INTERNATIONAL STANDARD

ISO 18442

First edition
2013-06-01

Space data and information transfer systems — Space Link Extension — Application Program Interface for Return All Frames Service

Systèmes de transfert des informations et données spatiales — Extension de liaisons spatiales — Interface du programme d'application pour service de retour par tout réseau

Reference number
ISO 18442:2013(E)

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Published in Switzerland

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

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ISO 18442 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 915.1-M-1, October 2008) 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 Link Extension — Application Program Interface for Return All Frames Service

1 Scope

This International Standard specifies extensions to the API needed for support of the Return All Frames (RAF) service defined in *Space Link Extension—Return All Frames Service Specification,* CCSDS 911.1-B-2.

This International Standard defines extensions to the SLE API in terms of:

a) the RAF-specific functionality provided by API components;

b) the RAF-specific interfaces provided by API components; and

c) the externally visible behavior associated with the RAF interfaces exported by the components.

It does not specify

a) individual implementations or products;

b) the internal design of the components; and

c) the technology used for communications.

This International Standard defines only interfaces and behavior that must be provided by implementations supporting the Return All Frames service in addition to the specification in *Space Link Extension—Application Program Interface for Transfer Services—Core Specification*, CCSDS 914.0-M-1.

The scope and field of application are furthermore detailed in subclause 1.3 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 915.1-M-1, October 2008, Space Link Extension — Application Program Interface for Return All Frames Service.

For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 915.1-M-1.

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

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Add the following information to the reference indicated:

[1] Document CCSDS 910.4-B-2, October 2005, is equivalent to ISO 15396:2007.

[2] Document CCSDS 911.1-B-2, December 2004, is equivalent to ISO 22669:2007.

[3] Document CCSDS 914.0-M-1, October 2008, is equivalent to ISO 18441:2013.

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Add the following information to the reference indicated:

[C4] Document CCSDS 913.1-B-1, September 2008, is equivalent to ISO 18440:2013.

3 Revision of publication CCSDS 915.1-M-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 915.1-M-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

The Consultative Committee for Space Data Systems

Recommendation for Space Data System Practices

SPACE LINK EXTENSION—APPLICATION PROGRAM INTERFACE FOR RETURN ALL FRAMES SERVICE

RECOMMENDED PRACTICE

CCSDS 915.1-M-1

MAGENTA BOOK
October 2008

AUTHORITY

Issue:	Recommended Practice, Issue 1
Date:	October 2008
Location:	Washington, DC, USA

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 documents is detailed in the *Procedures Manual for the Consultative Committee for Space Data Systems*, 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
Space Communications and Navigation Office, 7L70
Space Operations Mission Directorate
NASA Headquarters
Washington, DC 20546-0001, USA

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 **Recommendations** and are not in themselves considered binding on any Agency.

CCSDS Recommendations take two forms: **Recommended Standards** that are prescriptive and are the formal vehicles by which CCSDS Agencies create the standards that specify how elements of their space mission support infrastructure shall operate and interoperate with others; and **Recommended Practices** that are more descriptive in nature and are intended to provide general guidance about how to approach a particular problem associated with space mission support. This **Recommended Practice** is issued by, and represents the consensus of, the CCSDS members. Endorsement of this **Recommended Practice** is entirely voluntary and does not imply a commitment by any Agency or organization to implement its recommendations in a prescriptive sense.

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

FOREWORD

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

This **Recommended Practice** specifies service type-specific extensions of the Space Link Extension Application Program Interface for Transfer Services specified by CCSDS (reference [3]). It allows implementing organizations within each Agency to proceed with the development of compatible, derived Standards for the ground systems that are within their cognizance. Derived Agency Standards may implement only a subset of the optional features allowed by the **Recommended Practice** and may incorporate features not addressed by the **Recommended Practice**.

Through the process of normal evolution, it is expected that expansion, deletion, or modification of this document may occur. This Recommended Practice is therefore subject to CCSDS document management and change control procedures, which are defined in the *Procedures Manual for the Consultative Committee for Space Data Systems*. 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.

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

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- Swedish Space Corporation (SSC)/Sweden.
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DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 915.1-M-1	Space Link Extension—Application Program Interface for Return All Frames Service, Recommended Practice, Issue 1	October 2008	Original issue

CONTENTS

1 INTRODUCTION

1.1 PURPOSE

The Recommended Practice *Space Link Extension—Application Program Interface for Transfer Services—Core Specification* (reference [3]) specifies a C++ API for CCSDS Space Link Extension Transfer Services. The API is intended for use by application programs implementing SLE transfer services.

Reference [3] defines the architecture of the API and the functionality on a generic level, which is independent of specific SLE services and communication technologies. It is thus necessary to add service type-specific specifications in supplemental Recommended Practices. The purpose of this document is to specify extensions to the API needed for support of the Return All Frames (RAF) service defined in reference [2].

1.2 SCOPE

This Recommended Practice defines extensions to the SLE API in terms of:

a) the RAF-specific functionality provided by API components;

b) the RAF-specific interfaces provided by API components; and

c) the externally visible behavior associated with the RAF interfaces exported by the components.

It does not specify

a) individual implementations or products;

b) the internal design of the components; and

c) the technology used for communications.

This Recommended Practice defines only interfaces and behavior that must be provided by implementations supporting the Return All Frames service in addition to the specification in reference [3].

1.3 APPLICABILITY

The RAF Application Program Interface specified in this document supports two versions of the RAF service, namely:

a) version 1 as specified by reference [C2]; and

b) version 2 as specified by reference [2].

Support for version 1 of these services is included for backward compatibility purposes for a limited time and may not be continued in future versions of this specification. Support for

version 1 of the RAF service implies that SLE API implementations of this specification are able to interoperate with peer SLE systems that comply with the specification of the Transport Mapping Layer (TML) in ‘Specification of a SLE API Proxy for TCP/IP and ASN.1’, ESOC, SLES-SW-API-0002-TOS-GCI, Issue 1.1, February 2001.

Any version-dependent provisions within this Recommended Practice are marked as follows:

a) [V1:] for provisions specific to version 1; and

b) [V2:] for provisions specific to version 2.

1.4 RATIONALE

This Recommended Practice specifies the mapping of the RAF service specification to specific functions and parameters of the SLE API. It also specifies the distribution of responsibility for specific functions between SLE API software and application software.

The goal of this Recommended Practice is to create a standard for interoperability between:

a) application software using the SLE API and SLE API software implementing the SLE API; and

b) service user and service provider applications communicating with each other using the SLE API on both sides.

This interoperability standard also allows exchangeability of different products implementing the SLE API, as long as they adhere to the interface specification of this Recommended Practice.

1.5 DOCUMENT STRUCTURE

1.5.1 ORGANIZATION

This document is organized as follows:

a) section 1 provides purpose and scope of this specification, identifies conventions, and lists definitions and references used throughout the document;

b) section 2 provides an overview of the RAF service and describes the API model extension including support for the RAF service;

c) section 3 contains detailed specifications for the API components and for applications using the API;

d) annex A provides a formal specification of the API interfaces and data types specific to the RAF service;

e) annex B lists all acronyms used within this document;

f) annex C lists informative references.