

Section Meetings

Atlanta— December 2007

The Atlanta area SMPTE, the Audio Engineering Society (AES), and the Society of Broadcast Engineers (SBE) held an annual holiday party on December 10. The event, organized by AES chair Ed Welly, with the aid of Dan Burnett of SMPTE, Bill Magliocco of SBE, and several volunteers, was held at Sugo Restaurant and Tapas in downtown Roswell, GA.

After introductions by Welly, Magliocco, and SMPTE Section Chair T. J. Scott, SMPTE Sections Vice President David Siegler presented a plaque to Jim Edwards in appreciation of his 28 years of selfless service to the Society. Edwards, who retired from Tektronix in December, is a SMPTE Fellow. He has held many positions within the Society; the most recent as Governor of the Southern Region.

The presentation was followed by a raffle—prizes were donated by several manufacturers.—*T. J. Scott, Section Chair*



SMPTE Sections Vice President David Siegler (r) presents a plaque to Jim Edwards (l).

Hong Kong— November 2007

November marked the 13th anniversary of the Hong Kong Section. To commemorate this event, the Section held a seminar titled, "The D-Cinema—4K Solution and DTV—Mobile TV



Delegates attending the Hong Kong Section's 13th anniversary seminar.

Broadcasting." I Chih-Lin of the Hong Kong Applied Science and Technology Research Institute began with a keynote speech on the overview of digital television (DTV) and the mobile media trend. Kazuo Yamada, Victor Company of Japan, then reported on the display trend and the advanced flat panel display technology for broadcasting. Makoto Yoshimura, Victor Company of Japan, followed with an introduction of new D-Cinema projection technology using the DILA (Direct-Drive Image Light Amplifier) LCOS Technology and demonstrated the projection using a DILA projector with image captured by a JVC 4K camera. Attendees were impressed with the vivid picture quality.

Song Jian, Tsinghua University's DTV Technical R&D Center in China, presented the current proposed DMMB mobile media standard and its technical specs in detail. Li Xu-Ming, Beijing Nufont Software Technology, introduced T-MMB, a proposed alternative mobile media standard in China.

Shen Qun, ASTRI, elaborated on the implementation of DTV in Hong Kong, and the collaboration between Tsinghua University, local terrestrial broadcasters, and test/measurement

continued on page 12

SECTION MEETINGS

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equipment manufacturers to develop a compliance test plan for the DTV set-top box, which was scheduled to roll out in Hong Kong at the end of 2007. Finally, Oscar Au, Hong Kong University of Science and Technology, reported on the latest streaming media technology and application for mobile media in Hong Kong.

About 300 professionals from motion picture, television, telecom, and related fields attended the seminar, which was followed by the anniversary dinner.—
Tony Ngai, Section Chair



More than 100 members and guests attended the anniversary dinner.

Hong Kong— December 2007

On December 1, the Hong Kong Section opened the SMPTE-IVE Center at the Hong Kong Institute of Vocational Education (IVE). More than 100 professionals and students attended the event, which began with an opening speech by Victor Tsang, principal of IVE (Sha Tin), who pointed out that this collaboration would help SMPTE to continue its mission in Hong Kong. SMPTE Asia Pacific Governor K. L. Lam, remarked that the center signified a milestone in the collaboration between SMPTE-HK, the local student

chapter and IVE, which would strive toward its objectives of promoting new technologies and education and enhance the professional capabilities of the industries.

IVE, which began advanced motion picture and television related courses in 2000, is the only government subsidized vocational training course provider in Hong Kong. With favorable acceptance of its graduates by the motion picture and television industries, IVE continues to offer a variety of courses in motion picture, television, animation, and audio.

Attendees at the opening of the SMPTE-IVE Center in Hong Kong.



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The Institute also operates an Autodesk training center for high-end post-production systems (the first outside of North America) and the largest Apple certified training center in Hong Kong, equipped with a Dolby mastering/audio theater, Discreet's Luster D.I process, Arri scanner/Laser printer, as well as Sony and Panasonic HD camcorders. IVE is one of the most highly recognized colleges in the Asia region.—*Tony Ngai, Section Chair*

Ohio— October 2007

The meeting on October 25 was combined with local Chapter 52 of the Society of Broadcast Engineers, at the WSFJ-TV/DT studio plant. Jay Adrick, senior vice president of Harris Broadcast Division, Harris Corp., discussed the new Harris/LG/Zenith mobile in-band mobile pedestrian handheld (MPH) DTV system using a terrestrial TV broadcaster's digital multicasting signal stream. Adrick mentioned that the new in-band MPH DTV service will further assist broadcasters in reaching mobile viewers who use recreational vehicles, mass transit, field locales, and such, by providing more robust DTV signals to mobile, pedestrian and handheld devices. The goal of the joint development effort is to devise a robust, ATSC-compatible mobile solution for local terrestrial broadcasters to maximize the use of their 6 MHz, 19.39 Mbit/sec digital pathway, while delivering a wide range of compelling and profitable consumer services.

