

INTERNATIONAL STANDARD



**Digital living network alliance (DLNA) home networked device interoperability
guidelines –
Part 3: Link protection**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2017 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - www.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

INTERNATIONAL STANDARD



**Digital living network alliance (DLNA) home networked device interoperability
guidelines –
Part 3: Link protection**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.160; 35.100.05; 35.110

ISBN 978-2-8322-4541-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms, definitions, abbreviated terms and conventions.....	9
3.1 Terms and definitions.....	9
3.3 Conventions.....	14
4 DLNA home network architecture	14
5 DLNA device model.....	15
6 Guideline terminology and conventions.....	15
7 Common Link Protection guidelines.....	15
7.1 General.....	15
7.2 Conditions for measuring time in message exchanges	15
7.3 Networking and connectivity.....	15
7.4 Device discovery and control	15
7.5 Media management.....	15
7.5.1 General	15
7.5.2 Updates to existing general AV Media Management guidelines.....	18
7.5.3 New general AV Media Management guidelines.....	18
7.5.4 MediaRenderer device guidelines	22
7.6 Media Transport.....	22
7.6.1 General	22
7.6.2 Updates to existing general Media Transport guidelines	23
7.6.3 New general Media Transport guidelines	23
7.6.4 HTTP transport.....	24
7.6.5 Updates to existing general HTTP Media Transport guidelines	24
7.6.6 New general HTTP Media Transport guidelines	29
7.6.7 Updates to existing general HTTP Media Transport for Streaming Transfer guidelines.....	33
7.6.8 MT RANGE behaviour for Interactive Transferred Content.....	37
7.6.9 RTP transport.....	37
7.6.10 Updates to existing general RTP Transport guidelines.....	37
7.6.11 New general RTP Transport guidelines: MT: RTP support for link protected content.....	38
7.7 Content conversion device virtualization	38
7.8 Link Protection technology guidelines	38
7.8.1 Link Protection System: DTCP-IP	38
7.8.2 Link Protection System: Windows Media DRM for network Devices	40
7.9 DTCP-IP Link Protection System guidelines	41
8.1 General.....	41
8.2 CP DTCP-IP general guidelines	41
8.3 Networking and connectivity.....	41
8.3.1 General	41
8.3.2 New DLNAQOS guidelines: QoS requirement for DTCP-IP traffic	41
8.3.3 New common device guidelines: NC CP: wireless security	42
8.4 Device discovery and control	42

8.5	Media Management.....	42
8.5.1	General	42
8.5.2	MM CP: DTCP-IP URI.....	42
8.5.3	MM CP: mandatory media operations	43
8.6	Media Transport.....	43
8.6.1	HTTP transport.....	43
8.6.2	RTP transport	47
8.7	Content conversion device virtualization	49
8.8	Volume 2: DTCP-IP profiling guidelines	49
8.8.1	General	49
8.8.2	CP DTCP-IP: profile.....	49
8.8.3	CP DTCP-IP: profile MIME type definition	50
8.8.4	CP DTCP-IP: profile protected and unprotected content portions	51
8.8.5	CP DTCP-IP: profile HTTP encapsulation	52
8.8.6	DTCP-IP profile encapsulation.....	52
9	WMDRM-ND Link Protection System guidelines	55
9.1	Overview.....	55
9.2	General guidelines.....	55
9.2.1	CP WMDRM-ND: guidelines	55
9.2.2	CP WMDRM-ND: support for HTTP.....	55
9.2.3	CP WMDRM-ND: support for RTP.....	56
9.2.4	CP WMDRM-ND: Registration and Revalidation procedures	57
9.2.5	CP WMDRM-ND: discovery of Content Receivers	58
9.3	Networking and connectivity.....	58
9.3.1	General	58
9.3.2	CP WMDRM-ND: QoS guidelines	58
9.4	Device discovery and control	58
9.4.1	General	58
9.4.2	CP WMDRM-ND: additional rules for DMRs	59
9.5	Media management.....	59
9.6	Media Transport.....	59
9.6.1	HTTP transport	59
9.6.2	RTP transport.....	64
9.7	Content conversion device virtualization	67
9.8	Volume 2: WMDRM-ND profiling guidelines	68
9.8.1	General	68
9.8.2	CP WMDRM-ND: identification of content transferred using WMDRM-ND	68
9.8.3	CP WMDRM-ND: Media Format guidelines	68
9.8.4	CP WMDRM-ND: MIME type.....	69
9.8.5	CP WMDRM-ND: Decoder Friendly Alignment Position.....	69
9.8.6	CP WMDRM-ND: Media Format Alignment Element.....	69
	Annex A (informative) An introduction to DLNA seek operations	70
A.1	General.....	70
A.2	UCDAM and seek operations	70
A.3	Seek models	71
A.4	Full Random Access Data Availability	71
A.5	Limited Random Access Data Availability.....	73
A.6	Seek operations on link protected content.....	76

