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Space data and information transfer systems — CCSDS file delivery protocol

Systèmes de transfert des informations et données spatiales — Protocole CCSDS de livraison des fichiers

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Foreword

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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.

International Standard ISO 17355 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 727.0-B-1, January 2002) 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*.

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Space data and information transfer systems — CCSDS file delivery protocol

1 Scope

This International Standard specifies the requirements for a file delivery protocol and associated service for application in the space environment. It is intended for use over the current and envisaged packet delivery services used in the space environment.

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:

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CCSDS 727.0-B-1, January 2002, *Recommendation for space data system standards — CCSDS file delivery protocol (CFDP).*

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For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 727.0-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:

[1] Document CCSDS 701.0-B-3, June 2001, is equivalent to ISO 13420:—[1)].

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

[3] Document CCSDS 103.0-B-2, June 2001, is equivalent to ISO 17433:2003.

[4] Document CCSDS 202.0-B-3, June 2001, is equivalent to ISO 12172:2003.

1) To be published. (Revision of ISO 13420:1997)

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3 Revision of publication CCSDS 727.0-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 727.0-B-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

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Consultative Committee for Space Data Systems

RECOMMENDATION FOR SPACE DATA SYSTEM STANDARDS

CCSDS FILE DELIVERY PROTOCOL (CFDP)

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BLUE BOOK

January 2002

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CCSDS RECOMMENDATION FOR CCSDS FILE DELIVERY PROTOCOL (CFDP)

AUTHORITY

Issue:	Blue Book, Issue 1
Date:	January 2002
Location:	Not Applicable

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 the reference [A1], and the record of Agency participation in the authorization of this document can be obtained from the CCSDS Secretariat at the address below.

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This Recommendation is published and maintained by:

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CCSDS RECOMMENDATION FOR CCSDS FILE DELIVERY PROTOCOL (CFDP)

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:

o 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.

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-- The **standard** itself.

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-- 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 **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.

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CCSDS RECOMMENDATION FOR CCSDS FILE DELIVERY PROTOCOL (CFDP)

FOREWORD

Until relatively recently the typical storage medium for spacecraft has been the tape recorder, a complex device offering limited data storage and data access. The use of this type of storage has typically been limited to the recording and subsequent dump to the ground of telemetry data. Manipulation from the ground has required significant human intervention and used ad hoc, privately developed protocols.

The introduction of solid state mass memory providing gigabytes of storage with random access opens up a whole new ethos of spacecraft operation where much of the routine traffic to and from the spacecraft will be in the form of files. Furthermore, because of the random access nature of the onboard storage medium, it becomes possible to repeat transmission of data lost on the link and thus guarantee delivery of critical information.

To exploit the potential advantages of onboard mass memory, protocol support is required to provide a standard means to move data to and from the onboard storage medium in the form of files.

While the onboard storage medium has rapidly evolved, the essential constraints of space missions remain:

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– limited systems resources in terms of computational power and memory capacities;

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– environmental restrictions including noisy, bandwidth limited, asymmetrical, and interrupted communications links, some with very long propagation delay;

– varying user needs including a requirement for early access to transferred data regardless of its quality.

In view of these constraints, it is clear that there is a need for a file delivery service capable of transferring files to and from mass memory located in the space segment. Such a capability must not only operate under the constraints associated with space data communication, but it must also be applicable to the diverse range of mission configurations ranging from single low earth orbiting spacecraft to complex networks of relays, orbiters, and landers.

Through the process of normal evolution, it is expected that expansion, deletion, or modification of this document may occur. This Recommendation is therefore subject to CCSDS document management and change control procedures which are defined in reference [A1]. 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.

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

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- Agenzia Spaziale Italiana (ASI)/Italy.
- British National Space Centre (BNSC)/United Kingdom.
- Canadian Space Agency (CSA)/Canada.
- Centre National d'Etudes Spatiales (CNES)/France.
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)/Germany.
- European Space Agency (ESA)/Europe.
- Instituto Nacional de Pesquisas Espaciais (INPE)/Brazil.
- National Aeronautics and Space Administration (NASA)/USA.
- National Space Development Agency of Japan (NASDA)/Japan.
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- Austrian Space Agency (ASA)/Austria.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
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CCSDS 727.0-B-1	CCSDS File Delivery Protocol, Issue 1	January 2002	Original Issue

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