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Space data and information transfer systems — Digital motion imagery

Données spatiales et systèmes de transfert d'information - Imagerie du mouvement numérique

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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 766.1-B-2, August 2016) 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".

This second edition cancels and replaces the first edition (ISO 21077:2016), which has been technically revised.

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

— adds support for MPEG4 recording and JPEG2000 transmission.

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 AND SCOPE

The purpose of this document is to provide a common reference and framework of standards for digital motion video and imagery, and to provide recommendations for utilization of international standards for sharing or distributing motion video and imagery between spacecraft elements and ground systems.

The scope of this document includes traditional real-time streaming video and television, including human and robotic spacecraft-to-spacecraft and spacecraft-to-ground systems, as well as video recorded and distributed later, either as a real-time stream or as a file transfer. In this context, real-time streaming includes all modes where video is sent from a spacecraft in a continuous stream and is intended for immediate use when received, regardless of the latency of the transmission path. Other specialized motion imagery applications, such as high-speed scientific motion imagery and multi-spectral motion imagery, are not addressed in this document. However, if a specialized imagery camera system has a requirement to interface to spacecraft systems in a video mode, it would be required to match these interfaces.

Ground-systems-to-ground-systems video distribution is obviously a key component of the entire video system. However, this is not the primary focus of this document. Currently, there are significant differences in the ways mission video products are exchanged between the various space agencies on the ground. This is the result of differences in network topologies between space agencies, and agreements for video sharing. Those differences preclude there being a standard methodology for delivering video imagery between agencies. Prior to the commencement of video transmission between space agencies, system design reviews and performance testing should be done between the ground systems in use to assure operability when video imagery comes from spacecraft.

1.2 APPLICABILITY

This document is a CCSDS Recommended Standard. It is intended for all missions that produce, consume, or transcode video imagery from low-bandwidth video such as web streaming through high-bandwidth video such as high-definition television imagery.

1.3 NOMENCLATURE

1.3.1 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.

1.3.2 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.

1.4 REFERENCES

The following publications contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid. All publications are subject to revision, and users of this document are encouraged to investigate the possibility of applying the most recent editions of the publications indicated below. The CCSDS Secretariat maintains a register of currently valid CCSDS publications.

[1] *Studio Encoding Parameters of Digital Television for Standard 4:3 and Wide Screen 16:9 Aspect Ratios*. ITU-R BT.601-7. Geneva: ITU, 2011.

[2] *Television—SDTV Digital Signal/Data—Serial Digital Interface*. SMPTE ST 259:2008. White Plains, New York: SMPTE, 2008.

[3] *Digital Interfaces for HDTV Studio Signals*. ITU-R BT.1120-8. Geneva: ITU, 2012.

[4] *1.5 Gb/s Signal/Data Serial Interface*. SMPTE ST 292-1:2012. White Plains, New York: SMPTE, 2012.

[5] *High-Definition Multimedia Interface Specification*. Version 1.4. Sunnyvale, California: HDMI Licensing, LLC, 2009.

[6] *Electrical Characteristics of Low Voltage Differential Signaling (LVDS) Interface Circuits*. Revision A. TIA/EIA-644-A. Arlington, Virginia: TIA, February 2001.

[7] *Serial Digital Interface-Based Transport Interface for Compressed Television Signals in Networked Television Production Based on Recommendation ITU-R BT.1120*. ITU-R BT.1577. Geneva: ITU, 2002.