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Multimedia gateway in home networks – Guidelines

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IEC 62514 has been prepared by technical area 18: Audio, video and multimedia applications for end-user network, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) addition of new multimedia processing functions and requirements the HMG shall support, including adaptive multimedia processing, audio/video remote processing, and play function enhancement, in Clause 6;
- b) addition of home automation functions and requirements of audio/video analysis, recognition and alarm services based on AI technologies in Clause 7;
- c) addition of upgrade function and requirements of HMG in Clause 12.

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

Draft	Report on voting
100/4160/FDIS	100/4175/RVD

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 ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

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## INTRODUCTION

In ~~a digital~~ the smart-home system, in order to meet the various requirements of ~~digital living~~ home intelligence, all kinds of communication devices (computers, consumer-electrical products, etc.) and multimedia devices (TVs, surveillance cameras, etc.) are integrated into a home network. Such a network (comprising home information, entertainment, control services, etc.) thus forms a system of information exchange with outside networks.

In a home network system ~~is a Local Area Network (LAN) connecting such~~, terminal devices such as information devices, communication devices, entertainment devices, household appliances, meters of gas, water and electricity, health-care equipment, and lighting and security systems, ~~etc.~~ are interconnected through the Internet of Things (IoT) technology to implement the network management and services and share the resources and services in the network. Based on the interconnection of terminal devices, home network systems can also provide comprehensive multimedia processing services through the use of multi-screen interactive services, remote access, image recognition, and other audio and video processing technologies.

The multimedia services and the management for devices mentioned above can be performed through a home multimedia gateway.

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# MULTIMEDIA GATEWAY IN HOME NETWORKS – GUIDELINES

## 1 Scope

This document describes the general guidelines for typical applications of the home multimedia gateway in home networks supporting IP networking.

This document specifies recommended functions and services to be supported by the home multimedia gateway and, where appropriate, refers to existing standards supported in the market. For general requirements, it is expected that widely adopted standards and technologies will be considered by implementers.

This document gives supplementary applications to the IEC 62481 series, which specifies a central management model in home networks supporting various interfaces on the LAN side and on the WAN side (optional).

This document is applicable to home multimedia gateways in the home network or networks of similar environments.

## 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.

IEC 62481 (all parts), *Digital living network alliance (DLNA) home networked device interoperability guidelines*

IEC 62481-1:2007/2017, *Digital living network alliance (DLNA) home networked device interoperability guidelines – Part 1: Architecture and protocols*

IEC 62481-2, *Digital living network alliance (DLNA) home networked device interoperability guidelines – Part 2: Media formats*

~~ISO/IEC 14762, Information technology – Functional safety requirements for home and building electronic systems (HBES)~~

ISO/IEC 29341 (all parts), *Information technology – UPnP Device Architecture*

ISO/IEC 29341-1, *Information technology – UPnP Device Architecture – Part 1: UPnP Device Architecture Version 1.0*

~~ISO/IEC 29341-3 (all Parts 3), Information technology – UPnP Device Architecture – Part 3: Audio-Visual Device Control Protocol~~

~~ISO/IEC 15045-1, Information technology – Home electronic system (HES) gateway – Part 1: A residential gateway model for HES~~

~~ITU-T G.9960 /9961/G.hn Next generation home networking transceivers~~

~~UPnP Forum: Quality of Service:3 (all parts), <http://www.upnp.org/specs/qos/qos3.asp>~~

RFC 2663, *IP Network Address Translator (NAT) Terminology and Considerations*

RFC 3022, *Traditional IP Network Address Translator (Traditional NAT)*

~~IEEE 802.16, IEEE standard for Local and metropolitan Area Networks Media Access Control (MAC) Bridges~~

IEEE 802.1Q™, *IEEE standard for Local and metropolitan Area Networks – Bridges and Bridge Networks*

### 3 Terms, definitions and abbreviated terms

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 Terms and definitions

##### 3.1.1

##### **home multimedia network**

high speed network system to transport multimedia information within the home network

##### 3.1.2

##### **home multimedia gateway**

##### **HMG**

logical device in the home network, which provides such functions as multimedia processing and home automations, interconnection, QoS and security, etc; it can also

Note 1 to entry: It can connect LAN with outside networks (for example internet), implementing protocol translation and offer various network services.

