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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 42636-2023

Space data and information transfer systems - Lossless data compression

空间数据与信息传输系统 无损数据压缩

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Standardization Administration of the PRC

Table of Contents

Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules for Standardization Documents" drafting: This document is modified to adopt ISO 15887:2013 "Lossless Data Compression for Spatial Data and Information Transmission Systems": Compared with ISO 15887:2013, this document has more structural adjustments, and the structure number changes between the two documents are compared at a glance See Appendix A for the table: Compared with ISO 15887:2013, this document has many technical differences, and vertical Single lines () are marked: See Appendix B for a list of these technical differences and their reasons: The following editorial changes have been made to this document:

--- Deleted Chapter 1 of ISO 15887:2013 on principle definition, document structure, patented technology, etc:;

--- Deleted the definition of two compound nouns in the definition of ISO 15887:2013 Appendix B (see Chapter 3);

--- Change the "abbreviations" and "definitions" in Appendix B of ISO 15887:2013 to the text content (see Chapter 4);

--- Added the definition of symbols used in this document (see 4:1);

--- Deleted the abbreviations that did not appear in this document, and added other abbreviations used in this document (see 4:2);

--- Replaced ISO 22646 with the informative referenced GB/T 39348 (see 5:5);

--- Replaced ISO 22641 with the informative referenced GB/T 39351 (see 5:5);

--- Replaced the title "Overview" of Chapter 2 of ISO 15887:2013 with "Lossless Information Coder" (see Chapter 5);

--- Replaced "source data package" in ISO 15887:2013 with "spatial package" (see Chapter 8 and Chapter 9);

--- Deleted the informative appendix A "Security, space allocation coding and patent factors" of ISO 15887:2013;

--- Deleted the informative Appendix C "References" of ISO 15887:2013: Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents: This document is proposed and managed by the National Aerospace Technology and Its Application Standardization Technical Committee (SAC/TC425): This document is drafted by: Xi'an Institute of Space Radio Technology, China Aerospace Standardization Institute, 21st Century Space Technology Application Co:, Ltd:, Beijing Institute of Electronic Engineering, Shenzhen Chace Network Information Technology Co:, Ltd:, Beijing Remote Sensing Equipment Research Institute, China Resources Satellite Application Center: The main drafters of this document: Wang Juhua, Zhang Jianhua, Zhou Yuxia, Li Li, Xiao Huachao, Yuan Suchun, Yang Xinquan, Ma Xiaodong, Qu Zexu, Li Yongfeng, Zhang Jiapeng, Wang Mingtao, Xu Dongyan, Zhang Lang, Zheng Jingjing, Gou Baowei, Li Hongjuan, Tang Wenzhuo, Yu Bingyang, Deng Xiaodong, Lin Zhengchun, He Jianjun, Wang Xiaoyan: Space Data and Information Transmission System lossless data compression

1 Scope

GB/T 42636-2023 specifies lossless data compression for space data systems, adopting ISO 15887 with modifications. A satellite generates far more data than its downlink can carry, and for scientific instruments the loss that lossy compression accepts is not acceptable - the faint signal that would be discarded is often the observation. The scheme in this standard is built for that case and for the spacecraft's constraints: it is simple enough to implement in radiation-hardened hardware, it adapts to changing data statistics without a training pass, and a bit error damages only one block. The standard sets the lossless source coder with its preprocessor and adaptive entropy coder, the encapsulation of the coded data and the error control, then the preprocessor in detail - its functions, the predictor, the reference sample and the prediction error mapper - and the adaptive entropy coder. It took effect on 1 September 2023.

This document specifies the lossless data compression method for spatial data and information transmission systems, mainly including preprocessor adaptive entropy coder Lossless source coder, coded data format and compressed code stream packaging format: This document applies to lossless data compression of spacecraft platform and payload data:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date applies to this document: For undated reference documents, the latest version (including all amendments) applies to this document:

GB/T 42041-2022 Aerospace Terminology Space Data and Information Transmission

3 Terms and Definitions

The following terms and definitions defined in GB/T 42041-2022 apply to this document: 3:1 entropy entropy A quantifiable measure of the average amount of information contained in each source sample:

Note: Expressed in "bits/sample": [Source: GB/T 42041-2022, 3:3:32, modified] 3:

2 Fundamental sequence fundamental sequence; FS A code that expresses a non-negative integer m with m "0"s followed by a "1" binary codeword:

Note: A basic sequence (FS) code is the concatenation of J FS code words: 3:

3 Sample splitting samplesplitting The process of separating a sampling sample into two sets of binary numbers: The separated binary numbers are adjacent, one set is low-order bits, and the other set is high-order bits: step position: [Source: GB/T 42041-2022, 3:3:93] 3:4 splitbits splitbits The low-order bits split from a binary representation of a sample:

4 Symbols and abbreviations

1 Symbols The following symbols apply to this document: