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**Space data and information transfer  
systems — AOS (advanced orbiting  
systems) space data link protocol**

*Systèmes de transfert des données et informations spatiales —  
Protocole de liaison pour données spatiales AOS (systèmes  
perfectionnés sur orbite)*

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## Foreword

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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. [www.iso.org/directives](http://www.iso.org/directives)

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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 22666 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 232.0-B-3, September 2015) 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*.

This third edition cancels and replaces the second edition (ISO 22666:2007), which has been technically revised. It also incorporates the amendment ISO 22666:2007/Amd.1:2015.

## 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.
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  - 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 five 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 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 Advanced Orbiting Systems (AOS) Space Data Link Protocol described herein is intended for missions that are cross-supported between Agencies of the CCSDS.

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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-4). Current versions of CCSDS documents are maintained at the CCSDS Web site:

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

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- United States Geological Survey (USGS)/USA.

## DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 732.0-B-1	AOS Space Data Link Protocol, Issue 1	September 2003	Original issue, superseded
CCSDS 732.0-B-2	AOS Space Data Link Protocol, Recommended Standard, Issue 2	July 2006	Issue 2, superseded
CCSDS 732.0-B-3	AOS Space Data Link Protocol, Recommended Standard, Issue 3	September 2015	Current issue: <ul style="list-style-type: none"> <li>– adds specifications to support the Space Data Link Security Protocol;</li> <li>– updates Frame Error Control Field Encoding Procedure to be consistent with other CCSDS Space Data Link Protocol specifications;</li> <li>– changes all occurrences of ‘Packet Service’ and ‘Packet Transfer Service’ to ‘Virtual Channel Packet Service’;</li> <li>– corrects/clarifies Service Specification ‘indication’ text;</li> <li>– updates/clarifies text relating to Idle Packet generation;</li> <li>– replaces term ‘Idle Frame’ with ‘Only Idle Data (OID) Frame’;</li> </ul>

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Document	Title	Date	Status
			Current issue (continued): – removes obsolete informative annex detailing changes from Historical Recommendation CCSDS 701.0-B-3-S (1989–2005).

NOTE – Substantive changes from the previous issue are marked by change bars in the inside margin. For terminology changes affecting the entire document, only the first instances are marked.

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## 1 INTRODUCTION

### 1.1 PURPOSE

The purpose of this Recommended Standard is to specify the Advanced Orbiting Systems (AOS) Space Data Link Protocol. This protocol is a Data Link Layer protocol (see reference [1]) to be used over space-to-ground, ground-to-space, or space-to-space communications links by space missions.

### 1.2 SCOPE

This Recommended Standard defines the AOS Space Data Link 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 Recommended Standard applies to the creation of Agency standards and to future data communications over space links between Consultative Committee for Space Data Systems (CCSDS) Agencies in cross-support situations. The Recommended Standard 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 Recommended Standard 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 Recommended Standard is anticipated. Where mandatory capabilities are clearly indicated in sections of the Recommended Standard, 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.

## 1.4 RATIONALE

The CCSDS believes it is important to document the rationale underlying the recommendations chosen, so that future evaluations of proposed changes or improvements will not lose sight of previous decisions.

## 1.5 DOCUMENT STRUCTURE

This document is divided into six numbered sections and three annexes:

- a) section 1 presents the purpose, scope, applicability and rationale of this Recommended Standard and lists the conventions, definitions, and references used throughout the Recommended Standard;
- b) section 2 provides an overview of the AOS Space Data Link Protocol;
- c) section 3 defines the services provided by the protocol entity;
- d) section 4 specifies the protocol data units and procedures employed by the protocol entity;
- e) section 5 specifies the managed parameters used by the protocol entity;
- f) section 6 specifies the protocol entity with support for the Space Data Link Security Protocol;
- g) annex A lists all acronyms used within this document;
- h) annex B provides a list of informative references.

## 1.6 CONVENTIONS AND DEFINITIONS

### 1.6.1 DEFINITIONS

#### 1.6.1.1 Definitions from the Open Systems Interconnection (OSI) Basic Reference Model

This Recommended Standard makes use of a number of terms defined in reference [1]. The use of those terms in this Recommended Standard is to be understood in a generic sense, i.e., in the sense that those terms are generally applicable to any of a variety of technologies that provide for the exchange of information between real systems. Those terms are:

- a) blocking;
- b) connection;
- c) Data Link Layer;
- d) entity;

- e) flow control;
- f) Network Layer;
- g) peer entities;
- h) Physical Layer;
- i) protocol control information;
- j) protocol data unit;
- k) real system;
- l) segmenting;
- m) service;
- n) Service Access Point (SAP);
- o) SAP address;
- p) service data unit.

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### 1.6.1.2 Definitions from OSI Service Definition Conventions

This Recommended Standard makes use of a number of terms defined in reference [2]. The use of those terms in this Recommended Standard is to be understood in a generic sense, i.e., in the sense that those terms are generally applicable to any of a variety of technologies that provide for the exchange of information between real systems. Those terms are:

- a) confirmation;
- b) indication;
- c) primitive;
- d) request;
- e) response;
- f) service provider;
- g) service user.

### 1.6.1.3 Terms Defined in this Recommended Standard

For the purposes of this Recommended Standard, the following definitions also apply. Many other terms that pertain to specific items are defined in the appropriate sections.

**aperiodic:** not *periodic* (see below).