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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 62481-1 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this standard is based on the following documents:

CDV	Report on voting
100/1127/CDV	100/1213/RVC

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

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

A list of all parts of the 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 publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

0 Introduction

0.1 General

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 (DLNA) answered this challenge by taking the initiative to develop a workable framework for interoperable product design. The DLNA home networked device interoperability guidelines (hereinafter referred to as the interoperability guidelines) has been created in a unique cross-industry effort that combined the efforts of over 100 CE, PC-industry and mobile device companies from around the world who 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 of this part of IEC 62481 include several informative annexes: Annex A, Annex B, Annex C, Annex D, Annex E, Annex F and Annex G.

The media formats contain

a) ASF recommended procedures (informative);

b) IFO file format (normative).

0.2 Purpose

The interoperability guidelines consists of two volumes covering architecture and protocols and media formats. It provides vendors with the information needed to build interoperable networked platforms and devices for the digital home. The necessary standards and technologies are available now 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 interoperability guidelines fulfil that role.

The interoperability guidelines 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, and media transport protocols.

Table 1 – Interoperable components

Key technology ingredients	
Functional components	Technology ingredients
Connectivity	Ethernet, IEEE 802.11 and Bluetooth
Networking	IPv4 suite
Device discovery and control	UPnP* Device Architecture v1.0
Media management and control	UPnP AV v1 and UPnP Printer:1
Media formats	Required and optional format profiles
Media transport	HTTP (mandatory) and RTP (optional)

0.3 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.

0.4 Organization

This part of the interoperability guidelines is organized as follows. All annexes are informative.

Clause 2 Normative references: Information on ISO, IEC and recognized normative references contained in this standard. Other informative documents are listed in the bibliography.

Clause 3 Terms and acronyms: Definitions of terms and acronyms used in this standard.

Clause 4 DLNA home network architecture: An overview of the DLNA home networking architecture.

Clause 5 DLNA device model: An overview of the major device categpries used to group guideline requirements.

Clause 6 Guideline terminology and conventions: Definitions for the compliance and usage classifications used for guideline requirements.

Clause 7 Guideline requirements: Covers guideline requirements for DLNA devices excluding media formats which are covered in another part of IEC 62481.

Annex A (informative) Network infrastructure device (NID) recommendations: Covers a set of recommendations for home network infrastructure devices such as gateways, routers, and hubs to ensure they work well with DLNA devices.

Annex B (informative) Tuner representation: Describes the way DLNA devices should represent tuner-based content.

Annex C (informative) UPnP devices with multiple network interfaces: Describes how a DLNA device can represent itself on multiple network interfaces. The annex also discusses how a content source should expose content URI values for different network interfaces.

Annex D (informative) Printer support: Introduces developers to the technical considerations required to support printers and also discusses some of the usability aspects of printing that are important for a good user experience.

Annex E (informative) Example applications of the uniform client data availability model: Clarifies the general applicability of the uniform client data availability model (UCDAM). It describes the data accessibility assumptions for both content sources and content receivers. The UCDAM model strives for completeness by using examples derived from stored, converted, and live content streams. The model also accounts for caching of data by content receivers.

Annex F (informative) Auto-IP developer guidance: Provides guidance for developers on extending Auto-IP support for IP stacks that have problems with full conformance to Auto-IP.

Annex G (informative) Mobile network connectivity and power saving operation principles: Provides guidance on network connectivity for mobile devices, including Bluetooth security and NC power-saving modes.

Annex H (informative) RTP protocol stack and SDP/RTSP/RTCP parameters: Provides graphic layout of the protocol stack for the RTP transport and SDP/RTSP/RTCP parameters.

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

Part 1: Architecture and protocols

1 Scope

This part of IEC 62481 specifies the information needed to build interoperable networked platforms and devices for the digital home on audio, video and multimedia systems, including interoperable components for devices and software infrastructure, physical media, network transports, device discovery and control, media management and control, media formats, and media transport protocols. This standard also provides product developers with a long-term architectural view, plus specific guidance for IP-networked platforms, devices and applications in the home.

2 Normative references

The following referenced documents are indispensable for the application 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 62481-2, *Digital living network alliance (DLNA) home networked device interoperability guidelines – Part 2: Media formats*

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*

ISO 8601:2004, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*

IEEE 802.1D:2004, *IEEE Standard for Information technology – Telecommunications and information exchange between systems – IEEE standard for local and metropolitan area networks – Common specifications – Media access control (MAC) Bridges*

IEEE 802.1Q:2003, *IEEE Standard for Information Technology – Telecommunications and information exchange between systems – IEEE standard for local and metropolitan area networks – Common specifications – Virtual Bridged Local Area Networks*

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 specification*

IEEE 802, *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*