
**Space data and information transfer
systems — Producer-Archive Interface
Specification (PAIS)**

*Systèmes de transfert des informations et données spatiales —
Spécification de l'interface entre producteur et archives (PAIS)*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 20104:2015](https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015)

[https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-
e74660f5b369/iso-20104-2015](https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015)



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 20104:2015

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 20104 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 651.1-B-1, February 2014) and was adopted (without modifications except those stated in clause 2 of this International Standard) by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 13, *Space data and information transfer systems*.

(standards.iteh.ai)

ISO 20104:2015

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 20104:2015

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>

Recommendation for Space Data System Standards

**PRODUCER-ARCHIVE
INTERFACE
SPECIFICATION (PAIS)**

ISO 20104:2015

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>

RECOMMENDED STANDARD

CCSDS 651.1-B-1

BLUE BOOK
February 2014

AUTHORITY

Issue:	Recommended Standard, Issue 1
Date:	February 2014
Location:	Washington, DC, USA

This document has been approved for publication by the Management Council of the Consultative Committee for Space Data Systems (CCSDS) and represents the consensus technical agreement of the participating CCSDS Member Agencies. The procedure for review and authorization of CCSDS documents is detailed in *Organization and Processes for the Consultative Committee for Space Data Systems* (CCSDS A02.1-Y-3), and the record of Agency participation in the authorization of this document can be obtained from the CCSDS Secretariat at the address below.

This document is published and maintained by:

CCSDS Secretariat
Space Communications and Navigation Office, 7L70
Space Operations Mission Directorate
NASA Headquarters
Washington, DC 20546-0001, USA

STANDARD PREVIEW
(standards.iteh.ai)
ISO 20104:2015
<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-10060329/iso-20104-2015>

STATEMENT OF INTENT

The Consultative Committee for Space Data Systems (CCSDS) is an organization officially established by the management of its members. The Committee meets periodically to address data systems problems that are common to all participants, and to formulate sound technical solutions to these problems. Inasmuch as participation in the CCSDS is completely voluntary, the results of Committee actions are termed **Recommended Standards** and are not considered binding on any Agency.

This **Recommended Standard** is issued by, and represents the consensus of, the CCSDS members. Endorsement of this **Recommendation** is entirely voluntary. Endorsement, however, indicates the following understandings:

- o Whenever a member establishes a CCSDS-related **standard**, this **standard** will be in accord with the relevant **Recommended Standard**. Establishing such a **standard** does not preclude other provisions which a member may develop.
- o Whenever a member establishes a CCSDS-related **standard**, that member will provide other CCSDS members with the following information:
 - The **standard** itself.
 - The anticipated date of initial operational capability.
 - The anticipated duration of operational service.
- o Specific service arrangements shall be made via memoranda of agreement. Neither this **Recommended Standard** nor any ensuing **standard** is a substitute for a memorandum of agreement.

No later than three years from its date of issuance, this **Recommended Standard** will be reviewed by the CCSDS to determine whether it should: (1) remain in effect without change; (2) be changed to reflect the impact of new technologies, new requirements, or new directions; or (3) be retired or canceled.

In those instances when a new version of a **Recommended Standard** is issued, existing CCSDS-related member standards and implementations are not negated or deemed to be non-CCSDS compatible. It is the responsibility of each member to determine when such standards or implementations are to be modified. Each member is, however, strongly encouraged to direct planning for its new standards and implementations towards the later version of the Recommended Standard.

FOREWORD

This Recommended Standard is a technical Recommendation providing the abstract syntax and an XML implementation of descriptions of data to be sent to an archive. These descriptions are negotiated agreements between the data Producer and the Archive that facilitate production of agreed data by the Producer and validation of received data by the Archive. This Recommended Standard includes an abstract syntax for describing how these data will be aggregated into packages for transmission and one concrete implementation for the packages based on the XML Formatted Data Unit (XFDU) standard (see reference [1]). This will fulfill parts of the process defined in the *Producer Archive Ingest Methodology Abstract Standard (PAIMAS)* (see reference [2]).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CCSDS shall not be held responsible for identifying any or all such patent rights.

Through the process of normal evolution, it is expected that expansion, deletion, or modification of this document may occur. This Recommended Standard is therefore subject to CCSDS document management and change control procedures, which are defined in *Organization and Processes for the Consultative Committee for Space Data Systems* (CCSDS A02.1-Y-3). Current versions of CCSDS documents are maintained at the CCSDS Web site:

(standards.iteh.ai)

<http://www.ccsds.org/>

[ISO 20104:2015](http://standards.iteh.ai/catalog/standards/sic/6c0a047-2c69-46d0-9293-e746605b369/iso-20104-2015)

Questions relating to the contents or status of this document should be addressed to the CCSDS Secretariat at the address indicated on page i.

