EMA's Best Practices for Closed Captioning of Internet Protocol-Delivered Video Programming in the United States*

The EMA Closed Captions Working Group was created to develop a better understanding of, and appropriate best practices for compliance with, the legal requirements imposed by federal law and regulation for closed captioning of Internet Protocol-delivered video programming and to identify other best practices for the conversion of television closed caption files for transmission over the Internet.

Certification If Captions Are Not Provided

The Twenty-First Century Communications and Video Accessibility Act of 2010 and accompanying regulations promulgated by the Federal Communications Commission require that all full-length video delivered via the internet be able to be viewed with closed captions if the video airs on broadcast or cable television with closed captions on or after the applicable effective date. There were various effective dates for the requirement, which were dependent on whether the video programming was pre-recorded and whether it had been substantially edited for the Internet:

- September 30, 2012, for all prerecorded programming that is not edited for Internet distribution;
- March 30, 2013, for all live and "near-live" programming [programming that is performed and recorded within 24 hours prior to its initial airing on television];
- September 30, 2013, for all prerecorded programming that is edited for Internet distribution.

There are also rules for video programming that is already being shown on the internet before it is shown on television with closed captions. Currently, those videos must be captioned within 30 days of being shown on television with captions. The window will be reduced to 15 days in March 2016.

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The regulations do not cover user-generated content (unless that content is included in the video programming as broadcast on television).

The content licensor ("video programming owner") is to provide the closed captioning file to the online video service ("video programming distributor" or "video programming provider"). The content licensor and the online video service are to establish a mechanism for ongoing communication whether a particular video is covered by the closed captioning requirement, and the online video service must make a "good faith effort" to identify covered programming using that mechanism. An online video service is entitled to rely on a certification from the content provider that a particular video is not subject to the closed captioning requirement.

Recommended Best Practice for Certification if Captions Are Not Included (Manual Delivery):

If a closed caption file is not provided for intended IP-delivered video programming, the video programming owner should provide the following certification:

[Partner name] certifies that captions are not required for this video upload because:

- ☐ *This content has never aired on television in the U.S.*
- ☐ *This content has only aired on television in the U.S. without captions.*
- ☐ *This content has not aired on U.S. television with captions since September 30, 2012*
- ☐ *This content does not consist of full-length video programming.*
- ☐ *This content does not fall within a category of online programming that currently requires captions under FCC regulations (49 C.F.R. § 79.4(b)).*
- ☐ *The FCC and/or U.S. Congress has granted an exemption from captioning requirements for this content.*

Recommended Best Practice for Certification if Captions Are Not Included (Electronic Delivery):

If a closed caption file is not provided for intended IP-delivered video programming, the video programming owner should provide the above certification in both the avails and the metadata for that programming. The Media Entertainment Core Metadata (MEC) and EMA Content Availability Metadata (EMA Avails) provide the means to transfer the certification and reasons electronically.

Recommended Captioning Formats

In order for a broadcast video to be delivered over the Internet with closed captions, the closed caption file must be converted from the CEA-608-E [CEA 608] protocol used for television closed captions to a format suitable for Internet delivery (of which there are several), after which the captions can be edited to display properly. This conversion and editing can be done manually (extremely difficult and time-consuming), from scratch (very expensive), or by using

software to extract and reformat the captioning data (preferred).

Even with closed captioning software, conversion can be challenging, especially when it involves a broadcast closed caption file in a legacy format.

The intent of these recommendations is to facilitate the distribution of closed captions from a content provider in a manner that completely preserves their original presentation, or at least provides a functionally equivalent presentation. Most, if not all, captions in the United States are authored within the CEA-608 specification. It is, therefore, important to have recommendations that efficiently and accurately deliver captions sourced from CEA-608.

It is possible, however, to have captions that exceed CEA-608 capabilities, such as CEA-708-D digital television captions. Consequently, recommendations are included that support captions with capabilities beyond CEA-608. (Although the advanced caption recommendations can support CEA-608, we anticipate the CEA-608 recommendations will be preferred for conveying CEA-608 captions.)

There are two applicable standards for delivering CEA-608 captions. The first is Scenarist Closed Caption (SCC), a de facto standard for the conveyance of CEA-608 data. The second is SMPTE-TT, which was standardized by the Society of Motion Picture and Television Engineering (SMPTE), and is a profile of the Timed Text Markup Language (TTML), previously referred to as DFXP. SMPTE-TT also opens the door for advanced captions and subtitles, beyond CEA-608.

There are many ways to ensure compliance with the statutory and regulatory requirements to faithfully present closed captions, and users of CEA-608 captions are encouraged to understand the "safe harbor" provisions associated with compliant SMPTE-TT in the FCC regulations implementing the Twenty-First Century Communications and Video Accessibility Act of 2010 [47 C.F.R. 79.4(c)(1)(i)].

Recommended Best Practice for Caption Delivery:

The following three options are recommended.

