ATSC Standard: A/336:2023-03 Corrigendum No. 1, "CRC32 Specification"

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Revision History

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1. OVERVIEW

1.1 Definition

A Corrigendum is generated to correct an error or ambiguity in an ATSC document introduced either in drafting or publication of the document that could lead to incorrect or unsafe application of the document. Correction of a technical defect shall in no way cause a change in functionality. Corrigenda shall be published as attachments to the original ATSC document. Distribution by ATSC of existing documents shall include any approved Corrigenda.

1.2 Scope

This document describes the necessary update to A/336:2023-03.

1.3 Rationale for Changes

The changes described in this document are being proposed because the existing specification regarding use of CRC32 for error detection in video watermark messages contains an erroneous requirement that is non-functional, contradicts other requirements, and appears twice in the text. This error could lead to incompatible implementations and can be corrected easily.

A/336:2023-03 currently specifies use of CRC32 as follows:

> **message_CRC_32 –** When a message is sent in two or more fragments (e.g. last_fragment > 0) a 32-bit CRC covering the complete message (before segmentation) shall be provided in the last fragment of a fragmented message. The message_CRC_32 field shall not be present for non-fragmented messages (e.g. when the value of last_fragment is 0) or in any fragment other than the last (e.g. when fragment_number ≠ last_fragment). The message_CRC_32, when present, shall contain the CRC value that gives a zero output of the registers in the decoder defined in ISO/IEC 13818-1 [13], Annex A after processing the entire re-assembled message payload formed by concatenating the wm_message_id and wm_message_bytes(i) as specified in Table 5.4. The generating polynomial shall be $1 + x + x^2 + x^4 + x^5 + x^7 + x^8 + x^{10} + x^{11} + x^{12} + x^{16} + x^{22} + x^{23} + x^{26}$.
>
> **CRC_32 –** This 32-bit field shall contain the CRC value that gives a zero output of the registers in the decoder defined in ISO/IEC 13818-1 [13], Annex A after processing the entire message block. The generating polynomial shall be $1 + x + x^2 + x^4 + x^5 + x^7 + x^8 + x^{10} + x^{11} + x^{12} + x^{16} + x^{22} + x^{23} + x^{26}$.

The last sentence of each of these two definitions state a generator polynomial that is different from the polynomial specified by ISO/IEC 13818-1, Annex A, which includes all of the polynomial terms listed in A/336 and the additional term " + x^{32}". This last sentence therefore contradicts the preceding sentence, which dictates conformance with ISO/IEC 13818-1, Annex A. The use of this generator polynomial without the x^{32} term is not known to be effective for error detection nor is it used in any other known system or standard.

In contrast, ISO/IEC 13818-1 is widely used with demonstrated success. It also provides a functional and complete specification of CRC32 so further exposition of its method within A/336

is not needed. For these reasons, this corrigendum removes this incorrect and unnecessary text from A/336.

2. LIST OF CHANGES

Change instructions are given below in *italics*. Unless otherwise noted, inserted text, tables, and drawings are shown in blue; deletions of existing text are shown in ~~red strikeout~~. The text "[ref]" indicates that a cross reference to a cited referenced document should be inserted.

2.1 Change Instructions

In Section 5.1.1, delete two sentences as follows:

message_CRC_32 – When a message is sent in two or more fragments (e.g. last_fragment > 0) a 32-bit CRC covering the complete message (before segmentation) shall be provided in the last fragment of a fragmented message. The message_CRC_32 field shall not be present for non-fragmented messages (e.g. when the value of last_fragment is 0) or in any fragment other than the last (e.g. when fragment_number ≠ last_fragment). The message_CRC_32, when present, shall contain the CRC value that gives a zero output of the registers in the decoder defined in ISO/IEC 13818-1 [13], Annex A after processing the entire re-assembled message payload formed by concatenating the wm_message_id and wm_message_bytes(i) as specified in Table 5.4. ~~The generating polynomial shall be $1 + x + x^2 + x^4 + x^5 + x^7 + x^8 + x^{10} + x^{11} + x^{12} + x^{16} + x^{22} + x^{23} + x^{26}$.~~

CRC_32 – This 32-bit field shall contain the CRC value that gives a zero output of the registers in the decoder defined in ISO/IEC 13818-1 [13], Annex A after processing the entire message block. ~~The generating polynomial shall be $1 + x + x^2 + x^4 + x^5 + x^7 + x^8 + x^{10} + x^{11} + x^{12} + x^{16} + x^{22} + x^{23} + x^{26}$.~~

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