
**Space link extension — Cross support
transfer service — Specification
framework**

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This document was prepared by Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 921.1-B-1, April 2017) and drafted in accordance with its editorial rules. It was assigned to Technical Committee ISO/TC 20, *Space vehicles*, Subcommittee SC 13, *Space data and information transfer systems* and adopted under the “fast-track procedure”.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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1 INTRODUCTION

1.1 PURPOSE

The purpose of this Recommended Standard is to define the various logical components, also known within this Recommended Standard as procedures that are required for specifying Cross Support Transfer Services (CSTSeS).

1.2 SCOPE

1.2.1 This Recommended Standard defines, in an abstract manner, a CSTS in terms of:

- a) the procedures necessary to provide the service;
- b) the states of the service;
- c) the behavior of each procedure;
- d) the states of the procedures;
- e) the operations necessary to constitute the procedures; and
- f) the parameters associated with each operation.

1.2.2 It does not specify:

- a) individual application services, implementations, or products;
- b) the implementation of entities or interfaces within real systems;
- c) the methods or technologies required to acquire data;
- d) the methods or technologies required to provide a suitable environment for communications; or
- e) the management activities required to schedule and configure services.

1.3 APPLICABILITY

1.3.1 APPLICABILITY OF THIS RECOMMENDED STANDARD

This Recommended Standard provides a basis for the specification and development of Cross Support Services that are intended to be used for developing real systems that implement such services.

Implementation of a service based on the CSTS procedures defined in this Recommended Standard in a real system additionally requires the availability of a communications service to convey invocations and responses of the CSTS operations between the service user and the service provider.

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This Recommended Standard requires that such a communications service provides a reliable protocol, i.e., that it ensures that invocations and responses of operations are transferred:

- a) in sequence;
- b) completely and with integrity;
- c) without duplication;
- d) with flow control that notifies the application layer in the event of congestion or backpressure; and
- e) with notification to the application layer in the event that communications between the service user and the service provider are disrupted, possibly resulting in a loss of data.

It is the specific intent of this Recommended Standard to define the CSTS independently of any particular communications services, protocols, technologies, or formatting of the data content.

1.3.2 LIMITS OF APPLICABILITY

This Recommended Standard specifies the CSTS procedures that may be used for the definition of Cross Support Transfer Services. It does not intend to specify a Cross Support Transfer Service.

1.4 RATIONALE

The goal of this Recommended Standard is to create a standard for interoperability between various Agencies' tracking stations or ground data handling systems and the consumers or producers of spacecraft data and related monitor and/or control information.

1.5 DOCUMENT STRUCTURE

1.5.1 ORGANIZATION OF THIS DOCUMENT

This document is organized as follows:

- a) section 1 presents the purpose, scope, applicability, and rationale of this Recommended Standard and lists the definitions, conventions, and references;
- b) section 2 provides an overview of the CSTS Specification Framework;
- c) section 3 specifies the common operations to be used by Cross Support Transfer Services;
- d) section 4 specifies the procedures to be used by the Cross Support Transfer Services;
- e) annex A contains the proforma of the Protocol Implementation Conformance Statement;

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- f) annex B provides a formal specification of the production status;
- g) annex C provides a formal specification of what a qualified parameter is;
- h) annex D provides a formal specification of the Object Identifiers and the management of their allocation;
- i) annex E defines the composition of Functional Resource Names, Parameter Names, Event Names, Parameter Lists, and Event Lists using Published Identifiers of the appropriate types;
- j) annex F provides a formal specification of data types for Protocol Data Units (PDUs) for common operations using Abstract Syntax Notation One (ASN.1);
- k) annex G provides a description of the service provider states;
- l) annex H contains considerations related to security, SANA, and patents;
- m) annex I provides a list of informative references;
- n) annex J lists selected terms used in this Recommended Standard and identifies where they are defined;
- o) annex K lists acronyms used in this document;
- p) annex L provides an informative list of Object Identifiers used by this Recommended Standard;
- q) annex M illustrates by means of examples the concept of Published Identifiers.

1.5.2 CROSS SUPPORT TRANSFER SERVICES DOCUMENTATION

The basic organization of the Cross Support Services documentation and the relationship to CSTS documentation is shown in figure 1-1.

