporating medical devices – Part 2-3: Guidance for wireless networks*	ISO
ISO/IEEE 11073-20601	*Health informatics – Device interoperability – Part 20601: Personal health device communication – Application profile – Optimized exchange protocol*	ISO
ISO/IEEE 11073-10407	*Health informatics – Device interoperability – Part 10407: Personal health device communication – Device specialization – Blood pressure monitor*	ISO
ISO/IEEE 11073-10408	*Health informatics – Device interoperability – Part 10408: Personal health device communication – Device specialization – Thermometer*	ISO
ISO/IEEE 11073-10415	*Health informatics – Device interoperability – Part 10415: Personal health device communication – Device specialization – Weighing scale*	ISO
ISO/IEEE 11073-10417	*Health informatics – Personal health device communication – Part 10417: Device specialization – Glucose meter*	ISO
ISO/IEEE 11073-10420	*Health informatics – Device interoperability – Part 10420: Personal health device communication – Device specialization – Body composition analyzer*	ISO

Designation	Title	Standards development organization (SDO)
IEEE P11073-10428	*Health Informatics – Personal Health Device Communication – Part 10428: Device Specialization – Electronic Stethoscope*	ISO
ISO/IEEE 11073-10441	*Health informatics – Personal health device communication – Part 10441: Device specialization – Cardiovascular fitness and activity monitor*	ISO
ISO/IEEE 11073-10472	*Health Informatics – Personal health device communication – Part 10472: Device specialization – Medication monitor*	ISO
ITU-T Recommendation H.850	*Conformance of ITU-T H.810 personal health system: Personal Health Devices interface – Part 10: Transcoding for Bluetooth Low Energy: Personal Health Gateway – General requirements*	ITU-T

5.2.2 Communication between multimedia devices and AAL CHE gateway

See Table 2 for communication between multimedia devices and AAL CHE gateway.

Table 2 – Communication between multimedia devices and AAL CHE gateway

Designation	Title	Standards development organization (SDO)
ISO/IEC 13818-2	*Information technology – Generic coding of moving pictures and associated audio information – Part 2: Video*	ISO/IEC JTC 1
ISO/IEC 14496-1	*Information technology – Coding of audio-visual objects – Part 1: Systems*	ISO/IEC JTC 1
ISO/IEC 14496-2	*Information technology – Coding of audio-visual objects – Part 2: Visual*	ISO/IEC JTC 1
ISO/IEC 14496-3	*Information technology – Coding of audio-visual objects – Part 3: Audio*	ISO/IEC JTC 1
ISO/IEC 14496-10	*Information technology – Coding of audio-visual objects – Part 10: Advanced video coding*	ISO/IEC JTC 1
ISO/IEC 14496-12	*Information technology – Coding of audio-visual objects – Part 12: ISO base media file format*	ISO/IEC JTC 1
ITU-T Recommendation H.261	*Video codec for audiovisual services at p x 64 kbit/s*	ITU-T
ITU-T Recommendation H.262	*Information technology – Generic coding of moving pictures and associated audio information: Video*	ITU-T
ITU-T Recommendation H.263	*Video coding for low bit rate communication*	ITU-T
ITU-T Recommendation H.264	*Advanced video coding for generic audiovisual services*	ITU-T
ITU-T Recommendation H.265	*High efficiency video coding*	ITU-T
ITU-T Recommendation H.266	*Versatile video coding*	ITU-T

5.2.3 Communication between comfort devices and AAL CHE gateway

See Table 3 for communication between comfort devices and AAL CHE gateway.

Table 3 – Communication between comfort devices and AAL CHE gateway

Designation	Title	Standards development organization (SDO)
IEC 62394	*Service diagnostic interface for consumer electronics products and networks – Implementation for ECHONET*	ISO/IEC JTC 1
IEC TR 63425	*Connectivity for lighting systems*	ISO/IEC JTC 1
ISO/IEC 14543-3-1	*Information technology – Home electronic systems (HES) architecture – Part 3-1: Communication layers – Application layer for network based control of HES Class 1*	ISO/IEC JTC 1
ISO/IEC 14543-3-2	*Information technology – Home electronic system (HES) architecture – Part 3-2: Communication layers – Transport, network and general parts of data link layer for network based control of HES Class 1*	ISO/IEC JTC 1
ISO/IEC 14543-4-3	*Information technology – Home electronic systems (HES) architecture – Part 4-3: Application layer interface to lower communications layers for network enhanced control devices of HES Class 1*	ISO/IEC JTC 1
ISO/IEC 14543-3-10	*Information technology – Home electronic system (HES) architecture – Part 3-10: Amplitude modulated wireless short-packet (AMWSP) protocol optimized for energy harvesting – Architecture and lower layer protocols*	ISO/IEC JTC 1
ISO/IEC 14543-3-11	*Information technology – Home electronic system (HES) architecture – Part 3-11: Frequency modulated wireless short-packet (FMWSP) protocol optimised for energy harvesting – Architecture and lower layer protocols*	ISO/IEC JTC 1
ISO/IEC 14908-2	*Information technology – Control network protocol – Part 2: Twisted pair communication*	ISO/IEC JTC 1
ISO/IEC 30118-1	*Information technology – Open Connectivity Foundation (OCF) Specification – Part 1: Core specification*	ISO/IEC JTC 1
ISO/IEC 30118-3	*Information technology – Open Connectivity Foundation (OCF) Specification – Part 3: Bridging specification*	ISO/IEC JTC 1
ISO/IEC 30118-4	*Information technology – Open Connectivity Foundation (OCF) Specification – Part 4: Resource type specification*	ISO/IEC JTC 1
ISO/IEC 30118-5	*Information technology – Open Connectivity Foundation (OCF) Specification – Part 5: OCF device specification*	ISO/IEC JTC 1

