ISDCF Closed Caption Authoring Best Practices

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Introduction

This document summarizes information in *JPEG Interop Group Closed Caption Packaging*, *SMPTE 428-10*, and closed captioning systems currently being manufactured. It is intended to help closed caption authors in creating captions that will work on the largest number of systems.

Closed captions use the timed text file format defined in SMPTE 428-7. The file is constrained by the above cited documents to work on personal display devices. Each of the constraints are discussed below. Since the same type of devices are used for closed subtitles as for closed captions, these constraints also apply to closed subtitles.

Timed Text File Size

Some closed captioning systems may be limited in the size of the timed text file they can handle. Most of the existing system supports timed text XML file size of at least 256kB. Some system may support higher size (e.g., up to 2MB). A timed text reel typically runs 100kB, so this should not be an issue. It is possible to use a single timed text file for the entire composition and break it into reels using EntryPoint and Duration, however, this may not work in all current implementations if the file size is larger than 256kB.

TimeIn, TimeOut, FadeUp, FadeDown, EntryPoint, Duration

Subtitles on the main screen may have overlapping display times resulting in more than one subtitle being present at the same time. Closed caption devices can only display one caption at a time. SMPTE 428-7 states that the subtitle shall complete its fade out at TimeOut. Further, closed caption display devices do not support FadeUp and FadeDown. A caption will be fully visible at TimeIn and fully invisible at TimeOut. The TimeIn of a caption must be equal to or later than the TimeOut of the previous caption, if any. When a caption straddles a reel boundary, it should be presented twice, once in the old reel, and once in the new reel. The old reel should have a TimeOut equal to the last edit unit of the reel. The TimeIn on the new reel should be the first edit unit of the new reel.

EntryPoint and Duration allow the composition playlist (CPL) to perform the equivalent of a film "butt splice." Captions in a reel that are before the entry point or after entry point + duration will not be shown. Captions that start before the entry point but end after the entry point will be shown for a shorter period of time (from EntryPoint to TimeOut). Similarly, captions that start before EntryPoint + Duration but end after EntryPoint + Duration will be shortened.

Caption authors are encouraged to use appropriate timing to ensure users have enough time to read the caption. A minimum time for a short caption of 0.5 seconds is suggested.

Image

While on-screen subtitles can be PNG images, closed captions cannot. Closed captions must use Text elements to contain the caption text.

Ruby Text

Ruby text is not supported by closed caption devices.

Halign and Hposition

Halign may be used within a Subtitle or Text element to left, center, or right justify the closed caption text. Some closed caption displays use Halign to horizontally position the text, while others ignore Halign and always align to the left or center. Authors should not count on Halign positioning text as desired on all devices. The Hposition attribute is ignored by closed caption devices.

Valign and Vposition

Some, but not all, systems interpret Valign and Vposition as specified in SMPTE 428-10. To ensure captions display correctly on all devices:

- The Text elements of each caption should be in the order they are to be displayed.
- The text that is to display on the first line should be in the first Text element in the Subtitle element.
- Valign and Vposition should be in accordance with SMPTE 428-10. If Valign is "top" or "center," the Vposition of each Text element within a subtitle element should be higher than the previous. If Valign is "bottom," the Vposition of each Text element within a Subtitle element should be lower than the previous.

Valign may be used in a Text element. If Valign is not used, it takes on its default value of "center." Valign for each Text element within a single Subtitle element must be the same.

Direction Attribute

Closed caption devices ignore the Direction attribute of the Text element and always display text left to right. Further, closed caption devices do not implement the Unicode bidirectional algorithm and ignore related elements and marks (bdi, LRM, RLM, etc.).

LoadFont, Font, and Font Attributes

Closed caption displays use an internal device-specific font. These devices ignore the LoadFont and Font elements. Current devices also ignore font attributes such as Italic. The inclusion of a font file and a LoadFont element in a closed caption timed text file is not expected to cause a problem. There IS a problem if there is a LoadFont element that refers to a font file that is not present.

