SMPTE RECOMMENDED PRACTICE

Open Binding of Distribution Channel IDs and Timestamps (OBID-TLC) - Conformance Test Materials

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Foreword

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SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual. This SMPTE Engineering Document was prepared by Technology Committee 24TB.

Intellectual Property

SMPTE draws attention to the fact that it is claimed that compliance with this Standard may involve the use of one or more patents or other intellectual property rights (collectively, "IPR"). The Society takes no position concerning the evidence, validity, or scope of this IPR.

Each holder of claimed IPR has assured the Society that it is willing to License all IPR it owns, and any third party IPR it has the right to sublicense, that is essential to the implementation of this Standard to those (Members and non-Members alike) desiring to implement this Standard under reasonable terms and conditions, demonstrably free of discrimination. Each holder of claimed IPR has filed a statement to such effect with SMPTE. Information may be obtained from the Director, Standards & Engineering at SMPTE Headquarters.

Attention is also drawn to the possibility that elements of this Standard may be subject to IPR other than those identified above. The Society shall not be responsible for identifying any or all such IPR.

Introduction

This clause is entirely informative and does not form an integral part of this Engineering Document.

This document provides a means for implementers of SMPTE ST 2112-20 Open Binding of Distribution Channel IDs and Timestamps to Content (OBID-TLC) to verify correct operation of their implementations via two non-prose elements:

1. SMPTE RP 2112-21a –audio sample with one Distribution Mark embedded (SMPTE RP 2112-21a.wav)
2. SMPTE RP 2112-21b – audio sample with four Distribution Marks embedded (SMPTE RP 2112-21b.wav)

1. Scope

This document provides conformance test materials to be used to validate implementations of SMPTE ST 2112-20 Open Binding of Distribution Channel IDs and Timestamps to Content (OBID-TLC).

2. Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except the Introduction, any clause explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next; then formal languages; then figures; and then any other language forms.

3. 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.

SMPTE ST 2112-20 Open Binding of Distribution Channel IDs and Timestamps (OBID-TLC)

4. Terms and Definitions

For the purposes of this document, the terms and definitions included in ST 2112-20 Open Binding of Distribution Channel IDs and Timestamps (OBID-TLC) shall apply.

5. Sample Files

5.1.1 Watermarking Cell With One Distribution Mark Embedded

The time $T_{1,1}$ corresponding to the last audio sample of the watermark packet to embed is YYYY-01-1515:20:0.000.

Seconds elapsed between $T_{1,1}$ and YYYY-01-01 at 0:00 = 1264800.000.

The marks to embed are Distribution Channel ID = 0x0A0B0123 and Timestamp = 1264800.000 seconds.

DCTL_timecode = 1264800 / (40 * 32768 / 48000) = 46318

DCTL_accuracy = 368

The watermarking of this single Distribution Mark is achieved by embedding the symbol sequence in Table 1.

Table 1. Symbol Sequence – Watermarking Cell With One Distribution Mark Embedded

Time Slot	Packet structure	Symbol type	Symbol index to embed
1	**sync**	S_{sync1}	512
	DCIDpayload	Data symbol	184
		Data symbol	288
		Data symbol	104
		Data symbol	80
	DCIDparity_symbol	Data symbol	95
	DCTLpayload	Data symbol	27
		Data symbol	370
		Data symbol	416
	DCTLparity_symbol	Data symbol	201
2	**Stuffing packet**	S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
3	**Stuffing packet**	S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
4	**Stuffing packet**	S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516
		S_{st}	516

The Timestamp encoded (corresponding to the media timeline of the last audio sample of the watermark packet) is **DCTL_timecode** * 40 * T + **DCTL_accuracy** * 1280 = 60710400000 samples = 1264800 seconds.

An audio sample embedded with this single Distribution Mark symbol sequence is provided along with this document in the SMPTE ST 2112-21a element.

5.1.2 Watermarking Cell With Four Distribution Marks Embedded

In that example, there are four independent Distribution Marks to embed. Refer to Table 2.

- Time $T_{1,1}$ -in distribution order 1 embedder reference time- corresponding to the last audio sample of the first watermarked packet is YYYY-01-15 15:20:0.000.