##### 3.1.3

##### ~~home control network~~

~~network that transports control information in the home network~~

##### 3.1.4

##### ~~home control gateway~~

~~provides protocol translation, device management, network management and control services in a home control network which can be combined with HMG in the form of a physical device~~

##### 3.1.3

##### **control point**

logical device that retrieves device and Service descriptions, sends actions to Services, polls for Service state variables and receives events from Services

Note 1 to entry: 'Service' is a term that is also defined in the ISO/IEC 29341 series.

##### 3.1.4

##### **terminal device**

device in the home network that can be controlled and managed by HMGs and control points

**3.1.5  
media receiver**

**MR**  
device that receives media contents

Note 1 to entry: It normally refers to the media content player.

**3.1.6  
home media receiver**

**HMRec**  
device that receives media contents in the home network

Note 1 to entry: HMRec should fully support the function of DMR and DMP which are DLNA device classes defined by IEC 62481-1.

**3.1.7  
media source**

**MS**  
device that owns media resources and sends media contents

**3.1.8  
home media source**

**HMSou**  
device that provides media contents in the home network; it can be a media server

Note 1 to entry: HMSou should fully support the function of DMS and +PU+, which are defined by IEC 62481-1 and IEC 62481-2.

**3.1.9  
WAN media source**

**WMS**  
device that provides media contents in the Wide Area Network (WAN)

**3.1.10  
WAN media receiver**

**WMR**  
device that receives media contents in the Wide Area Network (WAN)

**3.2 Abbreviated terms**

+DN+	download controller
+PR+	printing controller
+PU+	push uploader
+UP+	upload controller
AAC	Advanced Audio Coding
ADSL	Asymmetric Digital Subscriber Line
ANSI	American National Standards Institute
ARP	Address Resolution Protocol
ATA	analogue telephone adapter
ATRAC	adaptive transform acoustic coding
AV	audio and video
AVC	Advanced Video <del>Codec</del> Coding
CDS	content distribution service
CPU	central processing unit
DHCP	Dynamic Host Configuration Protocol

DLNA	Digital Living Network Alliance
DMC	digital media controller
DMR	digital media renderer
DMP	digital media player
DMP <sub>r</sub>	digital media printer
DNS	domain name system
DRM	digital rights management
DSCP	differentiated service code point
DSL	Digital Subscriber Line
DTV	digital television
EPG	electronic program guide
ETH	Ethernet
FTP	File Transfer Protocol
GENA	general event notification architecture
HMRec	home media receiver
HMG	home multimedia gateway
HMSou	home media source
HTTP	Hyper Text Transfer Protocol
ICMP	Internet Control Message Protocol
ID	identification
IGD	internet gateway device
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IPTV	Internet Protocol television
ITU	International Telecommunication Union
JPEG	Joint Photographic Experts Group
LAN	local area network
LPCM	Linear Pulse Code Modulation
MAC	media access control
MIU	media interoperability unit
MPEG	Moving Picture Experts Group
MR	media receiver
MRCP	mediarenderer:1 control point
MS	media source
MSCP	mediaserver:1 control point
NAT	Network Address Translation
NAPT	port-level NATNA
NID	network infrastructure device
PAN	personal area network
PC	personal computer
QoS	quality of service
RID	request identity
RIP	Routing Information Protocol

SOAP	Simple Object Access Protocol
STB	set top box
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UPnP	Universal Plug and Play
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
VDSL	Very-high-bit-rate Digital Subscriber Line
VOD	video on demand
VOIP	voice over Internet Protocol
WAN	wide area network
WMS	WAN media source
WMM	wireless multimedia
WMR	WAN media receiver

## 4 HMG architecture

### 4.1 Architecture of a home multimedia network

A home multimedia network adopts a multiple-level network topology consisting of two network segments, i.e. a home multimedia network and a home control sub-network. The home control sub-network is optional, where appropriate.

The home multimedia network supports the central management mode, which can be functioned by HMG, as well as supporting peer-to-peer mechanisms as specified in the IEC 62481 series. The home multimedia network can access the outside network through an HMG, while the home control sub-network can be connected to the home multimedia network through a home control sub-network gateway. The devices in a home control sub-network can intercommunicate and further access outside networks by sub-gateways and HMGs.

The typical architecture of a home multimedia system is shown in Figure 1.