Text

The closed caption text is enclosed in a Text element. Each line of the closed caption is in an individual Text element. Closed caption devices are currently limited to three lines of text, so an individual closed caption may have a maximum of three Text elements.

Closed caption devices support a limited number of characters per line. For the character set that is common to all devices (in the next section), most current devices will generally support 30 characters per line. Most systems used fixed width characters with 32 characters per line, but some use variable width characters where the number of characters per line varies depending on which characters are used. If more characters with larger width are included in a line, fewer characters may be rendered in the line causing unintended line break or loss of text. Authors of closed captions should be aware of the nature of the variable width font. With typical text, 30 characters (whether fixed or variable width) per line can be assumed.

Most systems support word wrap if a line of text is longer than can be displayed on a line. In most systems, the remainder of a line is shown on the next line by itself. For example, if the first line was too long to fit, the words that would not fit would be shown on the second line. The second line of text would then be displayed on the third line. If there were a third line of text, it would not be displayed. However, some systems remove line breaks if there is word wrap. In the example, the first line of text would be continued on the second line. Then the second line of text would be shown on the second line, perhaps overflowing to the third line. As much of the third line of text as possible would be displayed on the third line.

Caption lines should be limited to 30 characters to avoid word wrap.

Supported Characters

Characters are encoded in Text elements using UTF-8. Since some characters are reserved in XML, "character entities" are used for a small number of characters. XML also supports numbered character references of the form &#xxxx; and &#xyyyy; where xxxx is the Unicode code point in decimal, and yyyy is the Unicode code point in hexadecimal. Support for numbered character references and named character entities varies.

The character set supported by most existing closed captioning systems is listed below. This is ISO 8859-1 plus the character U+266A (♪). Some closed captioning systems may support additional characters, including double width Asian characters. The preferred encoding that is supported by the largest number of suppliers is marked in green.

Character	Unicode	UTF-8	XML Predefined Entity	Character Reference Decimal	Character Reference Hex
space	U+0020	0x20		 	
!	U+0021	0x21		!	!
"	U+0022	0x22	"	"	"
#	U+0023	0x23		#	#

Character	Unicode	UTF-8	XML Predefined Entity	Character Reference Decimal	Character Reference Hex
$	U+0024	0x24		$	$
%	U+0025	0x25		%	%
&	U+0026	0x26	&	&	&
'	U+0027	0x27	'	'	'
(	U+0028	0x28		(	(
)	U+0029	0x29		)	)
*	U+002A	0x2A		*	*
+	U+002B	0x2B		+	+
,	U+002C	0x2C		,	,
-	U+002D	0x2D		-	-
.	U+002E	0x2E		.	.
/	U+002F	0x2F		/	/
0	U+0030	0x30		0	0
1	U+0031	0x31		1	1
2	U+0032	0x32		2	2
3	U+0033	0x33		3	3
4	U+0034	0x34		4	4
5	U+0035	0x35		5	5
6	U+0036	0x36		6	6
7	U+0037	0x37		7	7
8	U+0038	0x38		8	8
9	U+0039	0x39		9	9
:	U+003A	0x3A		:	:
;	U+003B	0 3B		;	;
<	U+003C	0x3C	<	<	<
=	U+003D	0x3D		=	=
>	U+003E	0x3E	>	>	>
?	U+003F	0x3F		?	?
@	U+0040	0x40		@	@
A	U+0041	0x41		A	A
B	U+0042	0x42		B	B
C	U+0043	0x43		C	C
D	U+0044	0x44		D	D
E	U+0045	0x45		E	E
F	U+0046	0x46		F	F
G	U+0047	0x47		G	G
H	U+0048	0x48		H	H
I	U+0049	0x49		I	I
J	U+004A	0x4A		J	J
K	U+004B	0x4B		K	K
L	U+004C	0x4C		L	L
M	U+004D	0x4D		M	M