The marks to embed are Distribution Channel ID1 = 0x0A0B0123 and Timestamp1 = 1264800.000 seconds.

- Time $T_{1,2}$ -in distribution order 2 embedder reference time- corresponding to the last audio sample of the first watermarked packet is YYYY-01-15 15:20:0.030.

Distribution Channel ID2 = 0x23456789 and Timestamp2 = 1264806.857 seconds

- Time $T_{1,3}$ -in distribution order 3 embedder reference time- corresponding to the last audio sample of the first watermarked packet is YYYY-01-20 15:20:0.005.

The marks to embed are Distribution Channel ID3 = 0x34567890 and Timestamp3 = 1696813.658 seconds.

- Time $T_{1,4}$ -in distribution order 4 embedder reference time- corresponding to the last audio sample of the first watermarked packet is YYYY-01-20 15:20:0.020.

The marks to embed are Distribution Channel ID4 = 0x45678901 and Timestamp4 = 1696820.500 seconds.

Table 2. Watermarking Cell With Four Distribution Marks Embedded

	Distribution order 1 Embedder	Distribution order 2 embedder	Distribution order 3 embedder	Distribution order 4 embedder
Time $T_{1,x}$ -in distribution order x embedder reference time- corresponding to the last audio sample of the first watermarked packet.	YYYY-01-15 15:20:0.000	YYYY-01-15 15:20:0.030[1]	YYYY-01-15 15:20:0.005[2]	YYYY-01-15 15:20:0.020[3]
Seconds elapsed between $T_{1,x}$ and YYYY-01-01 at 0:00:0.000	1264800	1264800.030	1696800.005	1696800.020
Timestamp to embed	1264800	1264800.030+ Tpacket/48000 =1264806.857	1696800.005+ 2*Tpacket/48000 =1696813.658	1696800.020 + 3*Tpacket/48000 =1696820.500
DCTL_timecode	46318	46318	62139	62139
DCTL_accuracy	368	625	176	433
Timestamp encoded	1264800	1264806.853	1696813.653	1696820.507

[1] Distribution order 2 embedder clock is shifted + 30 ms compared to Distribution order 1 embedder time in this example.

[2] Distribution order 3 embedder clock is shifted + 5 days and 5 ms compared to Distribution order 1 embedder time in this example.

[3] Distribution order 4 embedder clock is shifted + 5 days and 20 ms compared to Distribution order 1 embedder time in this example.

The watermarking of these Distribution Marks is achieved by embedding the symbol sequence in Table 3.

Table 3. Symbol Sequence - Watermarking Cell With Four Distribution Marks Embedded

Time Slot	Packet structure	Symbol type	Symbol index to embed
1	sync	S_{sync1}	512
	DCIDpayload	Data symbol	184
		Data symbol	288
		Data symbol	104
		Data symbol	80
	DCIDparity_symbol	Data symbol	95
	DCTLpayload	Data symbol	27
		Data symbol	370
		Data symbol	416
	DCTLparity_symbol	Data symbol	201
2	sync	S_{sync2}	513
	DCIDpayload	Data symbol	306
		Data symbol	121
		Data symbol	337
		Data symbol	196
	DCIDparity_symbol	Data symbol	289
	DCTLpayload	Data symbol	283
		Data symbol	370
		Data symbol	416
	DCTLparity_symbol	Data symbol	457
3	sync	S_{sync3}	514
	DCIDpayload	Data symbol	65
		Data symbol	71
		Data symbol	309
		Data symbol	44
	DCIDparity_symbol	Data symbol	224
	DCTLpayload	Data symbol	30
		Data symbol	468
		Data symbol	480
	DCTLparity_symbol	Data symbol	42
4	sync	S_{sync4}	515
	DCIDpayload	Data symbol	208
		Data symbol	36
		Data symbol	243
		Data symbol	162
	DCIDparity_symbol	Data symbol	346
	DCTLpayload	Data symbol	286
		Data symbol	468
		Data symbol	480
	DCTLparity_symbol	Data symbol	298

An audio sample embedded with this four Distribution Mark scenario is provided along with this document in the SMPTE RP 2112-21b element.