International Standard

ISO/IEC 21000-3

Information technology — Multimedia framework (MPEG-21) —

Part 3: Digital Item Identification

Technologies de l'information — Cadre multimédia (MPEG-21) — Partie 3: Identification des éléments numériques

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 21000-3:2003), which has been technically revised. It also incorporates ISO/IEC 21000-3:2003/Amd 1:2007 and ISO/IEC 21000-3:2003/Amd 2:2013.

The main changes are as follows:

— removal of Annex A (normative) - Requirements for the Registration Authority for Digital Item Identification Systems, and related descriptions that requires ISO/IEC 21000-3 to employ Registration Authority.

— updating information on ISO 15706-2 (ISAN), which has recently been approved as an International Standard.

— provision of MPEG-21 DII with the ability to explicitly and unambiguously describe existing relationships between different MPEG-21 Digital Items. It also conveys the base inter-DI relationship taxonomy in the form of an RDF/OWL ontology.

A list of all parts in the ISO/IEC 21000 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

0.1 Executive summary for MPEG-21

Today, many elements exist to build an infrastructure for the delivery and consumption of multimedia content. The aim for MPEG-21 multimedia framework (ISO/IEC 21000) is to describe how these various elements fit together.

The result is an open framework for multimedia delivery and consumption, with both the content creator and content consumer as focal points. This open framework provides content creators and service providers with equal opportunities in the MPEG-21 enabled open market. This will also be to the benefit of the content consumer providing them access to a large variety of content in an interoperable manner.

The vision for MPEG-21 is to define a multimedia framework to enable transparent and augmented use of multimedia resources across a wide range of networks and devices used by different communities.

This document specifies how Digital Items (see ISO/IEC 21000-2) and parts and collections thereof can be uniquely identified.

0.2 Organisation of the document

This introduction contains an overview of MPEG-21 Digital Items and the relation between ISO/IEC 21000-2 and this document.

Clause 4 specifies how to uniquely identify Digital Items, how to associate related identifiers with Digital Items and how to identify different types of Digital Items. Clause 5 then specifies how to associate metadata with Digital Items by using description scheme identifiers.

Annex A contains an example of how to resolve a unique identifier to appropriate metadata. Annex B contains a list of existing identification schemes that can be used by this document. Annex C provides an approach to dealing with varying functional granularities for identifying Digital Items. Annex D provides an example of how to express the relationship between two Digital Items.

0.3 Introduction to Digital Items

Within any system (such as MPEG-21) that proposes to facilitate a wide range of actions involving Digital Items, there is a need for a very precise description for defining exactly what constitutes such an “item”. Clearly there are many kinds of content, and probably just as many possible ways of describing it to reflect its context of use. This presents a strong challenge to lay out a powerful and flexible model for Digital Items which can accommodate the myriad forms that content can take (and the new forms it will assume in the future). Such a model is only truly useful if it yields a format that can be used to represent any Digital Items defined within the model unambiguously and communicate them, and information about them, successfully.

ISO/IEC 21000-2 provides such flexibility for representing Digital Items.

0.4 Example of a Digital Item

This subclause provides a simple example of a Digital Item. More complex examples can be found in ISO/IEC 21000-2.

This example uses ISO/IEC 21000 to create an "MPEG-21 music album" comprising a series of resources:

— Three audio files (coded in MPEG-2 AAC, as specified in ISO/IEC 13818-3) representing the "tracks" that form the basis of the album;

— Two text files (in Unicode, as specified in ISO/IEC 10646) representing the lyrics to two of the tracks;

— Two images (in JPEG, as specified in the ISO/IEC 10918 series) representing the cover photograph and other artwork of the album;

— A text file (in HTML, as specified in W3C, HTML 4.0 Specification[24]) representing the introductory text for the album.

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The relationship between these resources and how they relate to the Digital Item itself is expressed in ISO/IEC 21000-2 (DID). The DID contains, besides the references to the resources, information *about* the item and/or parts thereof. These metadata elements are associated through DID mechanisms to the item/resources as shown in Figure 1.

