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**Digital living network alliance (DLNA) home networked device interoperability
guidelines**
Part 1-2: Architecture and protocols – Extended Digital Media Renderer

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DIGITAL LIVING NETWORK ALLIANCE (DLNA) HOME NETWORKED DEVICE INTEROPERABILITY GUIDELINES

Part 1-2: Architecture and protocols – Extended Digital Media Renderer

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International Standard IEC 62481-1-2 has been prepared under technical area 8: Multimedia home systems and applications for end-user network IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

CDV	Report on voting
100/2736/CDV	100/2885/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 of IEC 62481 series, published under the general title *Digital Living Network Alliance (DLNA) home networked device interoperability guidelines*, 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- withdrawn,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
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INTRODUCTION

Consumers are acquiring, viewing, and managing an increasing amount of digital media (photos, music, and video) on devices in the consumer electronics (CE), mobile, and personal computer (PC) domains. As such, they want to conveniently enjoy the content, regardless of the source, across different devices and locations in the home. The digital home vision integrates the Internet, mobile, and broadcast networks through a seamless, interoperable network, which will provide a unique opportunity for manufacturers and consumers alike. In order to deliver on this vision, a common set of industry design guidelines is needed that allows vendors to participate in a growing marketplace, leading to more innovation, simplicity, and value for consumers. This document serves that purpose and provides vendors with the information needed to build interoperable networked platforms and devices for the digital home.

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DIGITAL LIVING NETWORK ALLIANCE (DLNA) HOME NETWORKED DEVICE INTEROPERABILITY GUIDELINES

Part 1-2: Architecture and protocols – Extended Digital Media Renderer

1 Scope

The DLNA Guidelines Parts 1 to 3 introduce a number of device classes to identify specific roles that connected endpoints implement in the network. Devices can act as content sources (e.g., Digital Media Servers, Push Controllers), and as content sinks (Digital Media Renderers or Digital Media Players).

Having two types of content sinks has been a useful strategy to accelerate the initial deployment phase. However, many of the modern receiver devices now include both types. Consequently, there is a need to define a receiver device that combines both types. This document addresses this issue and, specifically, it describes a device class for an Extended Digital Media Renderer (XDMR) and implementation guidelines for combining a Digital Media Renderer and a UPnP Media Server Control Point.

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 62481-1-1:2017, *Digital living network alliance (DLNA) Guidelines – Part 1-1: Architecture and protocols*

IEC 62481-2:2017, *Digital living network alliance (DLNA) Guidelines – Part 2: Media format profiles*

IEC 62481-3:2017, *Digital living network alliance (DLNA) Guidelines – Part 3: Link Protection*

IEC 62481-4:2017, *Digital living network alliance (DLNA) Guidelines – Part 4: DRM Interoperability Solutions*

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

ISO/IEC 29341-3-10, *Information Technology – UPnP Device Architecture – Part 3-10: Audio Video Device Control Protocol – Audio Video Transport Service*

ISO/IEC 29341-3-11, *Information Technology – UPnP Device Architecture – Part 3-11: Audio Video Device Control Protocol – Connection Manager Service*

ISO/IEC 29341-3-13, *Information Technology – UPnP Device Architecture – Part 3-13: Audio Video Device Control Protocol – Rendering Control Service*

3 Terms, definitions and conventions

For the purposes of this document, the terms and definitions given in IEC 62481-1-1:2017 and the following 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 General terms

3.1.1 **comply** **conform**

be in accordance with referenced requirements

Note 1 to entry: Where the reference includes both mandatory and optional requirements, only the mandatory elements are considered necessary for compliance.

Note 2 to entry: "Comply with" can be used interchangeably with "conform to" (includes the variations of complies, complying, compliant, compliance; conforms, conforming, conform, conformant).

Note 3 to entry: Optional requirements continue to be optional. Any variation from these expectations shall be specifically noted.

3.1.2 **Extended Digital Media Renderer** **XDMR**

Digital Media Renderer (DMR) that also implements a Media Server Control Point (MSCP); this device class defines the combined implementation of a Digital Media Renderer and a Digital Media Player

Note 1 to entry: The guidelines established in this document define the requirements for implementing an Extended Digital Media Renderer (XDMR) device class.

3.1.3 **AVT** **AVTransport Service**

UPnP service that provides network-based control for common transport operations such as play, stop, pause, next, previous, and seek

Note 1 to entry: The AVTransport Service specification is a standard UPnP DCP.

3.1.4 **CDS** **ContentDirectory Service**

UPnP service that provides network-based discovery of content

Note 1 to entry: The ContentDirectory Service specification is a standard UPnP Device Control Protocol.

3.1.5 **CMS** **ConnectionManager Service**

UPnP service that provides information about the supported transport protocols and media formats of a UPnP device

Note 1 to entry: The ConnectionManager Service specification is a standard UPnP Device Control Protocol.

3.1.6**DMP****Digital Media Player**

DLNA Device Class having home network environmental characteristics with the role of finding content exposed by a DMS and rendering the content locally

3.1.7**DMR****Digital Media Renderer**

DLNA Device Class having home network environmental characteristics, with the role of rendering content it receives after being setup by another network entity

3.1.8**DMS****Digital Media Server**

DLNA Device Class having home network environmental characteristics, with the role of exposing and distributing content throughout the home

3.1.9**DNS****Domain Name System**

protocol that enables hierarchical names for Internet domains and addresses

Note 1 to entry: The protocol includes the means to translate between numerical IP addresses and text host names.

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3.1.10**MRCP****MediaRenderer Control Point**

UPnP control point that issues actions to a DMR or an XDMP

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3.1.11**MSCP****MediaServer Control Point**

UPnP AV control point that issues actions to a DMS

3.1.12**RCS****RenderingControl Service**

UPnP service that provides network-based control for the adjustment of rendering attributes such as volume, brightness, contrast, and mute

Note 1 to entry: The RenderingControl Service specification is a standard UPnP Device Control Protocol.

3.1.13**XDMP****Extended DMR**

device class defined to combine the functionality of a Digital Media Renderer (DMR) and a Media Server Control Point (MSCP)

Note 1 to entry: This device class is equivalent to combining previous device classes known as a DMR and a DMP.

3.2 Conventions

In this document, a number of terms, conditions, mechanisms, sequences, parameters, events, states, or similar terms are printed with the first letter of each word in uppercase and the rest in lowercase (e.g., Move). Any lowercase uses of these words have the normal technical English meaning.

4 Networking architecture, device models and guideline conventions

4.1 DLNA home networking architecture

See Clause 4 in IEC 62481-1-1:2017 for a full description of the DLNA home networking architecture, which is augmented in this document as follows.

This document describes a device model referred to as an Extended Digital Media Renderer (XDMR) matching the following DLNA classification.

- An XDMR is a Device Class that belongs to the Home Network Device (HND) category.
- The XDMR Device Class unifies previous Device Classes known as Digital Media Renderer (DMR) and Digital Media Player (DMP). Consequently, an XDMR behaves as a Content Receiver for the following system usages: 2-box Pull, 2-box Push, and 3-box. These system usages are defined in 5.7 of IEC 62481-1-1:2017. See Annex A regarding the evolution of DMR and DMP device classes into XDMR.

The XDMR Device Class includes the following functionality.

- A UPnP AV MediaRenderer combined with a UPnP AV MediaServer control point. Sub-clause 5.2 specifies the corresponding implementation guidelines.
- A DNS Client that resolves domain names into IPv4 addresses as defined in IEC 62481-1-1:2017.
- Support for HTTP protocol messages to request and receive media resources from servers internal or external to the home network as defined in IEC 62481-1-1:2017.
- Support for the AVT:SetNextAVTransportURL action as defined in IEC 62481-1-1:2017.

Because an XDMR implements a UPnP AV MediaRenderer, any UPnP Control Point can send AVT, RCS, and CMS actions to the XDMR and transfer URIs (and HTTP URLs) for playback. Because an XDMR implements a UPnP AV MediaServer Control Point, an XDMR can send CDS actions to UPnP AV MediaServers. Using terminology defined in IEC 62481-1-1:2017, an XDMR integrates previous functionality from the DMR device class and from the DMP device class. Figure 1 shows the main components that characterize the XDMR device class.

Because an XDMR implements a DNS Client, the XDMR can process HTTP URLs that include textual domain names. The DNS Client is used to resolve domain names into IPv4 addresses. As defined in IEC 62481-1-1:2017, an XDMR is capable of using generic HTTP URLs that identify media resources located inside or outside the home network.