The first phase of the system was to build from scratch a special minibus mobile DTV unit for actual real-world field tests. The first market and DTV station selected was Dispatch Broadcast owned/CBS affiliate, WBNS-DT channel 21 in Columbus, OH, using its DTV multicasting channel streams to provide signals to MPH devices. The geographic areas selected included both good and challenging reception conditions. The MPH DTV receivers performed flawlessly under all conditions, even traveling up to 65 mph.

With the new MPH DTV standard, broadcasters can create potentially new

and lucrative revenue streams. MPH consumers of the future will also benefit greatly, since they will have universal access to their favorite programs (movies, sports, local news, weather, and emergency advisory information) from local digital terrestrial broadcasters, via mobile handheld video devices.

The presentation concluded with a very lively Q & A session. Some of the 35 attendees inquired about the amount of time left for field-testing the system. Others questioned the initial costs that would be incurred for both the DTV broadcaster and the consumer and the type of programming that would be transmitted.

Jason Knapp, the WSFJ-TV/DT chief engineer gave the audience an overview of the station's new master control room operations center, now located at Columbus' Easton Center. The meeting concluded with a detailed facilities tour.—*Gene L. Batey, Secretary/Treasurer*



L-R: Meeting speaker Jay Adrick and Ohio Secretary/Treasurer Gene L. Batey.

Rochester— November 2007

Seventeen members and guests gathered at the PBS affiliate WXXI-TV in Rochester, NY, for a demonstration of the UTAH-400 IP router, conducted by Troy Davis, regional sales manager for Utah Scientific. The UTAH-400 IP is a new 24-port Gigabit Ethernet router with realtime control for port priority, security groups (VLAN), port speed, quality of service (QOS) with a tactile control panel, as well as software graphical user interface. The router is used to increase workflow efficiency in

broadcasting and streaming video over an Ethernet network. Its tactile control panel allows for more intuitive on-the-fly changes, based on the network traffic condition, priority of the content, and other needs, in order to maintain an efficient traffic flow. There is also a dual 5 Gbit/sec uplink port to link multiple units together. The software includes configuration setting, as well as traffic monitoring and web interface.

Most attendees seemed impressed with the tactile control panel and the monitoring and "throttling" capability, but some were skeptical about its ability to be integrated to an existing data network (according to Davis, an upcoming update will address this issue), as opposed to building a new network just to handle video streams. Davis was eager to gather suggestions on ways to improve the product, as well as possible applications. Mark Henry, Kodak, suggested a possible application for the unit as part of the Digital Cinema Solution with Kodak: the router could be used as a distribution control locally in routing movies in the theater, commercials, etc., from the local server to the various screens at a multiplex theater. Barry Chow, Genesee Community College, also made a suggestion to integrate the product as part of a video conferencing network for educational facilities.—*Barry Chow, Section Manager*



Troy Davis, Utah Scientific, describes the UTAH-400 IP router at the Rochester meeting on November 13.

San Francisco— November 2007

Forty members and guests were joined by around 30 online webcast viewers—some watching a time-shifted, "on-demand" version later—for the

November 1 meeting featuring video and audio compression quality analysis, held at Hewlett-Packard in Cupertino, CA. The event was San Francisco's first webcast, made possible through the facilities of the HP Broadband operated by Craig Barnes, David Massey, and the staff at HP. SF Section manager Gary Youngs organized the meeting and produced the show with the help of SF officers John Goodell and Rick Reagan.

In a presentation titled, "Compression 2007: The Good, The Bad, and The Ugly," Bill Reckwerdt, chief technology officer of Video Clarity, pointed out that, today, almost all video and audio are produced, recorded, and transported as compressed streams, often heavily so. We sweat bullets to create pristine digital-A/V signals that we then squeeze down little pipes and dump into small bit buckets!

Digital Means Making Choices: To maintain quality as compression standards change, everyone along the chain needs to constantly measure the performance of the compression engines on which day-to-day operations depend. "Digital compression" means having



Bill Reckwerdt of Video Clarity is shown in the webcast of the SF Section's November, 2007, meeting discussing digital compression analysis methods.



San Francisco Section Secretary Pete Hammar, 120 miles from the SF Bay Area in his home near Fresno, toasts the launch of live and on-demand SF-Section webcasting.

The Future of SMPTE Webcasting

Like most SMPTE Sections, San Francisco members and friends are scattered over a wide geographic area, making regular meeting attendance difficult or impossible for many. Even local people often lack the time to attend meetings. **Times have changed: the SF Section, as well as the Society as a whole, must become more "virtual" to remain viable.** Toronto and other Sections are already doing some webcasting. The SF Section wants to join them on a regular basis with webcasts of as many of our events as possible, depending on logistics, costs, and copyright restrictions. SF's November webcast allowed me—located in the California Central Valley a three-hour drive from Cupertino—to feel as if I were there, a virtual and repeatable SMPTE experience.