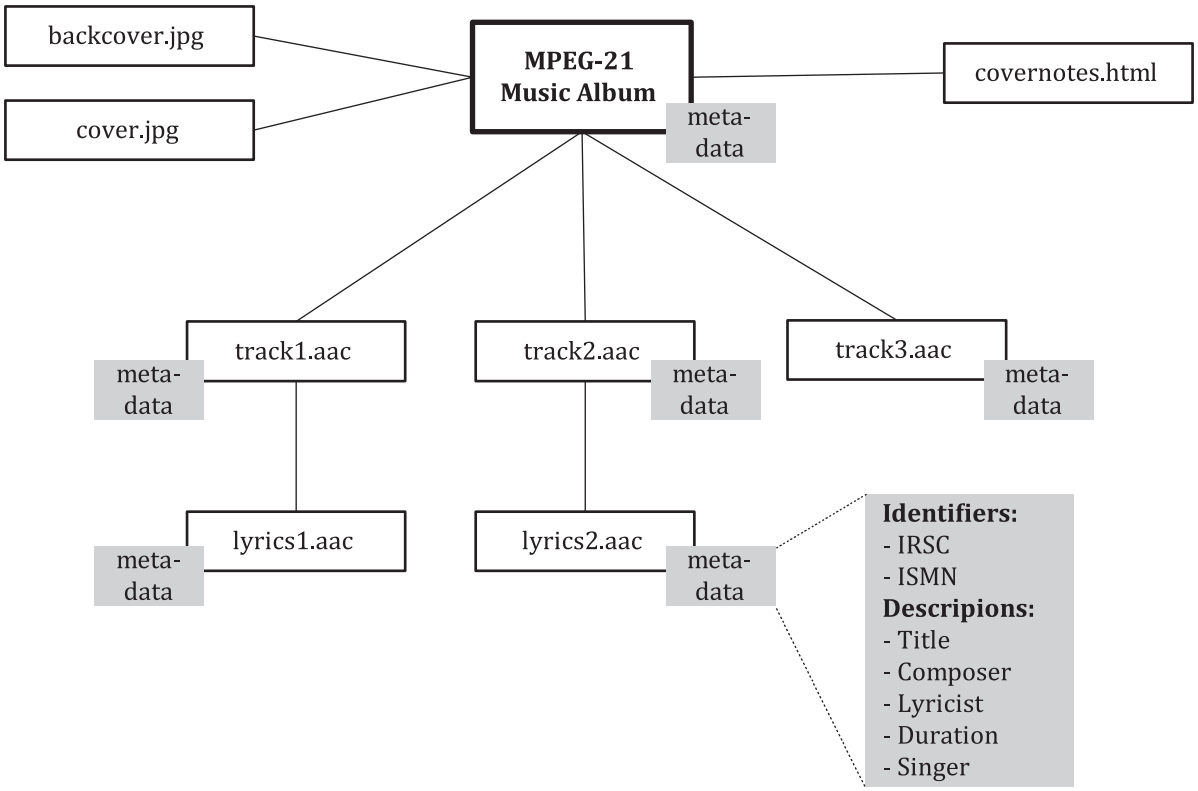


Figure 1 — MPEG-21 music album

0.5 Relationship between Digital Item Declaration and Digital Item Identification

Identifiers covered by this document can be associated with Digital Items, containers, components, and/or fragments thereof by including them in a specific place in the Digital Item Declaration. This place is the STATEMENT element. Examples of likely STATEMENTS include descriptive, control, revision tracking and/or identifying information.

Figure 2 shows this relationship. The shaded boxes are subject of this document while the bold boxes are defined in ISO/IEC 21000-2.

Several elements within a Digital Item Declaration can have zero, one or more DESCRIPTORS (as specified in ISO/IEC 21000-2). Each DESCRIPTOR may contain one STATEMENT which can contain one identifier relating to the parent element of the STATEMENT. In Figure 2, the two statements shown are used to identify a Component (left hand side of the diagram) and an Item (right hand side of the diagram).

