

INTERNATIONAL
STANDARD

ISO
19389

First edition
2014-07-01

**Space data and information transfer
systems — Conjunction data message**

*Systèmes de transfert des données et informations spatiales —
Message de données conjointes*

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

ISO 19389:2014

<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>



Reference number
ISO 19389:2014(E)

© ISO 2014

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19389:2014

<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2014

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
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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.

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 ISO documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

iTeh STANDARD PREVIEW

For an explanation on the meaning of (ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

ISO 19389 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 508.0-B-1, June 2013) 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*.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19389:2014

<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>

Space data and information transfer systems — Conjunction data message

1 Scope

This Conjunction Data Message (CDM) International Standard specifies a standard message format for use in exchanging spacecraft conjunction information between originators of Conjunction Assessments (CAs) and satellite owner/operators and other authorized parties. Such exchanges are used to inform satellite owner/operators of conjunctions between objects in space to enable consistent warning by different organizations employing diverse CA techniques.

This International Standard will:

- a) facilitate interoperability and enable consistent warning between data originators who supply CA and the satellite owner/operators who use it;
- b) facilitate automation for the CA processes; and
- c) provide critical information to enable timely CA decisions.

This document includes requirements and criteria that the message format has been designed to meet (see Annex D). Also included are informative descriptions of conjunction information pertinent to performing CA (see Annex E).

This International Standard is applicable to satellite operations in all environments in which close approaches and collisions among satellites are concerns. It contains the specification for a CDM designed for applications involving conjunction information interchange between originators of CAs and recipients. Conjunction information includes data types such as miss distance, probability of collision, Time of Closest Approach (TCA), and closest approach relative position and velocity. Further information describing the conjunction information contained in this message can be found in section 3 and Annex E.

This message is suited for exchanges that involve manual or automated interaction. The attributes of a CDM make it suitable for use in machine-to-machine interfaces because of the large amount of data typically present. The CDM is self contained. However, additional information could be specified in an Interface Control Document (ICD) written jointly by the service originator and recipients.

It is desirable that CDM originators maintain consistency with respect to the optional keywords provided in their implementations; i.e., it is desirable that the composition of the CDMs provided not change on a frequent basis.

This International Standard is applicable only to the message format and content, but not to its transmission nor to the algorithms used to produce the data within. The method of transmitting the message between exchange partners is beyond the scope of this document and could be specified in an ICD.

The methods used to predict conjunctions and calculate the probability of collision, and the definition of the conjunction assessment accuracy underlying a particular CDM, are also outside the scope of this International Standard (the interested reader can consult references in Annex F).

2 Requirements

Requirements are the technical recommendations made in the following publication (reproduced on the following pages), which is adopted as an International Standard:

CCSDS 508.0-B-1, June 2013, Conjunction Data Message

For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 508.0-B-1.

Pages i to vi

This part is information which is relevant to the CCSDS publication only.

Page 1-5

Add the following information to the reference indicated:

- [5] Document CCSDS 301.0-B-4, November 2010, is equivalent to ISO 11104:2011.
- [6] Document CCSDS 505.0-B-1, December 2010, is equivalent to ISO 17107:2011.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3 Revision of publication CCSDS 508.0-B-1

It has been agreed with the Consultative Committee for Space Data Systems that Subcommittee ISO/TC 20/SC 13 will be consulted in the event of any revision or amendment of publication CCSDS 508.0-B-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

Recommendation for Space Data System Standards

CONJUNCTION DATA MESSAGE

ISO 19389:2014

<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>

RECOMMENDED STANDARD

CCSDS 508.0-B-1

BLUE BOOK

June 2013

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19389:2014

<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>

AUTHORITY

Issue:	Recommended Standard, Issue 1
Date:	June 2013
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:

iteh STANDARD PREVIEW
CCSDS Secretariat (standards.iteh.ai)
Space Communications and Navigation Office, 7L70
Space Operations Mission Directorate
NASA Headquarters
Washington, DC 20546-0001, USA
<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-10017b50217c/iso-19389-2014>

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 document is a Recommended Standard for Conjunction Data Messages (CDMs) and has been prepared by the CCSDS. The CDM described in this Recommended Standard is the baseline concept for conjunction information interchange applications between interested parties.

