
**Space data and information transfer
systems — Space link extension
(SLE) — Return-all-frames service
specification**

*Systèmes de transfert des données et informations spatiales —
Extension de liaisons spatiales (SLE) — Service de retour par tout
réseau*

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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 (see www.iso.org/directives).

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This document was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 911.1-B-4, August 2016) and was adopted (without modifications) by Technical Committee ISO/TC 20, *Space vehicles*, Subcommittee SC 13, *Space data and information transfer systems*.

This fourth edition cancels and replaces the third edition (ISO 22669:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

- adds clarifications and corrections;
- adds production status annex;
- updates specifications to accommodate recent additions to the CCSDS Recommended Standards for coding and synchronization.

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.

CONTENTS

<u>Section</u>	<u>Page</u>
1 INTRODUCTION	1-1
1.1 PURPOSE OF THIS RECOMMENDED STANDARD.....	1-1
1.2 SCOPE.....	1-1
1.3 APPLICABILITY.....	1-1
1.4 RATIONALE.....	1-2
1.5 DOCUMENT STRUCTURE.....	1-2
1.6 DEFINITIONS, NOMENCLATURE, AND CONVENTIONS.....	1-5
1.7 REFERENCES.....	1-13
2 DESCRIPTION OF THE RETURN ALL FRAMES SERVICE	2-1
2.1 OVERVIEW.....	2-1
2.2 SPACE LINK EXTENSION REFERENCE MODEL.....	2-1
2.3 SERVICE MANAGEMENT.....	2-3
2.4 ARCHITECTURE MODEL—FUNCTIONAL VIEW.....	2-4
2.5 ARCHITECTURE MODEL—CROSS SUPPORT VIEW.....	2-7
2.6 FUNCTIONAL DESCRIPTION.....	2-8
2.7 OPERATIONAL SCENARIO.....	2-17
2.8 SECURITY ASPECTS OF THE SLE RAF TRANSFER SERVICE.....	2-18
3 RAF SERVICE OPERATIONS	3-1
3.1 GENERAL CONSIDERATIONS.....	3-1
3.2 RAF-BIND.....	3-15
3.3 RAF-UNBIND.....	3-22
3.4 RAF-START.....	3-26
3.5 RAF-STOP.....	3-31
3.6 RAF-TRANSFER-DATA.....	3-33
3.7 RAF-SYNC-NOTIFY.....	3-38
3.8 RAF-SCHEDULE-STATUS-REPORT.....	3-41
3.9 RAF-STATUS-REPORT.....	3-45
3.10 RAF-GET-PARAMETER.....	3-48
3.11 RAF-PEER-ABORT.....	3-52
4 RAF PROTOCOL	4-1
4.1 GENERIC PROTOCOL CHARACTERISTICS.....	4-1
4.2 RAF SERVICE PROVIDER BEHAVIOR.....	4-4

CCSDS RECOMMENDED STANDARD FOR SLE RAF SERVICE

CONTENTS (continued)

<u>Section</u>	<u>Page</u>
ANNEX A DATA TYPE DEFINITIONS (NORMATIVE)	A-1
ANNEX B PRODUCTION STATUS (NORMATIVE)	B-1
ANNEX C CONFORMANCE MATRIX (NORMATIVE)	C-1
ANNEX D INDEX TO DEFINITIONS (INFORMATIVE)	D-1
ANNEX E ACRONYMS (INFORMATIVE)	E-1
ANNEX F INFORMATIVE REFERENCES (INFORMATIVE)	F-1

Figure

1-1 SLE Services Documentation	1-4
2-1 Return Space Link Processing SLE-FG	2-4
2-2 RAF Service Production and Provision	2-6
2-3 Example of the Management and Provision of RAF Service	2-7
2-4 Simplified RAF Service Provider State Transition Diagram	2-10
2-5 Communications Realization of RAF Service	2-12
2-6 Buffers and Delivery Modes	2-17
B-1 RAF Production Status Transitions	B-1

