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Space data and information transfer systems — Security architecture for space data systems

Systèmes de transfert des informations et données spatiales — Architecture de sécurité pour les systèmes de données spatiales

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 20214 was prepared by the Consultative Committee for Space Data Systems (CCSDS) (as CCSDS 351.0-M-1, November 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*.

The Consultative Committee for Space Data Systems

Recommendation for Space Data System Practices

SECURITY ARCHITECTURE FOR SPACE DATA SYSTEMS

RECOMMENDED PRACTICE

CCSDS 351.0-M-1

MAGENTA BOOK

November 2012

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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 *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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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

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:

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.

DOCUMENT CONTROL

Document	Title	Date	Status
CCSDS 351.0-M-1	Security Architecture for Space Data Systems, Recommended Practice, Issue 1	November 2012	Original issue

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

1.1.1 PURPOSE

This document is intended as a high-level systems engineering reference to enable engineers to better understand the layered security concepts required to secure a space system. As such, this document is a Security Architecture for Space Data Systems (SASDS).

This architecture uses the views described in the Reference Architecture for Space Data Systems (reference [B1]) developed by the CCSDS Architecture Working Group.

The SASDS will be used:

– to establish an overall CCSDS conceptual framework for the incorporation of security into the data systems of space missions;

– to define common language and representation so that risks, requirements, and solutions in the area of security within space data systems can be readily communicated;

– to provide a source of information for the security architects on a space mission to use to develop the system security design;

– to facilitate development of standards in a consistent way so that any standard can be used with other appropriate standards in a system.

1.1.2 SCOPE

This document presents a security reference architecture for space data systems and is intended to provide a standardized approach for description of security within data system architectures and high-level designs, which individual working groups may use within CCSDS.

For further information regarding security's role in space systems, the reader is directed to the supporting CCSDS documentation listed in annex B.

1.1.3 RELATIONSHIP WITH OTHER CCSDS DOCUMENTS

The relationship between this and other CCSDS documents is shown in figure 1-1 below:

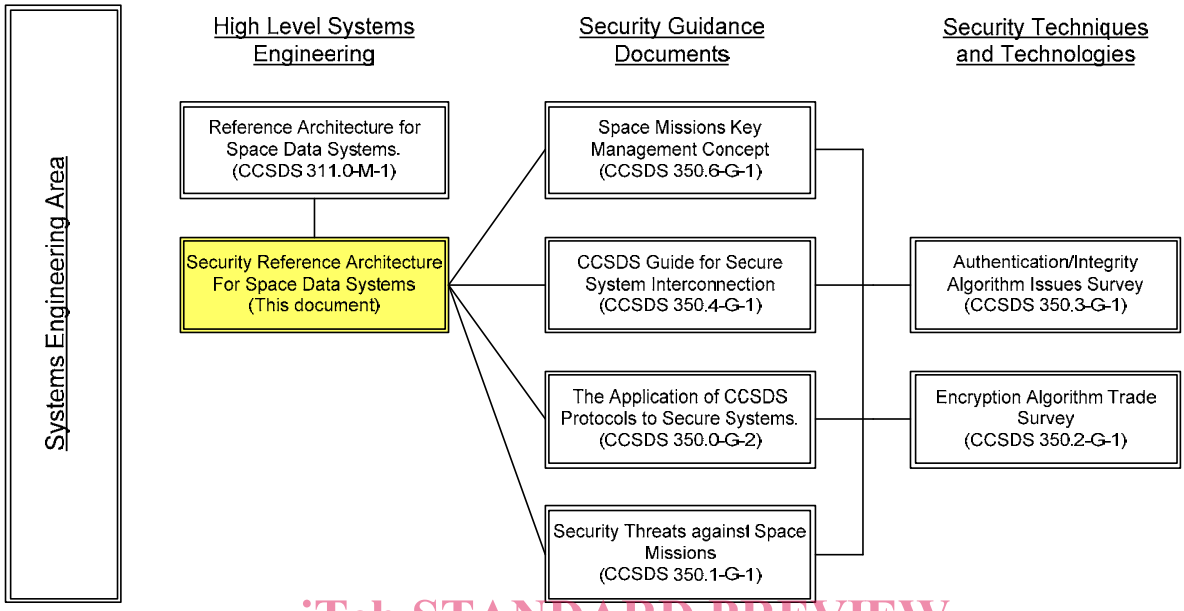

Figure 1-1: Relationship between This and Other CCSDS Documentation

1.2 DOCUMENT STRUCTURE

Section 2 provides an introduction into how the security architecture uses the Reference Architecture for Space Data Systems (RASDS).

Section 3 discusses the security concepts that need to be addressed by any security architecture.

Section 4 examines the security concepts and shows how the CCSDS architecture outlined in sections 2 and 3 relate to each other.

Section 5 establishes high-level principles and the scope that the security architecture addresses.

Section 6 illustrates a series of mission profiles which help identify where security is required, what the issues are, and what solutions are applicable.

Section 7 specifies the security reference architecture.

Annex **A** addresses security considerations pertaining to use of this Recommended Practice for developing real security architectures for missions.

Annex B lists informative references.

Annex C is a glossary of abbreviations and acronyms used in the document.

1.3 GLOSSARY OF TERMS

A full glossary of security terms used within this document is available in reference [B9].

1.4 NOMENCLATURE

1.4.1 NORMATIVE TEXT

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

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.

1.4.2 INFORMATIVE TEXT

In the normative sections of this document, informative text is set off from the normative specifications either in notes or under one of the following subsection headings:

– Overview;

– Background;

– Rationale;

– Discussion.