RECOMMENDED STANDARD FOR PRODUCER-ARCHIVE INTERFACE SPECIFICATION

At time of publication, the active Member and Observer Agencies of the CCSDS were:

Member Agencies

- Agenzia Spaziale Italiana (ASI)/Italy.
- Canadian Space Agency (CSA)/Canada.
- Centre National d'Etudes Spatiales (CNES)/France.
- China National Space Administration (CNSA)/People's Republic of China.
- Deutsches Zentrum für Luft- und Raumfahrt (DLR)/Germany.
- European Space Agency (ESA)/Europe.
- Federal Space Agency (FSA)/Russian Federation.
- Instituto Nacional de Pesquisas Espaciais (INPE)/Brazil.
- Japan Aerospace Exploration Agency (JAXA)/Japan.
- National Aeronautics and Space Administration (NASA)/USA.
- UK Space Agency/United Kingdom.

Observer Agencies

- Austrian Space Agency (ASA)/Austria.
- Belgian Federal Science Policy Office (BFSPPO)/Belgium.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
- China Satellite Launch and Tracking Control General, Beijing Institute of Tracking and Telecommunications Technology (CLTC/BITTT)/China.
- Chinese Academy of Sciences (CAS)/China.
- Chinese Academy of Space Technology (CAST)/China.
- Commonwealth Scientific and Industrial Research Organization (CSIRO)/Australia.
- Danish National Space Center (DNSC)/Denmark.
- Departamento de Ciência e Tecnologia Aeroespacial (DCTA)/Brazil.
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)/Europe.
- European Telecommunications Satellite Organization (EUTELSAT)/Europe.
- Geo-Informatics and Space Technology Development Agency (GISTDA)/Thailand.
- Hellenic National Space Committee (HNSC)/Greece.
- Indian Space Research Organization (ISRO)/India.
- Institute of Space Research (IKI)/Russian Federation.
- KFKI Research Institute for Particle & Nuclear Physics (KFKI)/Hungary.
- Korea Aerospace Research Institute (KARI)/Korea.
- Ministry of Communications (MOC)/Israel.
- National Institute of Information and Communications Technology (NICT)/Japan.
- National Oceanic and Atmospheric Administration (NOAA)/USA.
- National Space Agency of the Republic of Kazakhstan (NSARK)/Kazakhstan.
- National Space Organization (NSPO)/Chinese Taipei.
- Naval Center for Space Technology (NCST)/USA.
- Scientific and Technological Research Council of Turkey (TUBITAK)/Turkey.
- South African National Space Agency (SANSA)/Republic of South Africa.
- Space and Upper Atmosphere Research Commission (SUPARCO)/Pakistan.
- Swedish Space Corporation (SSC)/Sweden.
- Swiss Space Office (SSO)/Switzerland.
- United States Geological Survey (USGS)/USA.

DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 651.1-B-1	Producer-Archive Interface Specification (PAIS), Recommended Standard, Issue 1	February 2014	Original issue

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 20104:2015](https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015)

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>

CONTENTS

<u>Section</u>	<u>Page</u>
1 INTRODUCTION.....	1-1
1.1 PURPOSE AND SCOPE.....	1-1
1.2 APPLICABILITY.....	1-1
1.3 RATIONALE.....	1-2
1.4 CONFORMANCE.....	1-2
1.5 DOCUMENT STRUCTURE	1-2
1.6 DEFINITIONS.....	1-4
1.7 NOMENCLATURE	1-7
1.8 REFERENCES	1-8
2 OVERVIEW	2-1
2.1 GENERAL FRAMEWORK.....	2-1
2.2 FORMALLY DESCRIBING DATA OBJECTS FOR TRANSFER	2-2
2.3 SIP CREATION AND VALIDATION.....	2-4
3 DESCRIPTIONS OF PRODUCER DATA.....	3-1
3.1 GENERAL.....	3-1
3.2 TRANSFER OBJECT TYPE DESCRIPTOR SPECIFICATION (CCSD0014) ...	3-1
3.3 COLLECTION DESCRIPTOR SPECIFICATION (CCSD0015).....	3-16
3.4 SPECIALIZATION OF THE DESCRIPTOR MODELS	3-23
4 DEFINITION OF CONSTRAINTS ON TYPES OF SIPS (CCSD0016).....	4-1
4.1 OVERVIEW	4-1
4.2 ABSTRACT SIP CONSTRAINTS	4-1
4.3 SIP SEQUENCING CONSTRAINTS IMPLEMENTATION.....	4-3
5 ABSTRACT SIP SPECIFICATION (CCSD0017)	5-1
5.1 OVERVIEW	5-1
5.2 SIP MODEL SPECIFICATION.....	5-1
5.3 DISCUSSION.....	5-8
5.4 SIP MODEL SPECIALIZATION.....	5-10
6 SIP IMPLEMENTATION	6-1
6.1 OVERVIEW	6-1
6.2 SIP IMPLEMENTATION USING XFDU.....	6-1
6.3 SPECIALIZATION OF THE SIP IMPLEMENTATION IN AN XFDU.....	6-8