5.2.4 Communication between AAL robots and AAL CHE gateway

See Table 4 for communication between AAL robots and AAL CHE gateway.

Table 4 – Communication between AAL robots and AAL CHE gateway

Designation	Title	Standards development organization (SDO)
ISO/DIS 22166-201	*Robotics – Modularity for service robots – Part 201: Common information model for modules*	ISO

5.3 Communication between AAL CHE devices and AAL CHE backend system

See Table 5 for communication between AAL CHE devices and AAL CHE backend system.

Table 5 – Communication between AAL CHE devices and AAL CHE backend system

Designation	Title	Standards development organization (SDO)
IETF RFC 768	*UDP Datagram*	IETF
IETF RFC 791	*IPv4*	IETF
IETF RFC 793	*TCP Segment*	IETF
IETF RFC 2460	*IPv6*	IETF

5.4   Communication between AAL CHE gateway and AAL CHE applications/services

See Table 6 for communication between AAL CHE gateway and AAL CHE applications/services.

Table 6 – Communication between AAL CHE gateway and AAL CHE applications/services

Designation	Title	Standards development organization (SDO)
ISO/IEC 13818-2	*Information technology – Generic coding of moving pictures and associated audio information – Part 2: Video*	ISO/IEC JTC 1
ISO/IEC 14496-1	*Information technology – Coding of audio-visual objects – Part 1: Systems*	ISO/IEC JTC 1
ISO/IEC 14496-2	*Information technology – Coding of audio-visual objects – Part 2: Visual*	ISO/IEC JTC 1
ISO/IEC 14496-3	*Information technology – Coding of audio-visual objects – Part 3: Audio*	ISO/IEC JTC 1
ISO/IEC 14496-10	*Information technology – Coding of audio-visual objects – Part 10: Advanced video coding*	ISO/IEC JTC 1
ISO/IEC 14496-12	*Information technology – Coding of audio-visual objects – Part 12: ISO base media file format*	ISO/IEC JTC 1
ISO/TR 16056-2	*Health informatics – Interoperability of telehealth systems and networks – Part 2: Real-time systems*	ISO/IEC JTC 1
ISO/HL7 27931	*Data Exchange Standards – Health Level Seven Version 2.5 – An application protocol for electronic data exchange in healthcare environments*	ISO
ISO/HL7 27932	*Data Exchange Standards – HL7 Clinical Document Architecture, Release 2*	ISO
ITU-T Recommendation H.261	*Video codec for audiovisual services at p x 64 kbit/s*	ITU-T
ITU-T Recommendation H.262	*Information technology – Generic coding of moving pictures and associated audio information: Video*	ITU-T
ITU-T Recommendation H.263	*Video coding for low bit rate communication*	ITU-T
ITU-T Recommendation H.264	*Advanced video coding for generic audiovisual services*	ITU-T
ITU-T Recommendation H.265	*High efficiency video coding*	ITU-T
ITU-T Recommendation H.266	*Versatile video coding*	ITU-T
HL7 FHIR	*FHIR (Fast Healthcare Interoperability Resources)*	HL7

## 5.5	Communication between AAL CHE applications/services and AAL CHE information system

See Table 7 for communication between AAL CHE applications/services AAL CHE information system.

Table 7 – Communication between AAL CHE applications/services and AAL CHE information system

Designation	Title	Standards development organization (SDO)
IEC TR 60601-4-4	*Medical electrical equipment – Part 4-4: Guidance and interpretation – Guidance for writers of particular standards when creating alarm system-related requirements*	IEC
ISO/IEC 21778	*Information technology – The JSON data interchange syntax*	ISO/IEC JTC 1
W3C *Extensible Markup Language (XML) 1.1*	*Extensible Markup Language (XML) 1.1*	W3C