
**Space data and information transfer
systems — Space Link Extension —
Application Program Interface for the
Forward CLTU Service**

*Systèmes de transfert des informations et données spatiales —
Extension de liaisons spatiales — Interface du programme d'application
pour le service de l'unité de transmission pour la liaison d'envoi de
télécommande (CLTU)*

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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ISO 18445 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 916.1-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*.

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Space data and information transfer systems — Space Link Extension — Application Program Interface for the Forward CLTU Service

1 Scope

This International Standard specifies extensions to the API needed for support of the Command Link Transmission Unit (CLTU) service defined in *Space Link Extension—Forward CLTU Service Specification*, CCSDS 912.1-B-2.

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

- a) the CLTU-specific functionality provided by API components;
- b) the CLTU-specific interfaces provided by API components; and
- c) the externally visible behavior associated with the CLTU 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 forward CLTU 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 916.1-M-1, October 2008, Space Link Extension — Application Program Interface for the Forward CLTU Service.

For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 916.1-M-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 reference indicated:

- [1] Document CCSDS 231.0-B-1, September 2003, is equivalent to ISO 22642:2005.
- [2] Document CCSDS 232.0-B-1, September 2003, is equivalent to ISO 22664:2005.
- [3] Document CCSDS 910.4-B-2, October 2005, is equivalent to ISO 15396:2007.
- [4] Document CCSDS 912.1-B-2, December 2004, is equivalent to ISO 22671:2011.
- [5] Document CCSDS 914.0-M-1, October 2008, is equivalent to ISO 18441:2013.

Page C-1

Add the following information to the reference indicated:

- [C5] Document CCSDS 913.1-B-1, September 2008, is equivalent to ISO 18440:2013.

3 Revision of publication CCSDS 916.1-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 916.1-M-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

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Recommendation for Space Data System Practices

**SPACE LINK EXTENSION—
APPLICATION PROGRAM
INTERFACE FOR THE
FORWARD CLTU SERVICE**

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RECOMMENDED PRACTICE

CCSDS 916.1-M-1

MAGENTA BOOK

October 2008

AUTHORITY

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| Issue: | Recommended Practice, Issue 1 |
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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.

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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.

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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 [5]). 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**.

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1 INTRODUCTION

1.1 PURPOSE

The Recommended Practice *Space Link Extension—Application Program Interface for Transfer Services—Core Specification* (reference [5]) 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 [5] 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 Command Link Transmission Unit (CLTU) service defined in reference [4].

1.2 SCOPE

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

- a) the CLTU-specific functionality provided by API components;
- b) the CLTU-specific interfaces provided by API components; and
- c) the externally visible behavior associated with the CLTU interfaces exported by the components.

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- 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 forward CLTU service in addition to the specification in reference [5].

1.3 APPLICABILITY

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

- a) version 1 as specified by reference [C2]; and
- b) version 2 as specified by reference [4].

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 CLTU 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.

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 forward CLTU 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) SLE user and SLE provider applications communicating with each other using the SLE API on both.

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:

- section 1 provides purpose and scope of this specification, identifies conventions, and lists definitions and references used throughout the document;
- section 2 provides an overview of the CLTU service and describes the API model extension including support for the CLTU service;
- section 3 contains detailed specifications for the API components and for applications using the API;