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**Space data and information transfer
systems — Standard formatted data
units — Structure and construction
rules**

AMENDMENT 1

iTeh STANDARD PREVIEW
*Systemes de transfert des informations et données spatiales — Unités
de données à structuration normalisée (SFDU) — Règles de structure
et de construction*
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Consultative Committee for Space Data Systems

RECOMMENDATION FOR SPACE
DATA SYSTEM STANDARDS

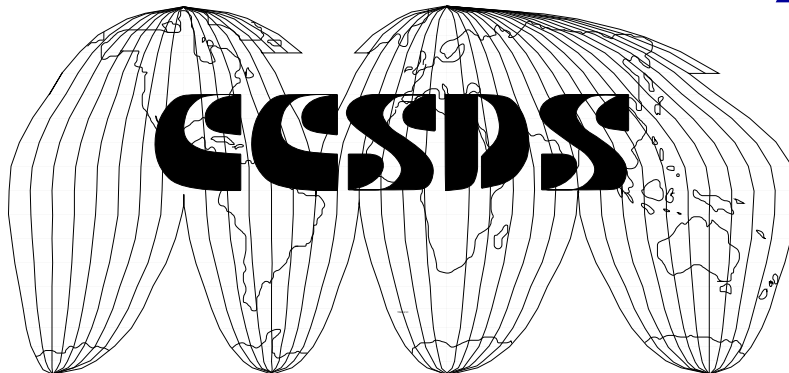
STANDARD FORMATTED DATA UNITS — STRUCTURE AND CONSTRUCTION RULES

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May 1992

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This Recommendation reflects the consensus technical agreement of the following member Agencies of the Consultative Committee for Space Data Systems (CCSDS):

- British National Space Centre (BNSC) / United Kingdom
- Canadian Space Agency (CSA) / Canada
- Centre National D'Etudes Spatiales (CNES) / France
- Deutsche Forschungsanstalt für Luft und Raumfahrt (DLR) / FRG
- European Space Agency (ESA) / Europe
- Instituto de Pesquisas Espaciais (INPE) / Brazil
- National Aeronautics and Space Administration (NASA) / USA
- National Space Development Agency of Japan (NASDA) / Japan

The following observer Agencies also concur with this Recommendation:

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FOREWORD

This document is a technical Recommendation for the standardisation of the structure and construction rules of Standard Formatted Data Units (SFDU), for the interchange of digital space-related data in an open data system and has been prepared by the Consultative Committee for Space Data Systems (CCSDS). Other aspects of the SFDU concept are described in documents listed in the Reference section.

This Recommendation defines SFDU structures that will handle some of the problems of digital data interchange and several construction rules that will limit the SFDUs to a practical set that can exist in an open data system environment. It allows implementing organisations within each Agency to proceed coherently with the development of compatible derived Standards for space data systems and widely dispersed data users that are within their cognisance.

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].

Questions relating to the contents or status of this document should be addressed to the CCSDS Secretariat.

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STATEMENT OF INTENT

The Consultative Committee for Space Data Systems (CCSDS) is an organisation officially established by the management of the member space Agencies. The committee meets periodically to address data system 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 the committee are termed **RECOMMENDATIONS** and are not considered binding to any Agency.

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

- Whenever an Agency establishes a CCSDS-related Standard, this Standard will be in accordance 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 memorandum 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.

DOCUMENT CONTROL

Document	Title	Date	Status/ Remarks
CCSDS 620.0-B-1	Recommendation for Space Data System Standards: Standard Formatted Data Units -- Structure and Construction Rules, Blue Book, Issue 1	Feb 1988	Issue 1
CCSDS 620.0-B-2	Recommendation for Space Data System Standards: Standard Formatted Data Units -- Structure and Construction Rules, Blue Book, Issue 2	May 1992	Issue 2, see note below

Note: The major changes from Issue 1 to Issue 2 are the inclusion of techniques for the following:

- For linking a data description with its identifier (ADID).
- For delimiting data objects other than by length.
- For referencing external labelled and unlabelled data objects.

Issue 2 is forwards compatible with the whole of Issue 1.

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REFERENCES

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- [2] "Recommendation for Space Data System Standards: Standard Formatted Data Units -- Control Authority Procedures", CCSDS 630.0-R-2, Red Book, Issue 2, Consultative Committee for Space Data Systems, April 1992 or later.
- [3] "Report Concerning Space Data System Standards: Standard Formatted Data Units -- A Tutorial", CCSDS 621.0-G-1, Green Book, Issue 1, Consultative Committee for Space Data Systems, May 1992 or later.
- [4] "Information Technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1)", ISO 8824:1990E, Second Edition, December 1990.
- [5] "Recommendation for Space Data System Standards: Parameter Value Language Specification (CCSD0006)", CCSDS 641.0-B-1, Blue Book, Issue 1, Consultative Committee for Space Data Systems, May 1992 or later.
- [6] "Recommendation for Space Data System Standards: ASCII Encoded English (CCSD0002)", CCSDS 643.0-R-1, Red Book, Issue 1, Consultative Committee for Space Data Systems, May 1992 or later.
- [7] "Recommendation for Space Data System Standards: Standard Formatted Data Units -- Control Authority Data Structures", CCSDS 632.0-B-1, Blue Book, Issue 1, Consultative Committee for Space Data Systems, November 1994 or later.
- [8] "Recommendation for Space Data System Standards: Standard Formatted Data Units -- Referencing Environment", CCSDS 622.0-R-1, Red Book, Issue 1, Consultative Committee for Space Data Systems, November 1994 or later.

