

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 62481-1:2014 sisaldab Euroopa standardi EN 62481-1:2014 inglisekeelset teksti.	This Estonian standard EVS-EN 62481-1:2014 consists of the English text of the European standard EN 62481-1:2014.
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**Digital living network alliance (DLNA) home networked device
interoperability guidelines -
Part 1: Architecture and protocols
(IEC 62481-1:2013)**

Lignes directrices pour l'interopérabilité
des dispositifs domestiques DLNA (Digital
Living Network Alliance) -
Partie 1: Architecture et protocoles (TA9)
(CEI 62481-1:2013)

Digital living network alliance (DLNA)
Interoperabilitäts-Richtlinien für Geräte im
Heimnetzwerk -
Teil 1: Architektur und Protokolle
(IEC 62481-1:2013)

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 100/1992A/CDV, future edition 2 of IEC 62481-1, prepared by technical area 9, "Audio, video and multimedia applications for end-user network", of IEC/TC 100, "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62481-1:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-10-07
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Endorsement notice

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60169-24	-	Radio-frequency connectors - Part 24: Radio-frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable distribution systems (Type F)	EN 60169-24	-
IEC 62481-2	2013	Digital living network alliance (DLNA) home networked device interoperability guidelines - Part 2: DLNA media formats	EN 62481-2	2014
IEC 62481-3	2013	Digital living network alliance (DLNA) home networked device interoperability guidelines - Part 3: Link protection	EN 62481-3	2012
ISO 3166	-	Codes for the representation of names of countries and their subdivisions	-	-
ISO/IEC 13818-1	2000	Information technology - Generic coding of moving pictures and associated audio information - Part 1: Systems	-	-
ISO/IEC 13818-9	1996	Information technology - Generic coding of moving pictures and associated audio information - Part 9: Extension for real time interface for system decoders	-	-
ISO/IEC 14977	1996	Information technology - Syntactic metalanguage - Extended BNF	-	-
ISO/IEC 29341-1	2011	Information technology - UPnP device architecture - Part 1: UPnP Device Architecture	-	-
ISO/IEC 29341-3-2	-	Information technology - UPnP Device Architecture - Part 3-2: Audio Video Device Control Protocol - Media Renderer Device	-	-
ISO/IEC 29341-3-3	-	Information technology - UPnP Device Architecture - Part 3-3: Audio Video Device Control Protocol - Media Server Device	-	-
ISO/IEC 29341-3-10	2008	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 29341-3-12	2008	Information technology - UPnP Device Architecture - Part 3-12: Audio Video Device Control Protocol - Content Directory Service	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO/IEC 29341-3-13	-	Information technology - UPnP Device Architecture - Part 3-13: Audio Video Device Control Protocol - Rendering Control Service	-	-
ISO/IEC 29341-4-2	-	Information technology - UPnP device architecture - Part 4-2: Audio Video Device Control Protocol - Level 2 - Media Renderer Device	-	-
ISO/IEC 29341-4-3	-	Information technology - UPnP Device Architecture - Part 4-3: Audio Video Device Control Protocol - Level 2 - Media Server Device	-	-
ISO/IEC 29341-4-4	-	Information technology - UPnP device architecture - Part 4-4: Audio Video Device Control Protocol - Level 2 - Audio Video Data Structures	-	-
ISO/IEC 29341-4-10	-	Information technology - UPnP device architecture - Part 4-10: Audio Video Device Control Protocol - Level 2 - Audio Video Transport Service	-	-
ISO/IEC 29341-4-11	-	Information technology - UPnP device architecture - Part 4-11: Audio Video Device Control Protocol - Level 2 - Connection Manager Service	-	-
ISO/IEC 29341-4-12	2008	Information technology - UPnP Device Architecture - Part 4-12: Audio Video Device Control Protocol - Level 2 - Content Directory Service	-	-
ISO/IEC 29341-4-13	-1	Information technology - UPnP device architecture - Part 4-13: Audio Video Device Control Protocol - Level 2 - Rendering Control Service	-	-
ISO/IEC 29341-4-14	-	Information technology - UPnP Device Architecture - Part 4-14: Audio Video Device Control Protocol - Level 2 - Scheduled Recording Service	-	-
ISO/IEC 29341-9-1	-	Information technology - UPnP Device Architecture - Part 9-1: Imaging Device Control Protocol - Printer Device	-	-
ISO/IEC 29341-9-12	-	Information technology - UPnP Device Architecture - Part 9-12: Imaging Device Control Protocol - Print Basic Service	-	-
ISO/IEC 29341-14-3	-	Information technology - UPnP device architecture - Part 14-3: Audio Video Device Control Protocol - Level 3 - Media Server Device	-	-