This Recommended Standard establishes a common framework and provides a common basis for the format of conjunction information exchange between originators of conjunction assessment data and satellite owner/operators. It allows implementing organizations within each conjunction assessment originator to proceed coherently with the development of compatible derived standards for the flight and ground systems that are within their cognizance. Derived Agency standards can implement only a subset of the optional features allowed by the Recommended Standard and can incorporate features not addressed by this Recommended Standard.

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: <https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>

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

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

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 e.V. (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.
- CSIR Satellite Applications Centre (CSIR)/Republic of South Africa.
- 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.
- Space and Upper Atmosphere Research Commission (SUPARCO)/Pakistan.
- Swedish Space Corporation (SSC)/Sweden.
- United States Geological Survey (USGS)/USA.

DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 508.0-B-1	Conjunction Data Message, Recommended Standard, Issue 1	June 2013	Current issue

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 19389:2014](https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014)

<https://standards.iteh.ai/catalog/standards/sist/055542bd-c784-4a84-a893-480b7b54213c/iso-19389-2014>

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 DOCUMENT STRUCTURE.....	1-2
1.4 CONVENTIONS AND DEFINITIONS.....	1-2
1.5 REFERENCES.....	1-4
2 OVERVIEW	2-1
2.1 GENERAL.....	2-1
2.2 CDM BASIC CONTENT.....	2-1
3 CDM CONTENT/STRUCTURE IN KVN	3-1
3.1 GENERAL.....	3-1
3.2 CDM HEADER.....	3-1
3.3 CDM RELATIVE METADATA/DATA.....	3-2
3.4 CDM METADATA.....	3-4
3.5 CDM DATA.....	3-7
3.6 DISCUSSION—CDM/KVN EXAMPLES.....	3-11
4 CDM CONTENT/STRUCTURE IN XML	4-1
4.1 DISCUSSION—THE CDM/XML SCHEMA.....	4-1
4.2 CDM/XML BASIC STRUCTURE.....	4-1
4.3 CONSTRUCTING A CDM/XML INSTANCE.....	4-2
4.4 DISCUSSION—CDM/XML EXAMPLE.....	4-6
5 CDM DATA IN GENERAL	5-1
5.1 OVERVIEW.....	5-1
5.2 RULES THAT APPLY IN KVN AND XML.....	5-1
6 CDM SYNTAX	6-1
6.1 OVERVIEW.....	6-1
6.2 COMMON CDM SYNTAX.....	6-1
6.3 THE CDM IN KVN.....	6-2
6.4 THE CDM IN XML.....	6-5

CONTENTS (continued)

<u>Section</u>	<u>Page</u>
ANNEX A IMPLEMENTATION CONFORMANCE STATEMENT PROFORMA (NORMATIVE)	A-1
ANNEX B SECURITY, SANA, AND PATENT CONSIDERATIONS (INFORMATIVE)	B-1
ANNEX C ABBREVIATIONS AND ACRONYMS (INFORMATIVE)	C-1
ANNEX D RATIONALE AND REQUIREMENTS FOR CONJUNCTION DATA MESSAGES (INFORMATIVE)	D-1
ANNEX E CONJUNCTION INFORMATION DESCRIPTION (INFORMATIVE)	E-1
ANNEX F INFORMATIVE REFERENCES (INFORMATIVE)	F-1

Figure

4-1 CDM XML Basic Structure	4-1
E-1 Definition of the RTN and TVN Coordinate Frames	E-2

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Table

3-1 CDM KVN Header	3-2
3-2 CDM KVN Relative Metadata/Data	3-2
3-3 CDM KVN Metadata	3-4
3-4 CDM KVN Data	3-8
4-1 Relation of KVN Logical Blocks to Special CDM/XML Tags	4-5
4-2 Another Special CDM/XML Tag	4-5
6-1 Example XML Keyword Tags with Specified Units	6-6
D-1 Primary Requirements	D-2
D-2 Desirable Characteristics	D-4