ATSC Standard:
A/322:2022-03 Amendment #1, "Time Expression"

Doc. A/322:2022-03 Amend, No. 1
24 November 2022

The Advanced Television Systems Committee, Inc. is an international, non-profit organization developing voluntary standards and recommended practices for broadcast television and multimedia data distribution. ATSC member organizations represent the broadcast, professional equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries. ATSC also develops implementation strategies and supports educational activities on ATSC standards. ATSC was formed in 1983 by the member organizations of the Joint Committee on Inter-society Coordination (JCIC): the Consumer Technology Association (CTA), the Institute of Electrical and Electronics Engineers (IEEE), the National Association of Broadcasters (NAB), the Internet & Television Association (NCTA), and the Society of Motion Picture and Television Engineers (SMPTE). For more information visit www.atsc.org.

Note: The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of this claim or of any patent rights in connection therewith. One or more patent holders have, however, filed a statement regarding the terms on which such patent holder(s) may be willing to grant a license under these rights to individuals or entities desiring to obtain such a license. Details may be obtained from the ATSC Secretary and the patent holder.

Implementers with feedback, comments, or potential bug reports relating to this document may contact ATSC at https://www.atsc.org/feedback/.

Revision History

Version	Date
Amendment approved	24 November 2022

ATSC Standard:
A/322:2022-03 Amendment #1, "Time Expression"

1. OVERVIEW

1.1 Definition

An Amendment is generated to document an enhancement, an addition or a deletion of functionality to previously agreed technical provisions in an existing ATSC document. Amendments shall be published as attachments to the original ATSC document. Distribution by ATSC of existing documents shall include any approved Amendments.

1.2 Scope

This document clarifies time expressions and references in A/322.

1.3 Rationale for Changes

1) S33 group was recently looking at TAI time and how ATSC specifies it. Currently A/322 has **L1D_time_sec** which uses the 32 LSBs of PTP epoch and parenthetically suggests PTP time. But the PTP time is only an informative reference, not normative in A/322. A/331 has System Time Fragment and talks of the same 32 bits, but no normative statement. It is suggested having A/322 change the PTP reference from informative to normative. In addition, semantics of **L1D_time_sec** needs to be modified to avoid confusion.

2) There are A/322 signaling fields controlled by A/324 (e.g., MISO related fields, TxID controls, etc.). It is suggested having A/322 change reference [4] from informative to normative.

1.4 Compatibility Considerations

The changes described in this document are backward-compatible relative to the currently published version of the standard to which this Amendment pertains.

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. Yellow highlighted references indicate the document editor should insert the appropriate internal document references.

2.1 Change Instructions

Modify Section 2.1 and Section 2.2 as follows:

2.1 Normative References

The following documents, in whole or in part, as referenced in this document, contain specific provisions that are to be followed strictly in order to implement a provision of this Standard.

[1] IEEE: "Use of the International Systems of Units (SI): The Modern Metric System," Doc. SI 10, Institute of Electrical and Electronics Engineers, New York, NY.

[2] ATSC: "ATSC Standard: System Discovery and Signaling," Doc. A/321:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.

[3] ATSC: "ATSC Standard: Link-Layer Protocol," Doc. A/330:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.

[4] ATSC: "ATSC Standard: Scheduler / Studio-Transmitter Link," Doc. A/324:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.

[5] IEEE: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems," Doc. 1588, Institute of Electrical and Electronics Engineers, New York, NY, approved 27 March 2008.

2.2 Informative References

[5] ATSC: "ATSC Standard: Scheduler / Studio-Transmitter Link," Doc. A/324:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.

[6] ATSC: "ATSC Standard: Signaling, Delivery, Synchronization, and Error Protection," Doc. A/331:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.

[7] IEEE: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems," Doc. 1588, Institute of Electrical and Electronics Engineers, New York, NY, approved 27 March 2008.

Add a new abbreviation in Section 3.3 as follows:

TAI   International Atomic Time

*Add a new term in Section 3.4 as follows:*

Time Information Position – The instant at the center of the leading edge of the first sample of the first symbol of a bootstrap.

Modify **L1D_time_sec** *in Section 9.3.1 as follows:*

L1D_time_sec – This field is the seconds portion of the precise TAI time[1] at which the first sample of the first symbol of the most recently received bootstrap was transmitted, shown as the Time Information Position in Figure 9.1. **L1D_time_sec** shall contain the 32 least significant bits of the number of seconds elapsed between the PTP epoch (see IEEE 1588 [6][5], Section 7.2.2) and the precise time at which the first sample of the first symbol of the most recently received bootstrap was transmitted. (Note that this calculation is performed before leap seconds are subtracted.) For example, if the precise time was 17:30:48 UTC (i.e., 17:31:24 TAI) on the 12th February 2016 there would have been exactly 1455298284 seconds elapsed since the PTP epoch (which is 1st January 1970 00:00:00 TAI) and the value transmitted in this field would be 0x56BE16EC. The difference between TAI and UTC seconds is signaled in A/331 SystemTime@currentUtcOffset (see A/331 [5], Section 6.4). The time value shall be transmitted at least once in every 5 second interval.

---

1 A monotonically increasing seconds count, without adjustment for leap seconds, maintained by the International Bureau of Weights and Measures (BIPM).
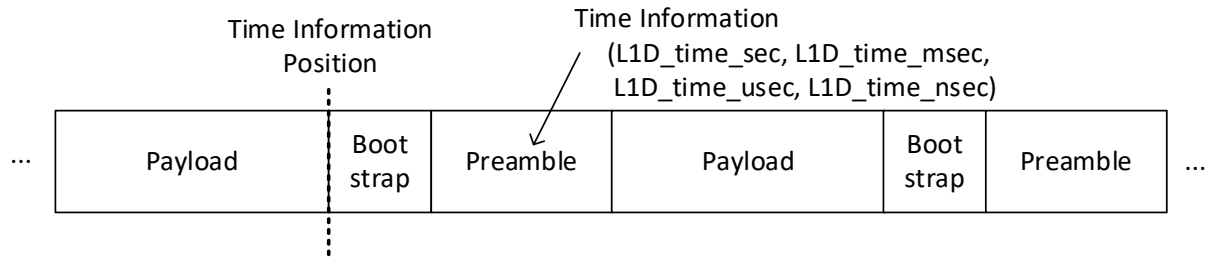
Figure 9.1 Illustration of the Time Information Position and the Time Information being transmitted in the Preamble.

– End of Document –