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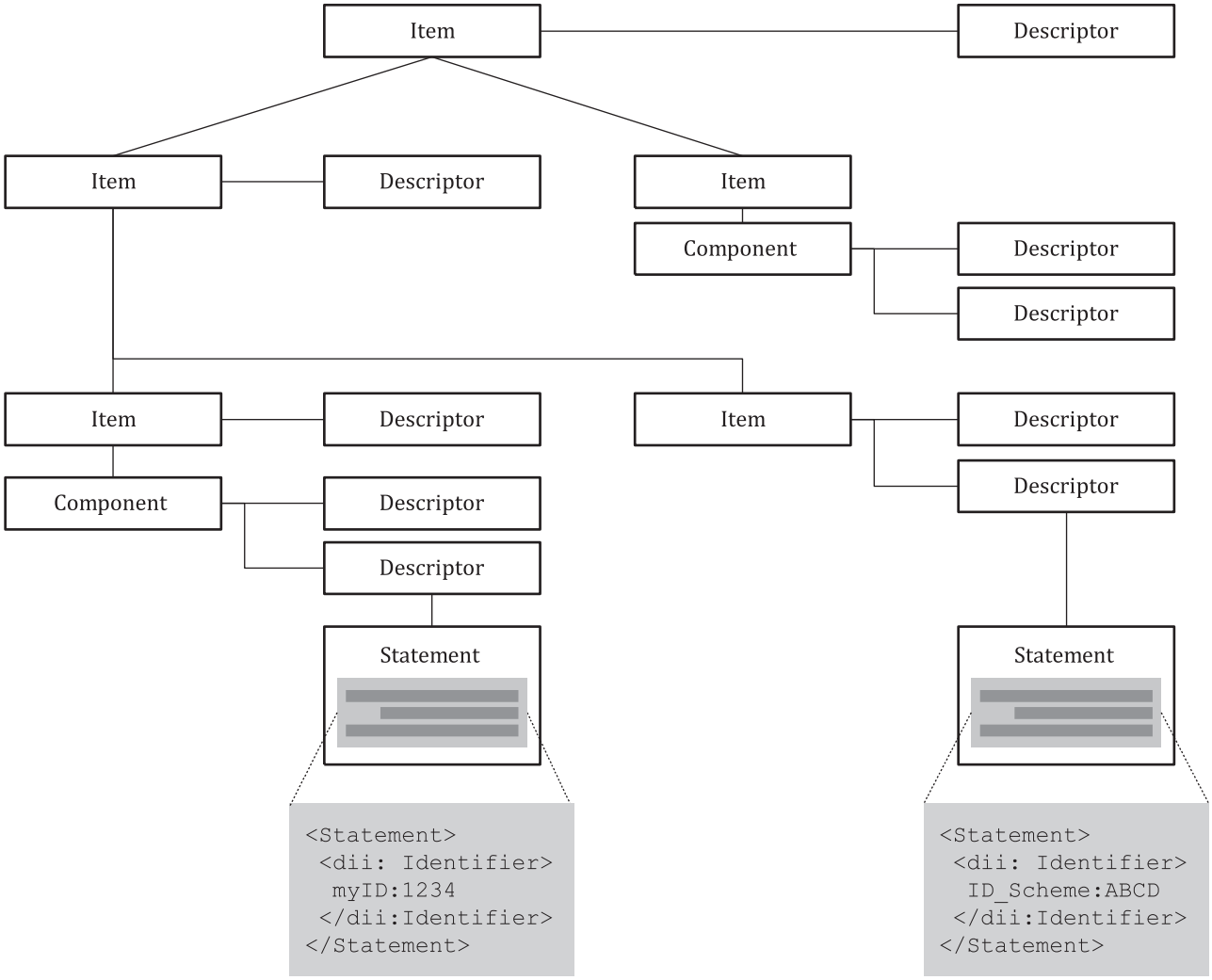


Figure 2 — Relationship between Digital Item Declaration and Digital Item Identification

Figure 3 gives an example of a DID descriptor containing one identifier. The use of the DII schema (identified by the DII namespace) is defined in subclause 4.4.

```
<?xml version="1.0"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:01-DIDL-NS"
      xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS">

  <Item id="Track1">
    <!-- Unique identifier of this digital item -->
    <Descriptor id="Item_Identifier">
      <Statement mimeType="text/xml">
         <dii:Identifier>urn:mpegRA:mpeg21:dii:cid:1702.F109%2F0000011</dii:Identifier>
      </Statement>
    </Descriptor>
   <!-- more information -->
  </Item>
</DIDL>
```

Figure 3 — Example: Uniquely identifying a Digital Item

0.6 Linking identifiers with associated information

Users may link identifiers to related entities (e.g. related metadata, related Digital Items and parts thereof, etc). One mechanism for achieving this is by using an online resolution service such as the Domain Name System (DNS) Resolution system (as specified in IETF RFC 1738).

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While some of the identification systems that are used to uniquely identify "content" have the capabilities to resolve an identifier online to appropriate metadata (e.g. cIDf, DOI), others do not have this capability (e.g. ISBN, ISRC). The latter identification systems still enable users to link the identifier to appropriate metadata offline. ISO/IEC 21000-2 does not mandate or specify such linking mechanism. Annex A provides an example of how such linking can be done online.

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Information technology — Multimedia framework (MPEG-21) —

Part 3:
Digital Item Identification

1 Scope

This document specifies:

— How to uniquely identify Digital Items (and parts thereof);

— How to uniquely identify IP related to the Digital Items (and parts thereof), for example abstractions;

— How to express the relationship between the two above identifiers;

— How to deal with varying levels of functional granularity for Digital Item identifiers;

— How to uniquely identify description schemes;

— The relationship between Digital Items (and parts thereof) and existing identification systems. Annex C contains a list of relevant identification systems. This is not an exhaustive list and is subject to change over time;

— How to express the relationship between two Digital Items.

This document does not specify:

— New identification systems for the content elements for which identification and description schemes already exist and are in use (e.g. this document does not attempt to replace the ISRC, as defined in ISO 3901, for sound recordings);

— Normative description schemes for describing content.

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.

