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# Best Practices for Closed Captioning of Internet Protocol-Delivered Video Programming

DRAFT
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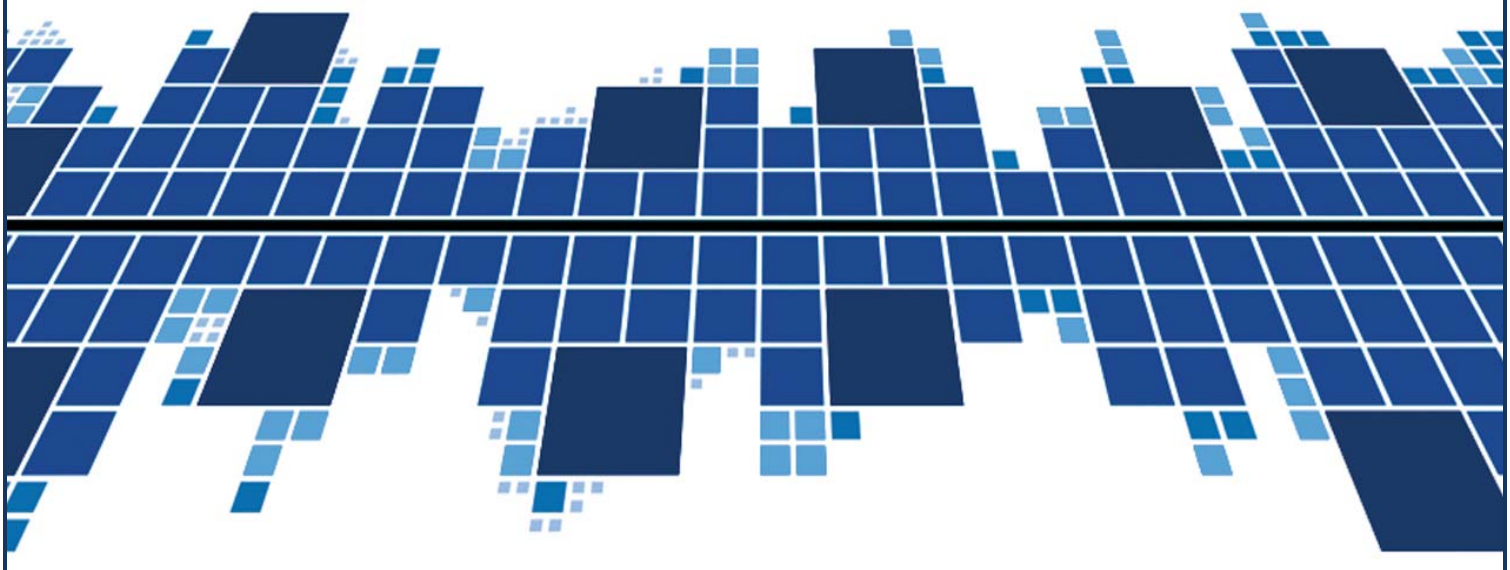

## EMA BEST PRACTICES FOR
## CLOSED CAPTIONING OF INTERNET PROTOCOL-DELIVERED VIDEO PROGRAMMING

The Closed Captions Working Group of EMA's Digital Supply Chain Committee developed the attached Best Practices for Closed Captioning of Internet Protocol-Delivered Video Programming. 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.

Why is the Best Practices document needed?

- 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.
- A number of different protocols are being used for the delivering closed caption files accompanying broadcast video, which creates inefficiencies.
- Conversion of closed captions accompanying broadcast video and subsequent editing can be challenging.
- Greater consistency in how closed captions for internet protocol delivered video programming will better serve diverse consumer constituencies.

Closed Captions Working Group

The Best Practices document was developed over a series of meetings among retailers/distributors to address their needs to fulfill delivery to the consumer and meet legal requirements.

Participants in the Closed Captions Working Group were:

Amazon – Andy Bruncke, Steve Geiger, Joe Pavey

Best Buy – Brigit Lee

Google – Ken Harrenstien, Steve Maher

Microsoft Corp. – Michelle Burbridge, Dennis Cronin, Laura Smith

MovieLabs – Craig Seidel, , Pierre-Anthony Lemieux (Sandflow)

Netflix – Dae Kim

Rovi Corporation – David Hazlett, James Moore

Vudu – Aaron Martin, Adam Simpson

EMA Staff – Sean Bersell, Jennifer Lane Burnell, Mark Fisher

(Names and employers of Working Group Participants are for information only and do not signify endorsement.)

