

Notes On The Implementation of CSP/RPL for Closed Captions

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Introduction

These notes are intended for the developers of digital cinema servers (DCS) in the application of SMPTE 430-10 Auxiliary Content Synchronization Protocol and SMPTE 430-11 Auxiliary Resource Presentation List for digital cinema closed caption communications. It is assumed that the reader is familiar with these standards. The notes below were initiated by USL, an ACS supplier. Comments are welcome.

SMPTE ST0430-10 Auxiliary Content Synchronization Protocol

1. Send the RPL URL Early

To play closed captions without early captions being skipped, the DCS should send the RPL URL(s) as soon as possible, prior to the playout of the captioned compositions described by the RPL. Ideally, the ACS should be informed of the pending playout as soon as the DCS has the information. The DCS could, for example, send the RPL URL(s) when the show is loaded for playout, whether scheduled or unscheduled. If the DCS uses a separate RPL for each composition, the RPL URL may be sent at any time prior to the start of the composition, including before the start of show playout or during the playout of the prior composition. In each case, the RPL URL(s) should be sent as early as possible to insure the ACS has sufficient time to fetch and parse the required resources.

It is important to understand that the ACS has no idea as to what it must play until it receives the URL. Once the URL is received, the ACS must fetch the RPL and parse it, and then fetch and parse the appropriate timed text caption files for each language to be displayed. The process can take time.

2. Wait For ACS Readiness

Before starting a show, the DCS should request the status of the ACS. The ACS returns a status response of **Processing** if it is not yet ready for caption playout. It returns a status response of **RRP Successful** when it is ready for caption playout. If the ACS is not ready when the composition is to start, it is recommended that the DCS wait 30 seconds for the ACS to signal that it's ready. If still not ready after 30 seconds, then the DCS should start playout to avoid an extended delay in playout. The DCS does not need to wait for an ACS to be ready if an ACS has not yet announced itself using CSP.

3. Set Output Enabled When Playout Starts

Output Mode should always be set to reflect the run/stop status of the DCS. If the DCS starts playout before the ACS has returned status **RRP Successful**, the DCS should still issue a **Set Output Mode** request to properly reflect the playout status. In this way, the ACS will know that playout has started so that it can start playing the content that it has fetched and parsed.

4. Use Unique Playout IDs

Each time the ACS receives a **Set RPL Location** request, it queues the URL associated with the RPL. Several RPLs may be sent, in temporal sequence, for one show. Each **Set RPL Location** request must include a unique **Playout ID**. The **Playout ID** carried in each **Update Timeline** request determines the caption that is actually played out. If the **Playout ID** in the **Update Timeline** request does not match the **Playout ID** of the next caption in the queue, the ACS determines if the caption in the queue is a past or future caption. If the **Playout ID** indicates the caption in the queue is a future caption, it is held for display at the proper time. If **Playout ID** indicates the caption corresponds to content that has already played, the ACS may discard the caption and evaluate the next caption in the queue. For this reason, it is important to not reuse a **Playout ID** within a single lease. **Playout IDs** may be reused in a separate lease (lease terminated or expired) since the ACS clears its memory on lease expiration or termination.

5. Unroll Loops When Possible

If a program loops, the DCS should unroll the loop into either a single, long RPL, or into a series of RPLs. If the DCS steps backwards through the timeline while reusing **Playout IDs**, the ACS may not find the caption, as it may have been discarded when it was previously displayed. If so, the ACS will need to re-fetch data, which will result in a delay before the presentation of caption text resumes. Unrolling the loop by using unique **Playout IDs** for the repeated content allows the ACS to pre-fetch the data, since the playout appears to be linear.

6. Joining A Show In Process

If the ACS connects to the DCS while a show is playing, the DCS should immediately report the current playback status. The following DCS requests should be sent to the ACS:

- a. **Update Timeline**: Send this before sending the **Set RPL Location** request so that the ACS knows to skip the fetching of timed text files that apply to an earlier segment of the show.
- b. Set **Output Mode** to "enabled": Let the ACS know that the movie is playing and that its clock should be advancing.
- c. Set RPL Location: Let the ACS know where the RPL is so it can start fetching the required data (except that data which has already played).

SMPTE ST0430-11 Auxiliary Resource Presentation List

1. No Empty ReelResource Elements

The ACS associates a language with a caption stream based on the language attribute in the **ReelResource** element. The **ResourceFile** subelement is not optional. If the **ResourceFile** subelement is missing, the ACS may continue to report its status as **Processing** as it attempts to fetch and parse files in search of captions for the language.

2. Use Standard Language Codes

Since the RPL language attribute is derived from the CPL language attribute, DCS manufacturers have little control over this. ACS suppliers may make an effort to handle

non-standard language attributes, but use of standard codes will improve the chances of proper payout.

SMPTE ST0429-7-2006 specifies that language codes shall be based on RFC3066, which in turn specifies the use of language codes in ISO 639. A language element consists of a language code optionally followed by a dash and a region code. For example, “en” is the language code for English, and “en-us” is the language code for English as spoken in the US. A list of language codes and region codes is at <http://www.langtag.net/registries.html>.

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