ISO/IEC 21000-2, *Information technology — Multimedia framework (MPEG-21) — Part 2: Digital Item Declaration*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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3.1.1
component
binding a resource to a set of descriptors

Note 1 to entry: These descriptors are information related to all or part of the specific resource instance. Such descriptors will typically contain control or structural information about the resource (such as bit rate, character set, start points or encryption information) but not information describing the “content” within. A component itself is not an item; components are building blocks of items.

3.1.2
descriptor
associating information with the enclosing element

Note 1 to entry: This information may be a component (such as a thumbnail of an image, or a text component), or a textual statement.

3.1.3
DI
digital item
structured digital objects, including a standard representation, identification and metadata

Note 1 to entry: This entity is the fundamental unit of distribution and transaction within the MPEG-21 framework as a whole.

3.1.4
electronic media
representing a digital media resource in a given media format for electronic distribution

3.1.5
entity
anything that can be uniquely identified regardless of its nature, type or granularity (e.g. digital resources, individuals and organisations, transactions, etc)

3.1.6
functional granularity
uniquely identified Digital Item

Note 1 to entry: The functional granularity principle states that the identification of a Digital Item can be different for different users whenever it needs to be distinguished from another Digital Item.

3.1.7
identification scheme
associating identifiers with entities (both as defined herein), e.g. ISRC, ISBN, etc

3.1.8
identifier
unique label allocated to an entity within a given namespace

Note 1 to entry: A label associated with a specific entity, e.g. a string "ISRC GB-XYZ-01-00001" whose function is to distinguish one entity from another.

3.1.9
inter-DI relationship
logical connection or association between two Digital Items, pertaining to the semantics of the role that one DI plays towards another DI

3.1.10
item
grouping of sub-items and/or components that are bound to relevant descriptors

Note 1 to entry: The term item is a technical term, and is, as such, a narrower term than Digital Item.

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3.1.11
media resource
content directly capable of digital representation

3.1.12
physical media
representing either an analogue or a digital media resource in a given media format for physical distribution.

3.1.13
relator
describes the relationship between two entities

3.1.14
resolution system
act of submitting an identifier to a network service and receiving in return one or more pieces of some information (which includes resources, descriptions, another identifier, Digital Item, etc.) related to the identifier

3.1.15
resource
individually identifiable asset such as a video or audio clip, an image, or a textual asset

Note 1 to entry: A resource may also potentially be a physical object. All resources shall be locatable via an unambiguous address.

3.1.16
statement
literal textual value that contains information, but not an asset

Note 1 to entry: Examples of likely statements include descriptive, control, revision tracking or identifying information (such as an identifier as described in this document).

3.2 Abbreviated terms

cIDf	Content ID forum
CIS	Common information system
CISAC	International confederation of societies of authors and composers (confédération internationale des sociétés d'auteurs et compositeurs)
DCMI	Dublin core metadata initiative
DID	Digital item declaration
DII	Digital item identification
DOI	Digital object identifier
EAN	European article number
IEC	International electrotechnical commission
ISAN	International standard audiovisual number
ISBN	International standard book number
ISO	International organization for standardization
ISRC	International standard recording code

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ISSN	International standard serial number
ISTC	International standard textual work code
ISWC	International standard musical work code
MPEG	Moving picture expert group
SMPTE	Society of motion picture and television engineers
UCC	Uniform code council
UPC	Universal product code
URI	Uniform resource identifier
URL	Uniform resource locator
URN	Uniform resource name
V-ISAN	Version identifier for ISAN

4 Identification of digital items and their parts

4.1 `Identifier` element

Digital Items and their parts within the MPEG-21 multimedia framework are identified by encapsulating Uniform Resource Identifiers (URIs), as specified in IETF RFC 2396, into the `Identifier` element.

4.1.1 Syntax

```
<--! ##############################
      ISO/IEC 21000-3 DI Identification Element
     ##############################>
<xsd:element name="Identifier" type="xsd:anyURI"/>
```

4.1.2 Semantics

This element contains an identifier for a Digital Item, container, component, and/or fragment thereof in the form of a URI.

A Registration Authority may be set up for maintaining a list of identification schemes to be used within this document. However, the set up and maintenance of such a Registration Authority is out of the scope of this document.

Identifiers are not required to be registered with such a Registration Authority to be conformant to subclause 4.1.

4.1.3 Notes

A Uniform Resource Identifier (URI) is a compact string of characters for identifying an abstract or physical resource, where a resource is defined as “anything that has identity”.

The requirement that a Digital Item identifier be a URI is also consistent with the statement that the MPEG-21 identifier may be a Uniform Resource Locator (URL), since the specification of URI is designed to meet the recommendations laid out in IETF RFC 1738 (URL specification). The term URL refers to a specific subset of URI that is in use today as pointers to information on the Internet; it allows for long-term to short-term persistence depending on the business case.

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