Character	Unicode	UTF-8	XML Predefined Entity	Character Reference Decimal	Character Reference Hex
N	U+004E	0x4E		N	N
O	U+004F	0x4F		O	O
P	U+0050	0x50		P	P
Q	U+0051	0x51		Q	Q
R	U+0052	0x52		R	R
S	U+0053	0x53		S	S
T	U+0054	0x54		T	T
U	U+0055	0x55		U	U
V	U+0056	0x56		V	V
W	U+0057	0x57		W	W
X	U+0058	0x58		X	X
Y	U+0059	0x59		Y	Y
Z	U+005A	0x5A		Z	Z
[	U+005B	0x5B		[	[
\	U+005C	0x5C		\	\
]	U+005D	0x5D		]	]
^	U+005E	0x5E		^	^
_	U+005F	0x5F		_	_
`	U+0060	0x60		`	`
a	U+0061	0x61		a	a
b	U+0062	0x62		b	b
c	U+0063	0x63		c	c
d	U+0064	0x64		d	d
e	U+0065	0x65		e	e
f	U+0066	0x66		f	f
g	U+0067	0x67		g	g
h	U+0068	0x68		h	h
i	U+0069	0x69		i	i
j	U+006A	0x6A		j	j
k	U+006B	0x6B		k	k
l	U+006C	0x6C		l	l
m	U+006D	0x6D		m	m
n	U+006E	0x6E		n	n
o	U+006F	0x6F		o	o
p	U+0070	0x70		p	p
q	U+0071	0x71		q	q
r	U+0072	0x72		r	r
s	U+0073	0x73		s	s
t	U+0074	0x74		t	t
u	U+0075	0x75		u	u
v	U+0076	0x76		v	v
w	U+0077	0x77		w	w

Character	Unicode	UTF-8	XML Predefined Entity	Character Reference Decimal	Character Reference Hex
x	U+0078	0x78		x	x
y	U+0079	0x79		y	y
z	U+007A	0x7A		z	z
{	U+007B	0x7B		{	{
|	U+007C	0x7C		|	|
}	U+007D	0x7D		}	}
~	U+007E	0x7E		~	~
space	U+00A0	0xC2 0xA0			
¡	U+00A1	0xC2 0xA1		¡	¡
¢	U+00A2	0xC2 0xA2		¢	¢
£	U+00A3	0xC2 0xA3		£	£
¤	U+00A4	0xC2 0xA4		¤	¤
¥	U+00A5	0xC2 0xA5		¥	¥
¦	U+00A6	0xC2 0xA6		¦	¦
§	U+00A7	0xC2 0xA7		§	§
¨	U+00A8	0xC2 0xA8		¨	¨
©	U+00A9	0xC2 0xA9		©	©
ª	U+00AA	0xC2 0xAA		ª	ª
«	U+00AB	0xC2 0xAB		«	«
¬	U+00AC	0xC2 0xAC		¬	¬
soft hyphen	U+00AD	0xC2 0xAD		­	­
®	U+00AE	0xC2 0xAE		®	®
¯	U+00AF	0xC2 0xAF		¯	¯
°	U+00B0	0xC2 0xB0		°	°
±	U+00B1	0xC2 0xB1		±	±
²	U+00B2	0xC2 0xB2		²	²
³	U+00B3	0xC2 0xB3		³	³
´	U+00B4	0xC2 0xB4		´	´
µ	U+00B5	0xC2 0xB5		µ	µ
¶	U+00B6	0xC2 0xB6		¶	¶
·	U+00B7	0xC2 0xB7		·	·
¸	U+00B8	0xC2 0xB8		¸	¸
¹	U+00B9	0xC2 0xB9		¹	¹
º	U+00BA	0xC2 0xBA		º	º
»	U+00BB	0xC2 0xBB		»	»
¼	U+00BC	0xC2 0xBC		¼	¼
½	U+00BD	0xC2 0xBD		½	½
¾	U+00BE	0xC2 0xBE		¾	¾
¿	U+00BF	0xC2 0xBF		¿	¿
À	U+00C0	0xC3 0x80		À	À
Á	U+00C1	0xC3 0x81		Á	Á

