INTERNATIONAL STANDARD

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Space data and information transfer systems — Packet telemetry

Systèmes de transfert des informations et données spatiales — Télémesure par paquets

INTERNATIONAL ISO

Reference number
ISO 13419:1997(E)

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.

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.

International Standard ISO 13419 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 13, *Space data and information transfer systems*.

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Space data and information transfer systems — Packet telemetry

1 Scope

This International Standard specifies the requirements for spacecraft packet telemetry systems.

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 102.0-B-4, November 1995, *Recommendation for space data system standards — Packet telemetry.*

For the purposes of international standardization, the modifications outlined below shall apply to the following pages of publication CCSDS 102.0-B-4.

Pages i to vi

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

Page 1-4

Add the following information to the references indicated in chapter 1.7:

[2] Document CCSDS 101.0-B-3, May 1992, is equivalent to ISO 11754:1994.

[3] Document CCSDS 301.0-B-2, April 1990, is equivalent to ISO 11104:1991.

[4] Document CCSDS 202.0-B-2, November 1992, is equivalent to ISO 12172:—[1)].

[6] Document CCSDS 701.0-B-2, November 1992, is equivalent to ISO 13420:—[1)].

3 Revision of publication CCSDS 102.0-B-4

It has been agreed with the Consultative Committee for Space Data Systems that ISO/TC 20/SC 13 will be consulted in the event of any revision or amendment of publication CCSDS 102.0-B-4. To this end, NASA will act as a liaison body between CCSDS and ISO.

1) To be published.

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Consultative Committee for Space Data Systems

RECOMMENDATION FOR SPACE DATA SYSTEM STANDARDS

PACKET TELEMETRY

CCSDS 102.0-B-4

BLUE BOOK

November 1995

DEDICATION

This document is dedicated to the memory of Mr. Daniel Rouat of the European Space Agency. He was a major contributor to the recommendations for Telecommand and Packet Telemetry, including the revisions in this issue. His vision and technical contributions inspired many people throughout the world, and he will be deeply missed by his many friends and colleagues in the CCSDS.

AUTHORITY

Issue:	Blue Book, Issue 4
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Location:	Toulouse, France

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 [1], 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
Program Integration Division (Code OI)
National Aeronautics and Space Administration
Washington, DC 20546, USA

CCSDS RECOMMENDATION FOR PACKET TELEMETRY

STATEMENT OF INTENT

The **CONSULTATIVE COMMITTEE FOR SPACE DATA SYSTEMS (CCSDS)** is an organisation 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 shall be 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 cancelled.

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 PACKET TELEMETRY

FOREWORD

This document is a technical **RECOMMENDATION** for use in developing packetised telemetry systems and has been prepared by the **CONSULTATIVE COMMITTEE FOR SPACE DATA SYSTEMS** (CCSDS). The Packet Telemetry concept described herein is the baseline concept for spacecraft-to-ground data communication within missions that are cross-supported between Agencies of the CCSDS.

This **RECOMMENDATION** establishes a common framework and provides a common basis for the data structures of spacecraft telemetry streams. It allows implementing organisations within each Agency to proceed coherently with the development of compatible derived Standards for the flight and ground systems that are within their cognizance. Derived Agency Standards may implement only a subset of the optional features allowed by the **RECOMMENDATION** and may incorporate features not addressed by the **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 which are defined in Reference [1].

CCSDS RECOMMENDATION FOR PACKET TELEMETRY

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

Member Agencies

- British National Space Centre (BNSC)/United Kingdom.
- Canadian Space Agency (CSA)/Canada.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
- Centre National d'Etudes Spatiales (CNES)/France.
- Deutsche Forschungsanstalt für Luft- und Raumfahrt e.V. (DLR)/Germany.
- European Space Agency (ESA)/Europe.
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- Australian Space Office (ASO)/Australia.
- Austrian Space Agency (ASA)/Austria.
- Belgian Science Policy Office (SPO)/Belgium.
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- European Telecommunications Satellite Organization (EUTELSAT)/Europe.
- Hellenic National Space Committee (HNSC)/Greece.
- Indian Space Research Organization (ISRO)/India.
- Industry Canada/Communications Research Centre (CRC)/Canada.
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- Institute of Space Research (IKI)/Russian Federation.
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- Ministry of Communications (MOC)/Israel.
- National Oceanic & Atmospheric Administration (NOAA)/USA.
- National Space Program Office (NSPO)/Taiwan.
- Swedish Space Corporation (SSC)/Sweden.
- United States Geological Survey (USGS)/USA.

CCSDS RECOMMENDATION FOR PACKET TELEMETRY

DOCUMENT CONTROL

A. FIRST ISSUE

DOCUMENT REFERENCE:	CCSDS 102.0-B-1
TITLE:	Recommendation for Space Data System Standards: Packet Telemetry, Issue 1
DATE:	May 1984

B. ISSUE 2

DOCUMENT REFERENCE:	CCSDS 102.0-B-2
TITLE:	Recommendation for Space Data System Standards: Packet Telemetry, Issue 2
DATE:	January 1987

C. ISSUE 3

DOCUMENT REFERENCE:	CCSDS 102.0-B-3
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DATE:	November 1992

C. ISSUE 4

DOCUMENT REFERENCE:	CCSDS 102.0-B-4
TITLE:	Recommendation for Space Data System Standards: Packet Telemetry, Issue 4
DATE:	November 1995

UPDATES: (Significant changes are identified by change bars in the outside margin.)

Changes not Compatible with the Previous Issue

The option of Source Packet Segmentation has been eliminated.

Editorial Changes

The definition of Source Packet Grouping has been clarified.
Minor format changes have been made based on the specifications of the CCSDS Publications Manual.

CCSDS RECOMMENDATION FOR PACKET TELEMETRY

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CCSDS RECOMMENDATION FOR PACKET TELEMETRY

1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to establish a common **RECOMMENDATION** for the implementation of spacecraft "Packet Telemetry" systems by the Agencies participating in the **CONSULTATIVE COMMITTEE FOR SPACE DATA SYSTEMS (CCSDS)**.

1.2 SCOPE

PACKET TELEMETRY is a concept which facilitates the transmission of space-acquired data from source to user in a standardised highly automated manner. **PACKET TELEMETRY** provides a mechanism for implementing common data transport structures and protocols which may enhance the development and operation of space mission systems.

This **RECOMMENDATION** addresses the following two processes:

— The end-to-end transport of space mission data sets from source application processes located in space to distributed user application processes located on the ground.

— The intermediate transfer of these data sets through space data acquisition networks, which contain spacecraft, radio links, tracking stations, ground communications circuits and mission control centres as some of their components.

This **RECOMMENDATION** is limited to describing the telemetry formats which are generated by the spacecraft in order to execute its role in the above processes. The services corresponding to these formats are defined in Reference [8]. The CCSDS channel coding and synchronisation mechanisms required to implement space-to-ground data links of acceptable quality are defined in Reference [2].

An overview of the **PACKET TELEMETRY** Concept is given in Chapter 2.

1.3 APPLICABILITY

This **RECOMMENDATION** applies to the creation of Agency standards and to the future exchange of **PACKET TELEMETRY** between CCSDS Agencies in cross-support situations. The **RECOMMENDATION** includes comprehensive specification of the structure of data streams that are generated by remote space vehicles for telemetering to space mission data processing facilities (which are usually located on Earth). The **RECOMMENDATION** does not attempt to define the architecture or configuration of these data processing facilities, except to describe assumed ground data handling services which affect the selection of certain on-board formatting options.