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

DRAFT – December 11, 2013

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 are various effective dates for the requirement, which are dependent on whether the video programming is pre-recorded and whether it has been 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.

* This document is a working draft and is subject to revision. Participation in the working group should not be considered endorsement of all of the draft recommendations.

No effort is being made by EMA or the EMA Digital Council to in any way obligate any market participant to adhere to the Best Practices for Closed Captioning of Internet Protocol-Delivered Video Programming. Whether to utilize the Best Practices for Closed Captioning of Internet Protocol-Delivered Video Programming in whole or in part is left entirely to the individual discretion of individual market participants, using their own independent business judgment. Moreover, EMA and the EMA Digital Council disclaim any warranty or representation as to the suitability of the Best Practices for Closed Captioning of Internet Protocol-Delivered Video Programming for any purpose, and any liability for any damages or other harm you may incur as a result of utilizing them.

There are special rules for video programming that is already in the library of the video programming provider/distributor before it is shown on television with closed captions. Starting in March 2014, those videos must be captioned within 45 days of being shown on television with captions. The window is reduced to 30 days in 2015 and 15 days in 2016.

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 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 CEA-608 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*

CEA-608 data is conveyed using SMPTE-TT as constrained by one of the following profiles:

Profile 1:

To maximize interoperability, it is recommended that

- SMPTE-TT files should conform to CFF-TT Text Profile (see [CFF-TT]) with, optionally, the additional constraints of SDP-US applied (see [SDP]); and
- if the caption source is CEA-608, SMPTE RP 2052-10 should be used to convert CEA-608 to SMPTE-TT. In particular, the CEA-608 data should be tunneled according to Section 5.10, allowing it to be preserved in the SMPTE-TT document; and
- if the caption source is CEA-708, SMPTE RP 2052-11 should be used to convert CEA-708 to SMPTE-TT. In particular, the CEA-708 data should be tunneled according to Section 5.13, allowing it to be preserved in the SMPTE-TT document.

NOTE: CFF-TT does not preclude the use of tunneling transport as specified in Section 5.4 of SMPTE ST 2052-1.

Profile 2:

1. Structural Constraints
    a. A document MUST contain a tt element.
    b. A document MUST contain both a head and body element.
    c. A document MUST contain a ttp:profile attribute on the tt element where the value of the attribute is [???].
2. Parameter Constraints
    a. A document MUST NOT contain a ttp:markerMode attribute.
3. Styling Constraints
    a. A document MUST NOT contain a **<length>** expression that uses the px unit of measure unless (1) the **<length>** expression appears in a tts:extent attribute on the tt element, or (2) a tts:extent attribute appears on the tt element.
    b. A document MUST NOT contain a **<length>** expression that uses the c (cell) unit of measure unless a ttp:cellResolution attribute appears on the tt element.

c. A document MUST NOT contain a **<length>** expression that uses the em unit of measure.
d. A document MUST NOT contain a tts:overflow attribute.

4. Layout Constraints
    a. A document MUST NOT contain a region such that the computed values of the origin and extent properties of the region would result in it extending outside the root container region.
    b. A document MUST NOT contain two regions such that the spatial extent of the two regions would (visually) overlap.
    c. A document MUST NOT contain content such that more than four regions would be selected into a given synchronic intermediate document.
5. SMPTE Extension Constraints
    a. A document MUST NOT contain a smpte:image element.
    b. A document MUST NOT contain a smpte:backgroundImage attribute.
    c. A document MUST NOT contain a smpte:backgroundImageHorizontal attribute.
    d. A document MUST NOT contain a smpte:backgroundImageVertical attribute.
6. Encoding Constraints
    a. Content Authors MUST adhere to the following constraints:
        i. A document MUST be concretely represented as a well-formed [XML10] entity.
        ii. A document MUST be concretely represented using the UTF-8 character encoding [UNICODE].

The use of features defined in SMPTE-TT is permitted unless explicitly precluded, and the use of other profiles that implement the features of this profile are acceptable. Video programming distributors that have additional or alternative preferences should clearly communicate those preferences.

The files shall use the .xml extension.

*Option 3: CEA-708 Caption Delivery:*

Captions are conveyed using the CEA-708 tunneling methods described in CEA-708.

*Recommendations Regarding Other Timed Text Methods:*

Also acceptable is Simple Delivery Profile (SDP), which is in process with the W3C TT Working Group. 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 Metadata, [add reference] |
| [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/ |