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## Demos Hit of Digital Cinema Summit

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I spent the weekend in Las Vegas attending the SMPTE-sponsored Digital Cinema Summit, and as usual, found it a very interesting and worthwhile event. This event, which occurs just prior to the opening of NAB, covers more than just digital cinema, and includes content creation, mastering and post-production, distribution, standards, home-based displays and even future 3D displays. As expected, there were a lot of discussions around 3D. But perhaps the most interesting take away for me were the demos organized by ETC and CableLabs.



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The CableLabs demo was organized by David Broberg, it's VP Consumer Video Technology. It featured the yet-to-be released Sony Bravia 3D LCD TV connected to a Cox cable feed in the Convention Center. On display was the Master's Tournament in 3D, which we discussed at length in last Friday's DD. But Friday's evaluation was based upon the 10Mbps Internet feed on an NVIDIA support monitor. The CableLabs demo was on a TV with the cable feed.

The difference was quite evident as most of the annoying compression artifacts were eliminated. The bit rate was unspecified, but was probably about 19 or 20Mbps — double the Internet feed and the primary reason for the improvement. We asked if the sampling/filtering method used to pack the two FHD streams into a single side-by-side frame compatible signal was simple column decimation, but the cable company would not comment.

The next three demos were organized by ETC with help from a number of partners, most importantly, Warner Brothers. The idea was to "isolate the difference in 3D filtering (packing) techniques from compression artifacts." In the first demo, two streams of 1920×1080/24 left eye and right eye data were encoded using the standard MVC process and recorded to a Blu-ray disc. This became the standard to which to compare the "simulated filtered" content.

Two filtering techniques were used. One sampled the two streams using a 3-lobe Lanczos filter to create two 1920×540 images. These were then decoded to restore the full 1920×1080 images, which were then re-encoded with MVC and written to a Blu-ray disc. This simulates the top/bottom approach. Similarly, the two streams were filtered using the same 3-lobe Lanczos filter to two 960×1080 images. These were likewise then decoded to restore the two FHD image, which were then encoded using MVC to Blu-ray, thus simulating side-by-side.





Two sequences (a car racing sequence and a scene from *Polar Express*) were shown on a Panasonic 3DTV played from a Blu-ray player to compare the difference in the filtering techniques to the unfiltered playback. The differences were clearly subtle and took some careful looking to see some slight softness with the simulated filtered playback.



The same experiment was done but starting with 1280x720p/60 content and using similar schemes to filter to top/bottom and side-by-side components, decode and encode with MVC to Blu-ray (see graphic). Here, a football and golfing sequence were shown. Again, the difference was very subtle with the background trees perhaps the best element to see the slight softness effect. This would be magnified on a larger screen of course, but for a 50" TV in a home, only the most careful examiner might be able to tell the difference.

The take away — it seems clear to me that filtering using this 3-lobe Lanczos filter produces very high quality 3D images. And, if the Blu-ray Association had adopted this approach, it would not have been necessary for consumers to buy a new Blu-ray player to see 3D — legacy players would work.

Finally, a third demo showed a random dot stereogram with 5 numbers and 5 symbols that are only visible when wearing the active shutter glasses. ETC Technology Specialist Bryan Gonzalez told us that people who are used to looking at stereoscopic images see these symbols quickly and easily, while others struggle a little to see them. The take-away — there is a component to eye-brain training in or to see this type of stereoscopic 3D.

In addition, he noted that several people who said they could not see 3D tried the demo and to their amazement, they saw the image in 3D. Gonzalez speculated that maybe their inability was a result of a single eye dominance that was somehow equalized by using the 3D shutter glasses. Perhaps the





shutter glasses allow the image from the less dominate eye to now be processed by the brain, enabling binocular Stereopsis in these people. If he's right, always wearing shutter glasses for those with a dominate eye may be a real way for them to always see the world in 3D. If anyone can shed more light on this, please feel free to write back to me.

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