Character	Unicode	UTF-8	XML Predefined Entity	Character Reference Decimal	Character Reference Hex
Â	U+00C2	0xC3 0x82		Â	Â
Ã	U+00C3	0xC3 0x83		Ã	Ã
Ä	U+00C4	0xC3 0x84		Ä	Ä
Å	U+00C5	0xC3 0x85		Å	Å
Æ	U+00C6	0xC3 0x86		Æ	Æ
Ç	U+00C7	0xC3 0x87		Ç	Ç
È	U+00C8	0xC3 0x88		È	È
É	U+00C9	0xC3 0x89		É	É
Ê	U+00CA	0xC3 0x8A		Ê	Ê
Ë	U+00CB	0xC3 0x8B		Ë	Ë
Ì	U+00CC	0xC3 0x8C		Ì	Ì
Í	U+00CD	0xC3 0x8D		Í	Í
Î	U+00CE	0xC3 0x8E		Î	Î
Ï	U+00CF	0xC3 0x8F		Ï	Ï
Ð	U+00D0	0xC3 0x90		Ð	Ð
Ñ	U+00D1	0xC3 0x91		Ñ	Ñ
Ò	U+00D2	0xC3 0x92		Ò	Ò
Ó	U+00D3	0xC3 0x93		Ó	Ó
Ô	U+00D4	0xC3 0x94		Ô	Ô
Õ	U+00D5	0xC3 0x95		Õ	Õ
Ö	U+00D6	0xC3 0x96		Ö	Ö
×	U+00D7	0xC3 0x97		×	×
Ø	U+00D8	0xC3 0x98		Ø	Ø
Ù	U+00D9	0xC3 0x99		Ù	Ù
Ú	U+00DA	0xC3 0x9A		Ú	Ú
Û	U+00DB	0xC3 0x9B		Û	Û
Ü	U+00DC	0xC3 0x9C		Ü	Ü
Ý	U+00DD	0xC3 0x9D		Ý	Ý
Þ	U+00DE	0xC3 0x9E		Þ	Þ
ß	U+00DF	0xC3 0x9F		ß	ß
à	U+00E0	0xC3 0xA0		à	à
á	U+00E1	0xC3 0xA1		á	á
â	U+00E2	0xC3 0xA2		â	â
ã	U+00E3	0xC3 0xA3		ã	ã
ä	U+00E4	0xC3 0xA4		ä	ä
å	U+00E5	0xC3 0xA5		å	å
æ	U+00E6	0xC3 0xA6		æ	æ
ç	U+00E7	0xC3 0xA7		ç	ç
è	U+00E8	0xC3 0xA8		è	è
é	U+00E9	0xC3 0xA9		é	é
ê	U+00EA	0xC3 0xAA		ê	ê
ë	U+00EB	0xC3 0xAB		ë	ë

Character	Unicode	UTF-8	XML Predefined Entity	Character Reference Decimal	Character Reference Hex
ì	U+00EC	0xC3 0xAC		ì	ì
í	U+00ED	0xC3 0xAD		í	í
î	U+00EE	0xC3 0xAE		î	î
ï	U+00EF	0xC3 0xAF		ï	ï
ð	U+00F0	0xC3 0xB0		ð	ð
ñ	U+00F1	0xC3 0xB1		ñ	ñ
ò	U+00F2	0xC3 0xB2		ò	ò
ó	U+00F3	0xC3 0xB3		ó	ó
ô	U+00F4	0xC3 0xB4		ô	ô
õ	U+00F5	0xC3 0xB5		õ	õ
ö	U+00F6	0xC3 0xB6		ö	ö
÷	U+00F7	0xC3 0xB7		÷	÷
ø	U+00F8	0xC3 0xB8		ø	ø
ù	U+00F9	0xC3 0xB9		ù	ù
ú	U+00FA	0xC3 0xBA		ú	ú
û	U+00FB	0xC3 0xBB		û	û
ü	U+00FC	0xC3 0xBC		ü	ü
ý	U+00FD	0xC3 0xBD		ý	ý
þ	U+00FE	0xC3 0xBE		þ	þ
ÿ	U+00FF	0xC3 0xBF		ÿ	ÿ
♪	U+266A	0xE2 0x99 0xAA		♪	♪