

# Closed Captioning for DTV

## Opportunities abound, once broadcasters understand the potential

by Craig Johnston

SEATTLE

Closed captioning for NTSC became a mature and reliable technology serving the deaf and hard of hearing community over nearly three decades, but the ATSC signal for DTV has ushered in a new closed-captioning technology, along with a new shakeout process.

Early reports have DTV captions working reliably one day, then disappearing the next, or captions running off the right side of the screen. As it was with analog captions during their introductory phase, the problems can be with source material, with the broadcaster's signal chain, with a cable or satellite system's delivery process, or with the viewer's own receiver or decoder box.

### DIFFERENT FROM ANALOG

According to closed caption technology suppliers, DTV captioning will also become a reliable and regular part

of television once its understood and properly monitored.

Captioning for DTV is different from its analog predecessor in three basic ways:

In the digital channel the captioned material does not reside in the vertical blanking interval (VBI) as it did in NTSC, but instead in the DTV closed caption (DTVCC) transport channel part of the DTV signal's user data bits segment.

Closed captions to be viewed on a DTV receiver reside in the DTVCC caption channel within the transport channel, and must be encoded to the EIA-708-B standard, described later in this article (see Fig. 1).

Closed captions to be viewed on an NTSC analog television receiving the DTV signal through a converter box must reside in a separate channel within the transport channel, and must be encoded in accordance with the EIA-608-A standard, which is currently used for captioning for analog broadcasts.

One reason a new captioning stan-

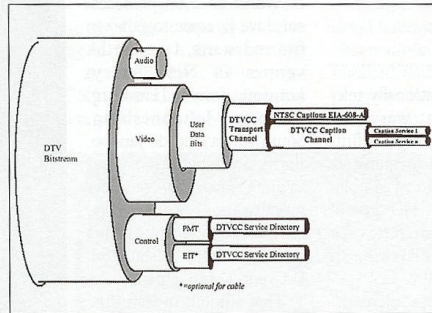


Fig. 1: DTVCC caption data in the DTV bitstream. Diagram courtesy EIA

dard was required for DTV is the various formats within the DTV standard, according to Bob Henson, CEO of Link Electronics, a Cape Girardeau, Mo.-based provider of closed captioning technology.

"A big challenge is keeping up with all the formats that are out there, 1080i, 720p, and the variations within them," Henson said.

This has required companies mak-

ing DTV closed caption encoders to build in the agility to work within different resolutions, interlace and progressive scans, and frame rates.

Captions for NTSC (EIA-608-A) are basically black and white (some color possible) text with bold, italic and underline control, that pop on or roll up the screen. The EIA-708-B standard

for DTV allows greater flexibility for the caption author and for the viewer. (Viewer option requirements for DTV receivers or tuners are listed in a sidebar.) Among the caption author's 708 options are:

- An enhanced character set with more accented letters and non-English letters, and more special symbols;
- Viewer-adjustable text size, allowing

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individuals to adjust their TVs to display small, normal, or large captions;

- More text and background colors, including see-through backgrounds to optionally replace the big black block;
- More text styles, including edged or drop-shadowed text rather than the letters on a solid background;
- More text fonts, including monospaced and proportional spaced, serif and sans-serif, and some playful cursive fonts;
- Higher bandwidth, to allow more data per minute of video, and multiple windows on the screen at the same time.

The difference between 608 and 708 captions can be described as the difference between a dumb terminal and a Windows or Mac operating system. But despite the new 708 authoring capabilities, most captions seen on DTV are not much more than NTSC captioning upconverted to the 708 format, according to Tony Zare, product manager, modular and captioning product line for Evertz in Burlington, Ontario.

"The industry has pretty much standardized on the translation of 608 captions to 708 as a standard practice," he said. "708 [capabilities] haven't been used because 608 is acceptable."