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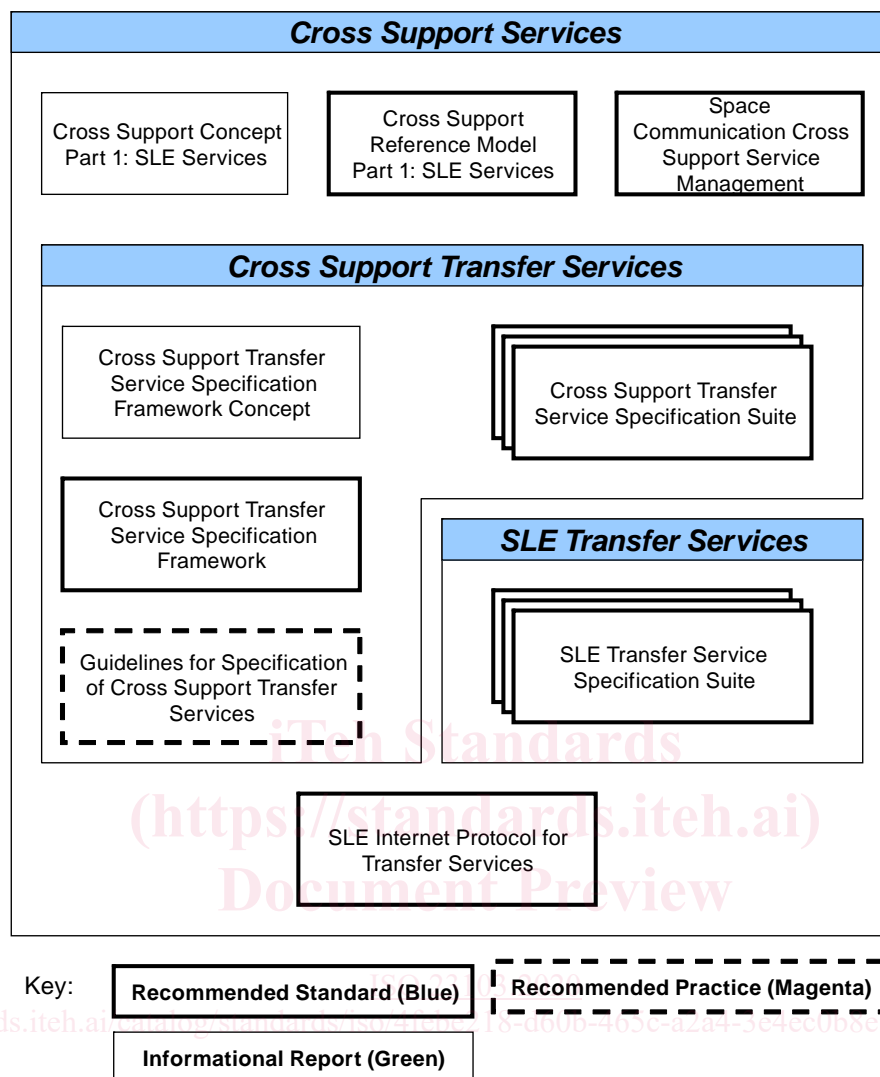


Figure 1-1: Cross Support Service Documentation

The Cross Support Services documents that are related to Cross Support Transfer Services are:

- Cross Support Concept—Part 1: Space Link Extension Services* (reference [12]): A report introducing the concepts of cross support and the SLE services. Many of the concepts for the SLE transfer services have been adopted for the CSTSes (see h) below).
- Cross Support Reference Model—Part 1: Space Link Extension Services* (reference [1]): A Recommended Standard that defines the framework and terminology for the specification of SLE services. Much of the framework and terminology of this reference model has been adopted or adapted for CSTSes (see 1.6.1.3 and 2.2).

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- c) *Space Communication Cross Support Service Management suite* (references [I4], [I6] and [I7]). Future data format Recommended Standards will specify the Service Management Information Entities that are used to configure and schedule CSTSes.
- d) The *SLE Transfer Services suite*: The SLE Transfer Services are a suite of Cross Support Services that are used to transfer specific telecommand and telemetry protocol data units. The SLE Transfer Services are closely related to the CSTS suite in that they collectively define the set of operations that are the basis for the CSTS Specification Framework. However, because of history (the SLE Transfer Services were already specified and implemented prior to development of the CSTS Specification Framework) the SLE Transfer Services are separated from CSTSes.
- e) *Space Link Extension—Internet Protocol for Transfer Services* (reference [2]): A Recommended Standard that defines a protocol for transfer of PDUs defined in the Cross Support Transfer Services. This Recommended Standard was originally developed to support SLE transfer services (hence the title), but it is also applicable to use by Cross Support Transfer Services.

The documents specific to Cross Support Transfer Services are:

- f) *Cross Support Transfer Services Specification Framework* (this Recommended Standard): A Recommended Standard that defines the specification of the Cross Support Transfer Service procedures;
- g) *Guideline for Specification of Cross Support Transfer Services* (reference [I3]): A Recommended Practice that defines the guidelines for construction of a Cross Support Transfer Service based on the CSTS Specification Framework;
- h) *Cross Support Transfer Services Specification Framework Concept* (reference [I5]): A Report that provides tutorial material on the objectives and concepts of the CSTS Specification Framework;
- i) *Cross Support Transfer Services Suite*: The set of specifications for actual CSTSes built from the procedures in the CSTS Specification Framework and in accordance with the CSTS Guidelines.

1.6 DEFINITIONS, NOMENCLATURE AND CONVENTIONS

1.6.1 DEFINITIONS

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

This Recommended Standard makes use of a number of terms defined in reference [3]. The use of those terms in this Recommended Standard shall be understood in a generic sense, i.e., in the sense that those terms are generally applicable to technologies that provide for the exchange of information between real systems. Those terms are:

- a) abstract syntax;