Recommended Standard CCSDS 431.1-B-1
TECHNICAL CORRIGENDUM 1

Issue Date: April 2022

Variable Coded Modulation Protocol

TECHNICAL CORRIGENDUM 1

The Management Council of the Consultative Committee for Space Data Systems (CCSDS) has authorized the publication of technical corrigendum 1 to CCSDS 431.1-B-1, issued February 2021.

Page D-1, delete

"CADU channel access data unit"

Page 3-7, note under 3.4.2, change

from:

"including CSM and pseudo-randomization"

to:

"including CSM and codeblock pseudo-randomization"

*Page 3-6, **3.3.2.4.2**, change*

from:

"either H = 26 or H = 90 symbols"

to:

"H = 90 $\pi/2$ BPSK symbols comprising a 26-symbol Start of Frame and 64-symbol Physical Layer Signalling (PLS) as specified in section 5 of reference [4], except that the PLS portion may be omitted"

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NOTE – Current versions of CCSDS documents are maintained at the CCSDS Web site:

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*Page 3-5, **3.3.2.4.1**, change*

from:

"as specified in reference [4]"

to:

"as specified in section 5 of reference [4]"

*Page 3-5, after **3.3.2.2 Encoder Input and Output Length**, add*

3.3.2.3 Base-Band Header Insertion

When the VCM system uses DVB-S2 codes as given in mode table 3-4, a base-band header of 10 bytes shall be inserted in front of each K-bit information block, as described in subsection 5.1.6 of reference [4], to form K+80 bits.

3.3.2.4 Randomization

Each information block, together with the base-band header if present (and called BBFRAME in reference [4]), shall be randomized with the scrambler described in subsection 5.2.2 of reference [4].

*Page 3-4, **3.3.1.4.2**, change*

from:

"either H = 256 or H = 320 symbols"

to:

"H = 320 $\pi/2$ BPSK symbols comprising a 256-symbol Frame Marker and 64-symbol Frame Descriptor as specified in section 5 of reference [2], except that the Frame Descriptor portion may be omitted"

*Page 3-4, **3.3.1.4.1**, change*

from:

"as specified in reference [2]"

to:

"as specified in section 5 of reference [2]"

*Page 3-2, before **3.3 SPECIFICATION**, add*

3.2.3 FRAME RANDOMIZATION

3.2.3.1 When Type 1 VCM is used, each Transfer Frame shall be randomized with the pseudo-randomizer described in section 8 of reference [2].

3.2.3.2 When Type 2 VCM is used, the Transfer Frames shall not be randomized.

Page 3-2, note at top of page, delete

> " It is important to note that what is referred to here as SMTF is called CADU in references [2] and [3]."

*Page 3-1, **3.1 DISCUSSION—SLICER AND PLFRAME STRUCTURE**, change*

from:

> "The VCM protocol operates by taking CCSDS Transfer Frames as input, adding . . ."

to:

> "The VCM protocol operates by taking CCSDS Transfer Frames as input, pseudo-randomizing the Transfer Frames when one type of VCM is used, adding . . ."

*Page 2-1, **2 OVERVIEW**, second paragraph, change*

from:

> "This Recommended Standard covers functions in both the Synchronization and Channel Coding Sublayer and the Physical Layer."

to:

> "This Recommended Standard covers functions in both the Synchronization and Channel Coding Sublayer and the Physical Layer, the latter for what concerns the modulation schemes. CCSDS 401.0-B (reference [5]) covers additional features of the Physical Layer, such as frequency bands and polarizations, that are not described or referenced here."

[Editorially update references to current issues—these changes are not marked.]

Page 1-3, delete

"**channel access data unit, CADU**: A data unit consisting of either an ASM or a Code Synchronization Marker (CSM) followed by a Transfer Frame, a codeword, or a codeblock, depending on the coding scheme in use."