Figure A.1 – UCDAM definitions for seek operations	71
Figure A.2 – Full Random Access Data Availability model	72
Figure A.3 – Limited Random Access Data Availability model Mode 0	74
Figure A.4 – Limited random access data availability model mode 1	75
Figure A.5 – Content flow unprotected content	76
Figure A.6 – Content flow link protected content	77
Table 1 – Summary of Domain Elements for Full Random Access Data Availability model	16
Table 2 – Summary of Domain Elements for Limited Random Access Data Availability model	17
Table 3 – AV Media Management guideline changes	18
Table 4 – Recommended metadata properties	19
Table 5 – Property type and multi value	20
Table 6 – Updates to existing general Media Transport guidelines	23
Table 7 – Updates to existing general HTTP Media Transport guideline	24
Table 8 – Updates to existing general HTTP Media Transport for Streaming Transfer guidelines	33
Table A.1 – DLNA constructs of Full Random Access Data Availability model	73
Table A.2 – DLNA Constructs of Limited Random Access Data Availability model	76

currently in preview, click buy full version

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL LIVING NETWORK ALLIANCE (DLNA) HOME NETWORKED
DEVICE INTEROPERABILITY GUIDELINES –****Part 3: Link protection****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62481-3 has been prepared under technical area 8: Multimedia home systems and applications for end-user network, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

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

- a) editorial updates;
- b) clarification for some of the guidelines that were ambiguous.

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

CDV	Report on voting
100/2732/CDV	100/2882/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
- amended.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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 achieve this interoperability, 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.

Currently in preview, click buy full version

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

Part 3: Link protection

1 Scope

This part of IEC 62481, the DLNA guidelines, specifies the DLNA Link Protection guidelines, which are an extension of the DLNA guidelines. DLNA Link Protection is defined as the protection of a content stream between two devices on a DLNA network from illegitimate observation or interception using the protocols defined within this part of DLNA guideline.

Content protection is an important mechanism for ensuring that commercial content is protected from piracy and illegitimate redistribution. Link Protection is a technique that enables distribution of protected commercial content on a home network, thus resulting in greater consumer flexibility while still preserving the rights of copyright holders and content providers.

The guidelines in this part of DLNA guidelines reference existing technologies for Link Protection and provide mechanisms for interoperability between different implementations as well as integration with the DLNA architecture.

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) home networked device interoperability guidelines – Part 1-1: Architecture and protocols*

IEC 62481-2:2017, *Digital living network alliance (DLNA) home networked device interoperability guidelines – Part 2: DLNA media formats*

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

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*

IETF RFC 1191, Path MTU Discovery, J. Mogul, DECEWRL, S. Deering, Stanford University
<http://www.ietf.org/rfc/rfc1191.txt>

IETF RFC 2045, Multipurpose Internet Mail Extensions (MIME) Part One

IETF RFC 2327, SDP: Session Description Protocol, M. Handley, V. Jacobson, ISI/LBNL
<https://www.ietf.org/rfc/rfc2327.txt>