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1 INTRODUCTION

1.1 Purpose and Scope

The purpose of this document is to establish a Recommendation for the implementation of standard data structures for the interchange of data in a more uniform and automated fashion within and between the Agencies participating in the Consultative Committee for Space Data Systems (CCSDS).

This Recommendation defines the Standard Formatted Data Unit (SFDU) Concept. This concept covers the following areas:

- 1) A method for labelling data objects to provide a general classification and a link to a unique description of each data object;
- 2) A method of organising data objects into a hierarchical structure to provide a complete set of information. This includes referencing of data objects that are defined externally, such as files.

1.2 Applicability

This Recommendation serves as a guideline for the development of compatible agency standards in the field of digital data interchange. The specifications in this document are to be invoked through the normal standards program of each member agency and are applicable, at a minimum, to those missions and services for which cross support based on the need for open system data interchange is anticipated.

To be compatible with the CCSDS SFDU concept, an agency must use the structures as defined by this Recommendation.

1.3 Recommended Approach to Reading the Document

A proper understanding of this Recommendation requires familiarity with the SFDU concept, the rationale underlying the various product building and packaging techniques and the specific terminology used in this document. It is recommended that Reference [3] be read prior to this Recommendation as it describes both the requirements and the rationale behind the SFDU concept, and introduces the technical material contained in this Recommendation through examples.

The document is structured as follows:

- Section 2 gives a general overview of the SFDU concept, and introduces the basic data structuring components;
- Section 3 describes the details of the LABEL-VALUE structure used by the SFDU concept and defines all its sub-fields;
- Section 4 describes CCSDS defined Class IDs and, where applicable, the relationships between them;

- Section 5 describes the CCSDS defined Authority and Description Identifiers (ADIDs) which are relevant to this Recommendation, with regard to the rules for constructing and parsing the corresponding VALUE fields;
- Section 6 describes the CCSDS defined combinations of ADIDs and Class IDs;
- Annexes A and B present a complete summary of the acronyms and the terminology used in this document;
- Annex C gives a formal specification in Abstract Syntax Notation One (ASN.1, see Reference [4]), of the structures presented in this Recommendation;
- Annexes D and E specify the ASCII character codes and octet/bit numbering conventions used throughout the document;
- An index is supplied covering all the major terms in the document, the first page referenced by the index points to the definition of the term.

Throughout this Recommendation structure diagrams are used to explain the structures presented. The following conventions are used in these diagrams:

- The item named to the left of the := symbol is the item being defined;
- The diagram on the right of the := symbol is the definition;
- A vertical branch point represents a choice;
- A repetition is indicated by a loop back covering the object to be repeated. If there are the symbols $n < x$ next to the loop back, then it means the loop can be repeated only 0 to x number of times;
- The termination of each structure is represented by an \circ symbol.

For example:

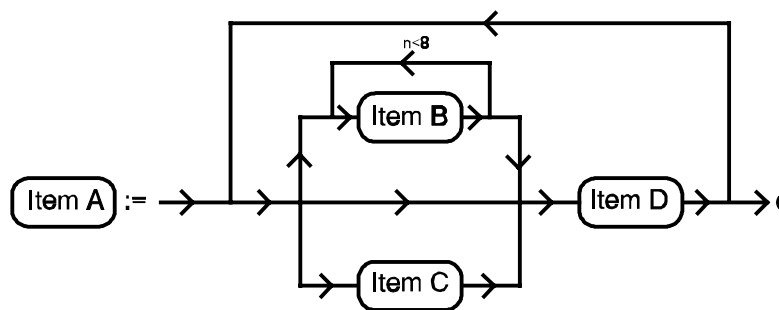


Figure 1-1: Example Structure Diagram

In this example Item A is defined as first a choice between Items B or C or nothing, if Item B is selected then it may be repeated further from 1 to 7 times. Then this structure is followed by one Item D. Once this structure is built up, it may then all be repeated any number of times, until the choice to pass onto the \circ symbol is taken. Of course if any items on the right (B, C or D) contain an Item A, the definition is recursive. Recursive structure definitions are permitted in this Recommendation.

Where possible Abstract Syntax Notation One (ASN.1, see Reference [4]) definitions of the structures presented in this Recommendation are given in Annex C. In the case of any unintentional inconsistency with the ASN.1 specification, the specification given in Sections 1 to 6 is the ruling specification (This is because the ASN.1 cannot wholly describe the structures presented here, without additional natural language comments).

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