

Space data and information transfer systems — Space packet protocol

ICS 49.140

National foreword

This British Standard is the UK implementation of ISO 22646:2005+A1:2015. It supersedes BS ISO 22646:2005, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee ACE/68, Space systems and operations.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Space data and information transfer systems — Space packet protocol

*Systèmes de transfert des données et informations spatiales —
Protocole pour données spatiales par paquets*



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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.

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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 22646 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 133.0-B-1, September 2003) 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*.

Space data and information transfer systems — Space packet protocol

1 Scope

This International Standard specifies the space packet protocol for transferring space application data over a network involving a ground-to-space or space-to-space communications link.

The scope and field of application are furthermore detailed in subclauses 1.1 and 1.2 of the enclosed CCSDS publication.

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 133.0-B-1, September 2003, *Space packet protocol*.

For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 133.0-B-1.

Pages i to v

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

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Add the following information to the references indicated:

[3] Document CCSDS 301.0-B-3, January 2002, is equivalent to ISO 11104:2003.

[4] Document CCSDS 135.0-B-1, January 2002, is equivalent to ISO 22647:—¹⁾.

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Add the following information to the references indicated:

[B2] Document CCSDS 102.0-B-5, November 2000, is equivalent to ISO 13419:2003.

[B3] Document CCSDS 203.0-B-2, June 2001, is equivalent to ISO 12174:2003.

[B6] Document CCSDS 132.0-B-1, September 2003, is equivalent to ISO 22645:2005.

1) To be published.

[B7] Document CCSDS 232.0-B-1, September 2003, is equivalent to ISO 22664:2005.

[B8] Document CCSDS 732.0-B-1, September 2003, is equivalent to ISO 22666:2005.

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 133.0-B-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

Consultative Committee for Space Data Systems

RECOMMENDATION FOR SPACE
DATA SYSTEM STANDARDS

SPACE PACKET PROTOCOL

CCSDS 133.0-B-1

BLUE BOOK

September 2003



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CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

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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 Recommendations is detailed in reference [B1], and the record of Agency participation in the authorization of this document can be obtained from the CCSDS Secretariat at the address below.

This Recommendation is published and maintained by:

CCSDS Secretariat
Office of Space Communication (Code M-3)
National Aeronautics and Space Administration
Washington, DC 20546, USA

CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

STATEMENT OF INTENT

The Consultative Committee for Space Data Systems (CCSDS) is an organization officially established by the management of member space Agencies. 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 **Recommendations** and are not considered binding on any Agency.

This **Recommendation** is issued by, and represents the consensus of, the CCSDS Plenary body. Agency endorsement of this **Recommendation** is entirely voluntary. Endorsement, however, indicates the following understandings:

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

No later than five years from its date of issuance, this **Recommendation** 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 **Recommendation** is issued, existing CCSDS-related Agency standards and implementations are not negated or deemed to be non-CCSDS compatible. It is the responsibility of each Agency to determine when such standards or implementations are to be modified. Each Agency is, however, strongly encouraged to direct planning for its new standards and implementations towards the later version of the Recommendation.

CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

FOREWORD

This document is a technical Recommendation for use in developing flight and ground systems for space missions and has been prepared by the Consultative Committee for Space Data Systems (CCSDS). The Space Packet Protocol described herein is intended for missions that are cross-supported between Agencies of the CCSDS.

This Recommendation specifies a communications protocol to be used by space missions to transfer space application data over a network that involves a ground-to-space or space-to-space communications link. This Recommendation was developed by consolidating the specifications of the packet portion of three CCSDS Recommendations, references [B2]-[B4], which define essentially the same protocol and services but in slightly different contexts.

This Recommendation does not change the major technical contents defined in (references [B2]-[B4]), but the presentation of the specification has been changed so that:

- a) this protocol can be used to transfer any data over any space link in either direction;
- b) all CCSDS space link protocols are specified in a unified manner;
- c) the specification matches the Open Systems Interconnection (OSI) Basic Reference Model (references [1] and [2]).

Together with the change in presentation, a few technical specifications in references [B2]-[B4] have been changed in order to unify the specifications in references [B2]-[B4]. Also, some technical terms in references [B2]-[B4] have been changed in order to unify the terminology used in all the CCSDS Recommendations that define space link protocols and to define this protocol as a general communications protocol. These changes are listed in annex C of this Recommendation.

Through the process of normal evolution, it is expected that expansion, deletion or modification to this document may occur. This Recommendation is therefore subject to CCSDS document management and change control procedures, as defined in reference [B1]. Current versions of CCSDS documents are maintained at the CCSDS Web site:

<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.

CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

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CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

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CCSDS 133.0-B-1	Space Packet Protocol, Issue 1	September 2003	Original Issue

CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

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CCSDS RECOMMENDATION FOR SPACE PACKET PROTOCOL

1 INTRODUCTION

1.1 PURPOSE

The purpose of this Recommendation is to specify the Space Packet Protocol. Space missions will use this protocol to transfer space application data over a network that involves a ground-to-space or space-to-space communications link.

1.2 SCOPE

This Recommendation defines the Space Packet Protocol in terms of:

- a) the services provided to the users of this protocol;
- b) the protocol data units employed by the protocol; and
- c) the procedures performed by the protocol.

It does not specify:

- a) individual implementations or products;
- b) the implementation of service interfaces within real systems;
- c) the methods or technologies required to perform the procedures; or
- d) the management activities required to configure and control the protocol.

1.3 APPLICABILITY

This Recommendation applies to the creation of Agency standards and to future data communications over space links between CCSDS Agencies in cross-support situations. The Recommendation includes comprehensive specification of the services and protocol for inter-Agency cross-support. It is neither a specification of, nor a design for, real systems that may be implemented for existing or future missions.

The Recommendation specified in this document is to be invoked through the normal standards programs of each CCSDS Agency and is applicable to those missions for which cross-support, based on capabilities described in this Recommendation, is anticipated. Where mandatory capabilities are clearly indicated in sections of the Recommendation, they must be implemented when this document is used as a basis for cross-support. Where options are allowed or implied, implementation of these options is subject to specific bilateral cross-support agreements between the Agencies involved.