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Space data and information transfer systems — Spacecraft onboard interface services — RFID-based inventory management systems

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National foreword

This British Standard is the UK implementation of ISO 18382:2013.

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INTERNATIONAL STANDARD

ISO 18382

First edition
2013-06-01

Space data and information transfer systems — Spacecraft onboard interface services — RFID-based inventory management systems

Systèmes de transfert des informations et données spatiales — Services d'interfaces à bord des véhicules spatiaux — Systèmes de gestion des stocks basés sur la radiofréquence (RFID)

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Foreword

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ISO 18382 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 881.0-M-1, May 2012) 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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INTERNATIONAL STANDARD ISO 18382:2013(E)

Space data and information transfer systems — Spacecraft onboard interface services — RFID-based inventory management systems

1 Scope

This International Standard provides recommended practices for the utilization of Radio Frequency Identification (RFID) protocol and communication standards in support of inventory management activities associated with space missions.

The recommended practices contained in this International Standard enable member agencies to select the best option(s) available for interoperable RFID-based communications in the support of inventory management applications. The specification of a Recommended Practice facilitates interoperable communications and forms the foundation for cross-support of communication systems between separate member space agencies.

This International Standard is targeted towards passive (unpowered) RFID tags transmitting in the 860 MHz – 960 MHz Ultra High Frequency (UHF) radio band. The recommended practices are applicable to both terrestrial (ground-based) and space-based automated inventory management systems utilizing only passive RFID tags.

Active RFID systems and utilization of RFID tags for precision asset localization are not covered in this International Standard.

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 881.0-M-1, May 2012, Spacecraft onboard interface services — RFID-based inventory management systems.

For the purposes of international standardization, the modifications outlined below shall apply to the specific clauses and paragraphs of publication CCSDS 881.0-M-1.

3 Revision of publication CCSDS 881.0-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 881.0-M-1. To this end, NASA will act as a liaison body between CCSDS and ISO.

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The Consultative Committee for Space Data Systems

Recommendation for Space Data System Practices

SPACECRAFT ONBOARD INTERFACE SERVICES—RFID-BASED INVENTORY MANAGEMENT SYSTEMS

RECOMMENDED PRACTICE

CCSDS 881.0-M-1

MAGENTA BOOK

May 2012

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AUTHORITY

Issue:	Recommended Practice, Issue 1
Date:	May 2012
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 *Organization and Processes for the Consultative Committee for Space Data Systems* (CCSDS A02.1-Y-3), 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:

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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.

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.

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FOREWORD

This document is, as of the date of publication, the consensus result of the best practices for inventory management systems utilizing wireless communications in support of space missions.

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 *Organization and Processes for the Consultative Committee for Space Data Systems* (CCSDS A02.1-Y-3). 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 addressed to the CCSDS Secretariat at the address indicated on page i.

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DOCUMENT CONTROL

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1 INTRODUCTION

1.1 PURPOSE

This document provides recommended practices for the utilization of Radio Frequency Identification (RFID) protocol and communication standards in support of inventory management activities associated with space missions. Relevant technical background information can be found in *Wireless Network Communications Overview for Space Mission Operations* (reference [D4]).

The recommended practices contained in this report enable member agencies to select the best option(s) available for interoperable RFID-based communications in the support of inventory management applications. The specification of a Recommended Practice facilitates interoperable communications and forms the foundation for cross-support of communication systems between separate member space agencies.

1.2 SCOPE

This Recommended Practice is targeted towards passive (unpowered) RFID tags transmitting in the 860 MHz – 960 MHz Ultra High Frequency (UHF) radio band. The recommended practices are applicable to both terrestrial (ground-based) and space-based automated inventory management systems utilizing only passive RFID tags.

Active RFID systems and utilization of RFID tags for precision asset localization are not covered in this Recommended Practice.

1.3 APPLICABILITY

This Recommended Practice specifies protocols that enable interoperable wireless inventory management systems that utilize RFID technologies.

NOTE – Inclusion of any specific wireless technology does not constitute any endorsement, expressed or implied, by the authors of this Recommended Practice or the agencies that supported the composition of this Recommended Practice.

1.4 RATIONALE

From an engineering standpoint, mission managers, along with engineers and developers, are faced with a plethora of wireless communication choices, both standards-based and proprietary. A CCSDS RFID-based inventory management system Recommended Practice provides guidance in the selection of systems necessary to achieve interoperable communications in support of automated inventory management.

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1.5 DOCUMENT STRUCTURE

Section 2 provides an informational overview of the rationale and benefits of spacecraft onboard wireless inventory management technologies for use in space operations. Included are an overview and comparison of the International Organization for Standardization (ISO) and the Electronic Product Code, known as EPCglobal, standards for RFID inventory management systems. EPCglobal is a joint venture between GS1 (formerly known as EAN International) and GS1 US (formerly the Uniform Code Council, Inc.). It is an organization set up to achieve worldwide adoption and standardization of Electronic Product Code (EPC) technology.

Section 3 provides a normative description for recommended practices and applicable standards relating to RFID portal-based readers and RFID hand-held readers.

Annex A provides an overview of security concerns pertaining to RFID-based inventory management systems.

Annex B discusses conformance and interoperability.

Annex C provides use cases and application profiles for RFID inventory management.

Annex D is a list of informative references.

Annex E is a glossary of abbreviations and terms used in this document.

Annex F provides a table of frequency ranges for ITU Industrial, Scientific, and Medical RF Bands.

Annex G identifies UHF spectrum utilization for major regions.

1.6 CONVENTIONS

1.6.1 NOMENCLATURE

The following conventions apply for the normative specifications in this Recommended Practice:

a) the words ‘shall’ and ‘must’ imply a binding and verifiable specification;

b) the word ‘should’ implies an optional, but desirable, specification;

c) the word ‘may’ implies an optional specification;

d) the words ‘is’, ‘are’, and ‘will’ imply statements of fact.

NOTE – These conventions do not imply constraints on diction in text that is clearly informative in nature.

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