ISO/IEC 29341-14-12	-	Information technology - UPnP device architecture - Part 14-12: Audio, Video Device Control Protocol - Level 3 - Audio Video Content Directory Service	-	-
IETF RFC 1122	1989	Requirements for Internet Hosts - Communication Layers	-	-
ETSI EN 300 468	-	Digital Video Broadcasting (DVB): Specification for Service Information (SI) in DVB systems	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IETF RFC 768	1980	User Datagram Protocol	-	-
IEEE 802.3	2002	IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) - Access Method and Physical Layer Specifications	-	-
IETF RFC 791	1981	Internet Protocol - DARPA Internet Program Protocol Specification	-	-
IETF RFC 793	1981	Transmission Control Protocol - DARPA Internet Program Protocol Specification	-	-
IETF RFC 826	1982	Ethernet Address Resolution Protocol	-	-
IETF RFC 1305	1992	Network Time Protocol, Version 3 - Specification and Implementation	-	-
IETF RFC 792	1981	Internet Control Message Protocol	-	-
IETF RFC 2474	1998	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	-	-
IEEE 802.1D	2004	IEEE Standard for Local and Metropolitan Area Networks - Media Access Control (MAC) Bridges	-	-
IEEE 802.1Q	2003	IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks	-	-
IETF RFC 2131	1997	Dynamic Host Configuration Protocol	-	-
IETF RFC 3551	-	RTP Profile for Audio and Video Conferences with Minimal Control	-	-
IETF RFC 3555	-	MIME Type Registration of RTP Payload Formats, S. Casner, Packet Design	-	-
IETF RFC 2326	1998	Real time Streaming protocol (RTSP)	-	-
IETF RFC 3550	-	A Transport Protocol for Real-Time Applications	-	-
IETF RFC 3984	-	RTP Payload Format for H.264 Video	-	-
IETF RFC 2250	-	RTP Payload Format for MPEG1/MPEG2 Video	-	-
IETF RFC 3640	-	RTP Payload Format for Transport of MPEG-4 Elementary Streams	-	-
IETF RFC 3927	-	Dynamic Configuration of IPv4 Link-Local Addresses	-	-
IEEE 802.11	2011	IEEE Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications	-	-
IETF RFC 1191	1990	Path MTU Discovery	-	-
IETF RFC 1738	1994	Uniform Resource Locators (URL)	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ITU-T G.9954	2007	Recommendation, Home networking transceivers - Enhanced physical, media access, and link layer specifications. ITU-T SG15/Q4 T-REC-G.9954-200701-I	-	-
ETSI TS 102 822-3	-	Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime") - Part 3: Metadata	-	-
ETSI TS 102 822-4	-	Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime") - Part 4: Content referencing	-	-
IETF RFC 1812	1995	Requirements for IP version 4 Routers	-	-
IETF RFC 2119	1997	Key words for use in RFCs to Indicate Requirement Levels	-	-
ANSI/ICEA S-90-661-2002	2002	Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use In General Purpose and LAN Communication Wiring Systems, Insulated Cable Engineers Association	-	-
IETF RFC 2234	1997	Augmented BNF for Syntax Specifications: ABNF	-	-
IETF RFC 2279	1998	UTF-8, a transformation format of ISO 10646	-	-
IETF RFC 2327	1998	SDP: Session Description Protocol	-	-
IETF RFC 2396	1998	Uniform Resource Identifiers (URI): Generic Syntax	-	-
IETF RFC 2429	2004	RTP Payload Format for the 1988 Version of ITU-T Rec. H.263 Video (H.263+)	-	-
IETF RFC 2766	2000	Network Address Translation - Protocol Translation (NAT-PT)	-	-
IETF RFC 2822	2001	Internet Message Format, P. Resnick, QUALCOMM Incorporated	-	-
IETF RFC 2929	2000	Domain Name System (DNS) IANA Considerations	-	-
IETF RFC 3066	2001	Tags for the Identification of Languages	-	-
IETF RFC 3261	2002	SIP: Session Initiation Protocol	-	-
IETF RFC 3267	2002	Real-Time Transport Protocol (RTP) Payload Format and File Storage Format for the Adaptive Multi-Rate (AMR) and Adaptive Multi-Rate Wideband (AMR-WB) Audio Codecs	-	-
IETF RFC 3391	2002	The MIME Application/Vnd.pwg-multiplexed Content-Type	-	-
IETF RFC 3556	2003	Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) Bandwidth	-	-
IETF RFC 4184	2005	RTP Payload Format for AC-3 Audio	-	-
IETF RFC 4352	2006	RTP Payload Format for the Extended Adaptive Multi-Rate Wideband (AMR-WB+) Audio Codec	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IETF RFC 4585	2006	Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-based Feedback (RTP/AVPF)	-	-
IETF RFC 4588	2006	RTP Retransmission Payload Format	-	-
IETF RFC 4646	2006	Tags for the Identification of Languages	-	-
ANSI/CEA-766-C	2008	U.S. and Canadian Rating Region Tables (RRT) and Content Advisory Descriptors for Transport of Content Advisory Information Using ATSC Program and System Information Protocol (PSIP)	-	-
ANSI/CEA-2033 A	2008	Specification for Electronic Program Guide Data Interchange	-	-
IETF RFC 2616	1999	Hypertext Transfer Protocol HTTP/1.1.	-	-
IETF RFC 1945	1996	Hypertext Transfer Protocol – HTTP/1.0, T. Berners-Lee, MIT/LCS, R. Fielding, UC Irvine, H. Frystyk	-	-
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INTRODUCTION

Overview

Consumers are acquiring, viewing, and managing an increasing amount of digital media (photos, music, and video) on devices in the Consumer Electronics (CE), Mobile Device, and Personal Computer (PC) domains. Consumers want to conveniently enjoy that content, regardless of the source, across different devices and locations in their homes. 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, it was recognized that a common set of industry design guidelines would be required to allow companies to participate in a growing marketplace, leading to more innovation, simplicity, and value for consumers.

The Digital Living Network Alliance answered this challenge by taking the initiative to develop a workable framework for interoperable product design. The DLNA Home Networked Device Interoperability Guidelines have been created in a unique cross-industry effort that combined the efforts of over 100 Consumer Electronics, PC-industry and Mobile Device companies from around the world that worked together with the aim of achieving the world's first substantial platform for true interoperability between personal computer and consumer electronic devices. The Interoperability Guidelines provide product developers with a long-term architectural view, plus specific guidance for IP-networked platforms, devices and applications in the home. The Interoperability Guidelines will be introduced in phases over several years to accompany the market adoption of usages and the availability of needed technology and standards.

The Interoperability Guidelines that are the object of this standard are based on an architecture (see Clause 4) that defines interoperable components for devices and software infrastructure. It covers physical media, network transports, device discovery and control, media management and control, media formats, media transport protocols, and remote user interfaces. Table 1 shows a summary of the key functional components and technology ingredients that are covered by these Interoperability Guidelines.

Table 1 – Key technology ingredients

Functional components	Technology ingredients
Connectivity	Ethernet*, IEEE 802.11, MoCA, HPNA and Bluetooth
Networking	IPv4 Suite
Device Discovery and Control	UPnP* Device Architecture v1.0
Media Management and Control	UPnP AV and UPnP Printer:1
Media Formats	Required and Optional Format Profiles
Media Transport	HTTP (Mandatory) and RTP (Optional)
Remote User Interfaces	CEA-2014-A

Version Number

For version control, the protocols defined in this standard constitute version 1.5 of the specifications. Device implementations advertise adherence to the protocols selecting value 1.5 in the fields and flags designed to expose the DLNA protocol version.

Audience

The Interoperability Guidelines are intended for the following audiences:

- Marketing professionals who specify requirements for home networked media products.
- Developers who design and build home networked media products.
- Quality assurance personnel who test and validate home networked media products.

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

Part 1: Architecture and protocols

1 Scope

This part of IEC 62481 specifies the core architecture and protocols of DLNA implementations.

The interoperability guidelines consist of five parts covering Architecture and Protocols, Media Formats, Link Protection, DRM Interoperability Systems and Device Profiles. This part of IEC 62481 provides vendors with the information needed to build interoperable networked platforms and devices for the digital home. The necessary standards and technologies are now available to enable products to be built for networked entertainment centric usages. However, standards and technologies need to be clarified and options limited to ensure interoperability. The five parts of the DLNA Home Networked Device Interoperability Guidelines fulfill that role.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60169-24, *Radio-frequency connectors – Part 24: Radio-frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable distribution systems (Type F)*

IEC 62481-2:2013, *Digital Living Network Alliance (DLNA) Guidelines – Part 2: Media format profiles*

IEC 62481-3:2013, *Digital Living Network Alliance (DLNA) Guidelines – Part 3: Link protection*

ISO/IEC 13818-1:2000, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

ISO/IEC 13818-9:1996, *Information technology – Generic coding of moving pictures and associated audio information – Part 9: Extension for real time interface for systems decoders, International Standards Organization, 1996*

ISO/IEC 14977:1996, *Information technology – Syntactic metalanguage – Extended BNF*

ISO/IEC 29341-1:2011, *Information technology – UPnP Device Architecture – Part 1-1: UPnP Device Architecture Version 1.0*

ISO/IEC 29341-3-2, *Information technology – UPnP Device Architecture – Part 3-2: Audio Video Device Control Protocol – Media Renderer Device¹*

ISO/IEC 29341-3-3, *Information technology – UPnP Device Architecture – Part 3-3: Audio Video Device Control Protocol – Media Server Device¹*

¹ In this International Standard also referred to as AVv1.

ISO/IEC 29341-3-10:2008, *Information technology – UPnP Device Architecture – Part 3-10: Audio Video Device Control Protocol – Audio Video Transport Service*²

ISO/IEC 29341-3-11, *Information technology – UPnP Device Architecture – Part 3-11: Audio Video Device Control Protocol – Connection Manager Service*²

ISO/IEC 29341-3-12:2008, *Information technology – UPnP Device Architecture – Part 3-12: Audio Video Device Control Protocol – Content Directory Service*²

ISO/IEC 29341-3-13, *Information technology – UPnP Device Architecture – Part 3-13: Audio Video Device Control Protocol – Rendering Control Service*²

ISO/IEC 29341-4-2, *Information technology – UPnP Device Architecture – Part 4-2: Audio Video Device Control Protocol – Level 2 – Media Renderer Device*³

ISO/IEC 29341-4-3, *Information technology – UPnP Device Architecture – Part 4-3: Audio Video Device Control Protocol – Level 2 – Media Server Device*⁴

ISO/IEC 29341-4-4, *Information technology – UPnP Device Architecture – Part 4-4: Audio Video Device Control Protocol – Level 2 – Audio Video Data Structures*³

ISO/IEC 29341-4-10, *Information technology – UPnP Device Architecture – Part 4-10: Audio Video Device Control Protocol – Level 2 – Audio Video Transport Service*³

ISO/IEC 29341-4-11, *Information technology – UPnP Device Architecture – Part 4-11: Audio Video Device Control Protocol – Level 2 – Connection Manager Service*³

ISO/IEC 29341-4-12:2008, *Information technology – UPnP Device Architecture – Part 4-12: Audio Video Device Control Protocol – Level 2 – Content Directory Service*⁴

ISO/IEC 29341-4-13, *Information technology – UPnP Device Architecture – Part 4-13: Audio Video Device Control Protocol – Level 2 – Rendering Control Service*³

ISO/IEC 29341-4-14, *Information technology – UPnP Device Architecture – Part 4-14: Audio Video Device Control Protocol – Level 2 – Scheduled Recording Service*³

ISO/IEC 39342-9-1, *Information technology – UPnP Device Architecture – Part 9-1: Imaging Device Control Protocol – Printer Device*

ISO/IEC 29341-9-12, *Information technology – UPnP Device Architecture – Part 9-12: Imaging Device Control Protocol – Print Basic Service*

ISO/IEC 29341-14-3, *Information technology – UPnP Device Architecture – Part 14-3: Audio Video Device Control Protocol – Level 3 – Media Server Device*⁵

ISO/IEC 29341-14-12, *Information technology – UPnP Device Architecture – Part 14-12: Audio Video Device Control Protocol – Level 3 – Content Directory Service*⁵

ISO 3166, *Codes for the representation of names of countries and their subdivisions*

² In this International Standard also referred to as AVv1.

³ In this International Standard also referred to as AVv2, AVv3.

⁴ In this International Standard also referred to as AVv2.

⁵ In this International Standard also referred to as AVv3.