Table

2-1 RAF Operations	2-9
3-1 Setting of RAF Service Configuration Parameters	3-6
3-2 RAF-BIND Parameters	3-16
3-3 RAF-UNBIND Parameters	3-23
3-4 RAF-START Parameters	3-27
3-5 RAF-STOP Parameters	3-31
3-6 RAF-TRANSFER-DATA Parameters	3-33
3-7 RAF-SYNC-NOTIFY Parameters	3-38
3-8 RAF-SCHEDULE-STATUS-REPORT Parameters	3-42
3-9 RAF-STATUS-REPORT Parameters	3-45
3-10 RAF-GET-PARAMETER Parameters	3-48
3-11 RAF Parameters	3-50
3-12 RAF-PEER-ABORT Parameters	3-52
4-1 Provider Behavior	4-6
4-2 Event Description References	4-13
4-3 Predicate Descriptions	4-13
4-4 Boolean Flags	4-14
4-5 Compound Action Definitions	4-14
B-1 Production Status Changes and Notifications	B-2
B-2 Effect of Production Status on Operations	B-3
C-1 Conformance Matrix for RAF Service (Operations)	C-1
C-2 Conformance Matrix for RAF Service (Other Requirements)	C-2

1 INTRODUCTION

1.1 PURPOSE OF THIS RECOMMENDED STANDARD

The purpose of this Recommended Standard is to define the Space Link Extension (SLE) Return All Frames (RAF) service in conformance with the SLE Reference Model (reference [1]). The RAF service is an SLE transfer service that delivers to a mission user all telemetry frames from one space link physical channel.

1.2 SCOPE

This Recommended Standard defines, in an abstract manner, the RAF service in terms of:

- a) the operations necessary to provide the service;
- b) the parameter data associated with each operation;
- c) the behaviors that result from the invocation of each operation; and
- d) the relationship between, and the valid sequence of, the operations and resulting behaviors.

It does not specify:

- a) individual implementations or products;
- b) the implementation of entities or interfaces within real systems;
- c) the methods or technologies required to acquire telemetry frames from signals received from a spacecraft;
- d) the methods or technologies required to provide a suitable environment for communications; or
- e) the management activities required to schedule, configure, and control the RAF service.

1.3 APPLICABILITY

1.3.1 APPLICABILITY OF THIS RECOMMENDED STANDARD

This Recommended Standard provides a basis for the development of real systems that implement the RAF service. Implementation of the RAF service in a real system additionally requires the availability of a communications service to convey invocations and returns of RAF service operations between RAF service users and providers. This Recommended Standard requires that such a communications service must ensure that invocations and returns of operations are transferred:

- a) in sequence;

CCSDS RECOMMENDED STANDARD FOR SLE RAF SERVICE

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

It is the specific intent of this Recommended Standard to define the RAF service in a manner that is independent of any particular communications services, protocols, or technologies.

1.3.2 LIMITS OF APPLICABILITY

1.3.2.1 Relationship to Real Systems

This Recommended Standard specifies the RAF service that may be provided by an SLE Complex for inter-Agency cross support. It is neither a specification of, nor a design for, real systems that may be implemented for the control and monitoring of existing or future missions.

1.3.2.2 RAF Service and Telemetry Channel Coding

Telemetry channel coding on the space link is specified by references [2], [3], and [4]. The provision of RAF service requires, as specified in reference [2], that, at any given time, the coding options must be the same for all frames on a physical channel.

Reference [F5] allowed multiplexing of coded Transfer Frames (encoded with the Reed-Solomon code) with non-coded Transfer Frames on a Physical Channel. This is not allowed anymore by recommendations in force.

1.4 RATIONALE

The goal of this Recommended Standard is to create a standard for interoperability between the tracking stations or ground data handling systems of various Agencies and the consumers of spacecraft telemetry.

1.5 DOCUMENT STRUCTURE

1.5.1 ORGANIZATION

This document is organized as follows: