SLOVENSKI STANDARD
SIST EN 16603-50-24:2022

01-september-2022

Nadomešča:
SIST EN 16603-50-04:2015

Vesoljska tehnika - Sprejem obvestila CCSDS 231.0-B-3, sinhronizacija TC in kodiranje kanalov

Space engineering - Adoption Notice of CCSDS 231.0-B-3, TC Synchronization and Channel Coding

Raumfahrttechnik - Adaption CCSDS 231.0-B-3, Telekommando-Synchronisation und -Kanalkodierung

Ingénierie spatiale - Notice d'adoption de la CCSDS 231.0-B-3, TC Synchronization and Channel Coding

Ta slovenski standard je istoveten z: **EN 16603-50-24:2022**

ICS:

49.140	Vesoljski sistemi in operacije	Space systems and operations

SIST EN 16603-50-24:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16603-50-24

July 2022

ICS 49.140

Supersedes EN 16603-50-04:2014

English version

Space engineering - Adoption Notice of CCSDS 231.0-B-3, TC Synchronization and Channel Coding

Ingénierie spatiale - Notice d'adoption de la CCSDS 231.0-B-3, TC Synchronization and Channel Coding

Raumfahrttechnik - Adaption CCSDS 231.0-B-3, Telekommando-Synchronisation und -Kanalkodierung

This European Standard was approved by CEN on 13 March 2022.

CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN and CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN and CENELEC members are the national standards bodies and national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

CEN-CENELEC Management Centre:
Rue de la Science 23, B-1040 Brussels

Table of contents

Tables

European Foreword

This document (EN 16603-50-24:2022) has been prepared by Technical Committee CEN-CENELEC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-50-24:2022) originates from ECSS-E-AS-50-24C.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2023, and conflicting national standards shall be withdrawn at the latest by January 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

EN 16603-50-24, EN 16603-50-25 and EN 16603-50-26 together supersede EN 16603-50-04:2014.

The main changes with respect to EN 16603-50-04:2014 are listed below:

- Replacement of document by three Adoption Notices.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

This document has been developed to cover specifically space systems and has therefore precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1
Scope

This document identifies the clauses and requirements modified with respect to the standard CCSDS 231.0-B-3, *TC Synchronization and Channel Coding*, Issue 3, September 2017 for application in ECSS.

2
Context information

In the standard CCSDS 231.0-B-3, *TC Synchronization and Channel Coding*, CCSDS specifies synchronization and channel coding schemes, and the Physical Layer Operations Procedures, for use with EN 16603-50-25 (ECSS-E-AS-50-25) *TC Space Data Link Protocol*.

This Adoption Notice adopts and applies CCSDS 231.0-B-3 with a minimum set of modifications, identified in the present document, to allow for reference and for a consistent integration in the ECSS system of standards.

CCSDS 231.0-B-3 is similar to clauses 8 (Synchronization and coding sublayer) and 9 (Physical layer) of the EN 16603-50-04:2014 (ECSS-E-ST-50-04C) *Space data links – Telecommand protocols synchronization and channel coding*.

EN 16603-50-04:2014 (ECSS-E-ST-50-04) that is superseded by the following three Adoption Notices: EN 16603-50-24 (ECSS-E-ST-50-24), EN 16603-50-25 (ECSS-E-AS-50-25) and EN 16603-50-26 (ECSS-E-AS-50-26).

Differences between these standards that are not covered by the normative modifications in clause 4 are described in the informative Annex A.

Overview of superseded EN 16603-50-xx Standards

Superseded EN	New EN	Based on CCSDS
EN 16603-50-01:2014	EN 16603-50-21	CCSDS 131.0-B-3 (Sept. 2017)
EN 16603-50-03:2014	EN 16603-50-22	CCSDS 132.0-B-2 (Sept. 2015)
	EN 16603-50-23	CCSDS 732.0-B-3 (Sept. 2015)
EN 16603-50-04:2014	EN 16603-50-24	CCSDS 231.0-B-3 (Sept. 2017)
	EN 16603-50-25	CCSDS 232.0-B-3 (Sept. 2015)
	EN 16603-50-26	CCSDS 232.1-B-2 (Sept. 2010)

3 Abbreviated terms

Abbreviation	Meaning
BCH	Bose-Chaudhuri-Hocquenghem
CLTU	Communications Link Transmission Unit
LDPC	Low-density Parity-check
PLOP	Physical Layer Operations Procedure
SEC	Single Error Correction

4 Application requirements

a. CCSDS 231.0-B-3, TC Synchronization and Channel Coding, Issue 2, September 2010 shall apply with the following modifications listed in Table 4-1.

Table 4-1: Applicability table for CCSDS 231.0-B-3

Clause or requirement number	Applicability	Applicable text (the new/added text is underlined)	Comments	Text as in the original document (deleted text with strikethrough)
2.2.2	Modified (statement in informative section)	The Frame Error Control Field (FECF) defined in reference [1] is used to reduce the probability of undetected errors.	CCSDS informative section modified: words “may be used” replaced by words “is used”; words “particularly when the modified BCH code is decoded in an error-correcting mode”deleted.	The Frame Error Control Field (FECF) defined in reference [1] ~~may be~~ used to reduce the probability of undetected errors~~, particularly when the modified BCH code is decoded in an error-correcting mode.~~
3.5	Modified	Codewords that have been encoded using the modified BCH code described in 3.3 shall be decoded in an error correcting mode (Single Error Correction, or SEC). In error-correcting mode, the code can correct one bit in error and can detect two bits in	CCSDS requirement modified: SEC decoding not optional for BCH; Word “may” replaced by word “shall”. Words	Codewords that have been encoded using the modified BCH code described in 3.3 ~~may~~ be decoded ~~either in an error-detecting mode (Triple Error Detection, or TED) or~~ in an error correcting mode (Single

Clause or requirement number	Applicability	Applicable text (the new/added text is underlined)	Comments	Text as in the original document (deleted text with strikethrough)
		error.	"either in an error-detecting mode (Triple Error Detection, or TED) or" and words "depending on mission requirements" deleted. Sentence "When the error-detecting mode is chosen, one, two or three bits in error will be detected within the codeword (not counting the appended Filler Bit); when the error-correcting mode is chosen, one bit in error will be corrected and two bits in error will be detected" deleted. New sentence "In error-correcting mode, the code can correct one bit in error and can detect two bits in error" added.	Error Correction, or SEC)~~,~~ ~~depending on mission requirements. When the error-detecting mode is chosen, one, two or three bits in error will be detected within the codeword (not counting the appended Filler Bit); when the error-correcting mode is chosen, one bit in error will be corrected and two bits in error will be detected.~~
Table 5-1, in row S3 for State Definition bullet 1	Modified (Text in a Table 5-1)	Codewords, which are either free of error or which can be corrected, are received, decoded, and derandomized, and their contents are transferred to the sublayer above	CCSDS text in Table 5-1 modified: randomization not optional both for BCH and for LDPC. Words "if necessary" deleted.	Codewords, which are either free of error or which can be corrected, are received, decoded, and derandomized ~~(if necessary)~~, and their contents are transferred to the sublayer above.
Note 1 below Table 5-2	Modified (NOTE)	When BCH code is used, the search for the Start Sequence in State 2 accepts a Start Sequence containing one error.	CCSDS NOTE modified: SEC decoding not optional for BCH. Word "in" deleted and replaced by words "when BCH code is	~~In~~ the search for the Start Sequence in State 2~~, no error in the Start Sequence is allowed if the modified BCH code is decoded in the error-~~