CONTENTS (continued)

<u>Section</u>	<u>Page</u>
ANNEX A PAIS XML SCHEMAS (NORMATIVE)	A-1
ANNEX B LEGEND FOR XML FIGURES (INFORMATIVE)	B-1
ANNEX C INFORMATIVE REFERENCES (INFORMATIVE)	C-1
ANNEX D MANAGEMENT OF IDS (INFORMATIVE)	D-1
ANNEX E SECURITY, SANA, AND PATENT CONSIDERATIONS (INFORMATIVE)	E-1
ANNEX F SIP TO XFDU MAPPING EXAMPLE (INFORMATIVE)	F-1

Figure

2-1 PAIS General Process	2-2
2-2 An Example of the Entities and Their Relationships Involved in Creating the Formal Specifications	2-4
2-3 SIP Process	2-6
3-1 First Decomposition Level of ‘transferObjectTypeDescriptor’	3-3
3-2 Complete Decomposition of the ‘transferObjectTypeDescriptor’	3-4
3-3 Transfer Object Type Descriptor ‘identification’	3-6
3-4 Transfer Object Type Descriptor ‘description’	3-8
3-5 Transfer Object Type Descriptor ‘relation’	3-9
3-6 Transfer Object Type Descriptor ‘groupType’	3-15
3-7 Transfer Object Type Descriptor ‘any’	3-16
3-8 First Decomposition Level of ‘collectionDescriptor’	3-18
3-9 Complete Decomposition of a ‘collectionDescriptor’	3-18
3-10 Collection Descriptor ‘identification’	3-20
3-11 Collection Descriptor ‘description’	3-21
3-12 Collection Descriptor ‘relation’	3-22
3-13 Collection Descriptor ‘any’	3-22
3-14 Specialization of the Descriptor Models.....	3-23
4-1 Decomposition of ‘sipConstraints’	4-3
5-1 Abstract View of the SIP Container	5-2
5-2 Abstract View of the Transfer Object Container.....	5-4
5-3 Abstract View of the Transfer Object Group Container.....	5-5
5-4 Abstract View of the Data Object Container.....	5-7
5-5 Abstract View of SIP, Transfer Object, Transfer Object Group, and Data Object	5-9
5-6 Specialization of the SIP Model	5-10
6-1 SIP and XFDU Schemas Constrain the XFDU XML Manifest to Implement the SIP as an XFDU	6-2
6-2 SIP Global Information.....	6-3
6-3 SIP Transfer Object Identification and Status	6-4
6-4 SIP Transfer Object Group Identification.....	6-4
6-5 SIP Data Object Identification.....	6-5

CONTENTS (continued)

<u>Figure</u>	<u>Page</u>
6-6 SIP Transfer Object To Delete	6-5
6-7 Any Extension Type	6-5
6-8 sipGlobalInformation Mapped to XFDU.....	6-6
6-9 sipTransferObject Mapped to XFDU	6-7
6-10 Byte Stream Mapped to XFDU byteStream Element.....	6-8
B-1 Legend for XML Figures.....	B-2

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 20104:2015](https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015)

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 20104:2015

<https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e74660f5b369/iso-20104-2015>

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this Recommended Standard is to provide a standard method for formally defining the digital information objects to be transferred by an information Producer to an Archive and for effectively packaging these objects in the form of **Submission Information Packages (SIPs)**. This supports effective transfer and validation of SIP data.

This Recommended Standard fits into the context defined by:

- The *Reference Model for an Open Archival Information System (OAIS)* Recommended Standard (see reference [3]).
- The *Producer-Archive Interface Methodology Abstract Standard (PAIMAS)* Recommended Standard (see reference [2]).
- The *XML Formatted Data Unit (XFDU) Structure and Construction Rules* Recommended Standard (see reference [1]).

The PAIMAS Recommended Standard (see reference [2]) defines a methodology based on the four following phases: Preliminary, Formal Definition, Transfer, Validation.

This Recommended Standard applies specifically to the implementation of the main part of the Formal Definition Phase and the Transfer Phase, taking into account part of the Validation Phase.

[ISO 20104:2015](https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e741d051269/iso-20104-2015)

[https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-](https://standards.iteh.ai/catalog/standards/sist/66c0a047-2c69-4fc9-9292-e741d051269/iso-20104-2015)

The proposed implementation should help in the automation and management of the Transfer and Validation Phases.

The proposed implementation may also be used, to some extent, for the Preliminary Phase.

This Recommended Standard does not exclude other PAIMAS implementation Recommended Standards.

1.2 APPLICABILITY

The implementation defined in this document applies to any **Producer-Archive Project**. It is specifically applicable to those organizations and individuals who create information that may need Long-Term Preservation and to organizations making information available for the Long Term.

This application is relevant only if both partners in the Producer-Archive Project agree with a shared implementation as defined in this document.