Option 1: Delivery of CEA-608 closed caption files in SCC format

> Closed captions are delivered using SCC files. SCC offers a simple means to transfer CEA-608 equivalent data. CEA-608 caption data is tied by frames as a byproduct of which frames include the data. SCC substitutes timecodes for frame synchronization, but otherwise uses CEA data exactly.
>
> These files shall use the .scc extension.

Option 2: Delivery of CEA-608 closed caption files in SMPTE-TT format

In this option, SMPTE RP 2052-10 is used to convert CEA-608 to SMPTE-TT. The CEA-608 data should be tunneled according to Section 5.10, allowing it to be preserved in the SMPTE-TT document.

To maximize interoperability, the resulting SMPTE-TT file should conform to TTML Text and Image Profiles for Internet Media Subtitles and Captions 1.0 [IMSC1] if possible.

Option 3: CEA-708 Caption Delivery:

In this option, SMPTE RP 2052-11 is used to convert CEA-708 to SMPTE-TT. CEA-708 data should be tunneled according to RP 2052-11, Section 5.13, allowing it to be preserved in the SMPTE-TT document.

Note that it is permissible for CEA-708 captions to be embedded in the video stream; however, this does not satisfy the delivery requirement if it is the sole source of the caption information.

To maximize interoperability, the resulting SMPTE-TT file should conform to TTML Text and Image Profiles for Internet Media Subtitles and Captions 1.0 [IMSC1] if possible.

Recommendations Regarding Other Timed Text Methods:

Also acceptable are:

- Simple Delivery Profile (SDP), which is in process with the W3C TT Working Group; and
- Common File Format-Time Text (CFF-TT) (Note: CFF-TT does not preclude the use of tunneling transport as specified in Section 5.4 of SMPTE ST 2052-1.

Other formats are not recommended.

Frame Rates

Closed caption data files are separate from the video data files. Ideally, the caption frame rate should match the native frame rate of the source. However, they often do not, and synchronization of the two can be a problem.

Television in North America is generally broadcast at a standard rate of 29.97 frames per second (FPS). Internet video delivery, however, can support a variety of frame rate formats, and a number of distributors of IP-delivered video programming require films and TV shows to be at a frame rate of 23.976 or 25 FPS.

These varying frame rate requirements mean that the closed caption files that were created for North American broadcast will not match the Internet video frame rate. As a result, the frame rate of the caption file must be reconfigured to the frame rate utilized by the Internet video content distributor (such as 23.976 FPS), and if necessary, the time code must be stretched or shrunk.

This can be a challenge for a number of reasons. In many cases, the caption file has SMPTE-based timestamps and fails to specify the frame rate. In such cases, one has to guess the frame rate until the correct frame rate is identified. In other cases, the video has been transcoded to a slightly different frame rate, or the captions were generated using a differently transcoded or edited version of the video.

To address this issue, some Internet video content distributors require the content provider to provide a closed caption data file that is already synchronized to the video data file. Others have developed processes to fix the caption files in-house.

Recommended Best Practice:

If the Internet video content distributor does not require the closed caption data file to be already synchronized to the video data file, the closed caption data file may be submitted in any frame rate in which it was created, so long as the frame rate is clearly indicated in the file name, metadata, or code. However, for .SCC files, the file name should indicate whether the file is drop-frame (DF) or non-drop-frame (NDF) and the timecode should be hours:minutes:seconds:frames for non-dropframe timebase and hours:minutes:seconds;frames for dropframe timebase.

References

[CEA-608]	CEA-608-E, “Line 21 Data Services”, April 1, 2008
[CEA-708]	CEA-708-D, “Digital Television (DTV) Closed Captioning”, August 1, 2008
[CFF-TT]	Digital Entertainment Content Ecosystem (DECE). Common File Format & Media Formats Specification. http://www.uvvuwiki.com/images/c/cb/CFFMediaFormat-1.1r1.pdf
[EMA-Avails]	EMA Avails Movie & TV Template v1-6 (October 27, 2014) http://www.entmerch.org/digitalema/committeescouncils/avails-work-group/ema_v1-6_movies-tv.xlsx (Excel)
[IMSC1]	TTML Text and Image Profiles for Internet Media Subtitles and Captions 1.0, http://www.w3.org/TR/ttml-imsc1/
[MEC]	Media Entertainment Core Metadata, http://www.movielabs.com/md/mec/
[SCC]	Scenarist Closed Caption Format, http://www.theneitherworld.com/mcpoodle/SCC_TOOLS/DOCS/SCC_FORMAT.HTML [Editors note: Although there is no de jure standard, this seems to be the best reference for SCC.]
[SDP]	Simple Delivery Profile, http://www.w3.org/TR/ttml10-sdp-us/
[SMPTE-TT]	SMPTE ST2052-1:2010, “Timed Text Format (SMPTE-TT)”
[SMPTE-608]	SMPTE RP2052-10:2012, “Conversion from CEA-608 Data to SMPTE-TT”
[SMPTE-708]	SMPTE RP2052-11, “Conversion from CEA-708 Data to SMPTE-TT”
[TTML]	W3C Timed Text Markup Language (TTML) 1.0 (Second Edition) http://www.w3.org/TR/ttaf1-dfxp/