David Ko, technical product manager for Optibase Solutions in Mountain View, Calif., describes the situation in much the same way: "708 has about 10-times the bandwidth [of 608]. I don't think anyone's really utilized that extra bandwidth yet."

Because caption viewers, particularly the deaf and hard-of-hearing community, are unfamiliar with DTV

captions, or that most own NTSC receivers and view analog channels, there may not be much clamor for the tricked-out 708 captions.

"Right now broadcasters have a bit of a false sense of security, because they've been putting something on the air for a number of years now, and [with their digital channel] they're not getting a lot of complaints early-on," said Phil McLaughlin, president of EEG, a Farmingdale, NY-based provider of captioning technology.

Harvey Barnes, vice president of marketing and sales for Konata, Ontario-based Norpak, which specializes in signal processing technology, echoed that thought.

"In our experience, most people are authoring 708 captions in a very basic way... they're not taking advantage of some of the extended capabilities of the 708 standard," Barnes said. "There's not a huge incentive for them to do that."

### PROBLEM ORIGINATION

In fact, there's quite an incentive to keep it simple. Since caption authoring is mostly done on the fly, especially at the broadcasting plant, it's easy to imagine a misprogrammed step that could result in captions consisting of white text over a white background. Stranger things have happened.

For the home viewer, there is similar room for problems. In addition to the same colored text and background described above, a combination of hard carriage returns entered by the captioning's author and the viewer's playing with the font size could result in annoyingly inconsistent captioning line lengths. One can only imagine the frustration of a station's technical support staff attempt-

ing to prompt the viewer through a myriad of menu steps to reset a receiver's (or set top box's) captioning function to default.

However, to lay a caption viewability problem at the foot of the viewer requires the broadcaster to be sure the captioning problem is not in the source material, the broadcast plant's signal chain through caption encoding and broadcast, and signal distribution partners, including cable and satellite systems.

Larry Goldberg, director of media access at closed-captioning pioneer PBS station WGBH-TV in Boston, described a current problem a deaf viewer was having receiving a Boston affiliate's captioning via a DBS distributor.

"[The satellite company's engineers and the station's engineers] are troubleshooting the problem, and they need to hold hands," Goldberg said. "They're having trouble figuring out where the problem lies. So a local broadcaster needs to monitor those captions in all the separate ways that a broadcast is being distributed."

That means monitoring equipment beyond just a display of the captions themselves, according to Zare at Evertz.

"From a broadcaster's point of view, you would want to assure that the three parts of the caption distribution package [header information, the body, and footer information] are formatted correctly," he said. "Is it working 100-percent, or is it working by fluke?"

EEG's McLaughlin cautions broadcasters against using waveform monitors, as they frequently did for NTSC captioning analysis, to monitor DTV captions.

"If you looked at a signal, they decode the 608 data better than the

708, and they'll actually show you that the captioning is present," he said. "As far as the broadcaster is concerned, they monitored the signal, they see the captioning in the waveform and say 'Hey, it's Miller time, we're done!' And in reality, that's not what they're obligated by the FCC to produce."

If a broadcaster finds his captions are disappearing as they pass through a particular piece of equipment in the plant, an alternative to replacing that equipment is to use a bridging solution that decodes the captions on the input side of the problem box, and passes them to an encoder placed at the output side. (Luckily we're not talking about lip-sync audio here, and mis-matching the captions a few frames one way or another is not likely to generate complaints.)

High-definition closed captioning seems to have caught some parts of the post-production community by surprise. Dilip Som, president of Rockville, Md.-based Computer Prompting and Captioning, which makes a software-based product that inserts closed captioning directly into a pre-produced video file, said incompatibility between some different brands of servers has blocked the transfer of caption data as the video is transferred.

"Until these people get their acts together, which they can, they're blocking the closed-captioning information," Som said. "We're working with all of them to get a resolution here."

As noted at this article's beginning, implementing NTSC's captions was not a smooth process either. But with time and attention, EIA-708-B will similarly become a mature and reliable technology. ■