Archived streams may become as important as the live webcasts themselves. HP kindly maintained the on-demand version of our November meeting for some weeks so we "cume" an audience. In the future, we look forward to permanently archiving these shows online, perhaps through the smpte.org website.

As SMPTE web activity increases, we hope engineers, marketers, students, teachers, and journalists will learn they can find answers to their technical questions through the Society's online resources. A searchable library will enhance the reputation of the Society as the "go-to" place for technical information. SMPTE Sections should also share web resources, including co-hosting online events.

Despite the sophistication of state-of-the-art facilities such as HP Broadband, **current internet costs and other limitations require the use of relatively narrow bandwidths for webcasting, lowering picture and sound quality.** Naturally, HDTV and even SDTV displays at the physical event won't reach online viewers in full bandwidth at this time. That day will have to wait.

The current high cost of sufficiently wide bandwidth still means webcasting depends on the generosity of corporate and educational supporters for access to their broadband "fat pipes," limiting where and when we can hold Section meetings. **If "being virtual" really is SMPTE's future, we may have to allocate significant funds for bandwidth and equipment rental for Sections.** Perhaps the next generation of broadband wireless will enable us to create a "SMPTE webcast in a box," a single-case, multicam portable system with a whip antenna, allowing webcasts to originate from literally anywhere, even "out in the plowed furrow," so please stand by!—*Peter Hammar, Secretary, SF Section*

to make choices, including temporal resolution vs. noise, spatial resolution vs. image size, and luminance/color range vs. gamut. Large or small, from hardware/software designers to end user—producers who work with any kind of compression in SD or HD or any operation should subjectively and objectively analyze compression performance to know how their technical and aesthetic choices will look to end-users.

Video Clarity's ClearView system offers a set of compression-analysis tools for software developers, hardware designers, QA/QC engineers, video researchers, and production/distribution facilities. ClearView records, displays, and then objectively and subjectively analyzes processed video. The device can capture video content from virtually any source-file or digital or analog source such as SDI, HD-SDI, DVI, VGA, HDMI, component, composite, or S-video. Regardless of the input,

ClearView can ingest and convert it to fully uncompressed 4:2:2 Y'CbCr, 4:4:4 RGB, ARGB, or RGBA.

For subjective analysis, multiple video sequences can be shown on the same display in a split-screen, seamless-split, split-mirror (butterfly), or A-B (source minus result) mode. Playback supports zoom, jog, shuttle, and pause for in-depth analysis. The device also has a multclip playlist capability.

Objective Analysis and Scoring: ClearView generates a numerical value reflecting user-selectable parameters and measurements of compression quality for objective analysis and quantitative scoring. The system applies these metrics to each frame of a video sequence, detects anomalies outside of the threshold range, generates graphs, and logs the results. ClearView includes both No-Reference and Full-Reference metrics. When there is no comparable video, No-Reference metrics can

determine anomalies such as loss of video, frozen video, loss of audio, and audio-video sync problems.

Video Clarity is a member of SMPTE and the VQEG and works with other standards-based committees, including ISMA and MPEG-IF. The company also collaborates with other vendors to promote common standards and interoperability. Bill Reckwerdt has held senior positions at Hewlett-Packard, C-Cube, Vweb, and Optibase, and is an active member of SMPTE, the VQEG, and the VPQM.—*Peter Hammar, Secretary*

Washington, D.C.— October 2007

Joe Kane on the Importance of Display Design and Calibration

This report is for a special event presented by the SMPTE—Washington DC Section at the AFI Silver Theater in Silver Spring, MD, on October 20, 2007. Invitations were extended to other eastern U.S. SMPTE Sections, plus DC-region custom home theater installers and display calibrators.

Program production and transmission (via any path) through to the consumer's display is all about the art of storytelling through audio and video—making sure the intentions of the program originator can be properly seen and heard.

Thanks to a number of SMPTE standards, image creation, monitoring, and display are much more a quantified and standardized process than is the case for audio.

Directors, cinematographers, and videographers work hard to create specific image characteristics in support of the story being told. If we want to best experience that vision, or help in its formation, we need displays that match those on which the images were monitored during creation. For the consumer to see an image that closely reflects what was created by the director and cinematographer/videographer, a properly designed and calibrated display is required; any deviations compromise the artistic integrity of that vision, sometimes severely reducing the effectiveness of the message.

With this in mind, I devoted two years to arranging a SMPTE DC section special event: a presentation from industry video consultant Joe Kane, JKP Productions, to discuss and demonstrate the need for and benefits of proper display design and calibration, and to show attendees the image quality that reasonably priced display devices are capable of delivering. During this four-hour seminar (intended primarily for production and post-production professionals, home-theater retailers, display calibrators, and custom installers), Kane addressed in technical depth the science of electronic imaging and accurately reproducing video signals on all types of displays:

Film and video, the canvases on which the story is painted, define the limits of what can be presented, with video often being shy of film's capability. The canvas of HD video is much larger than that of SD. As much as consumers are often wowed by HD images, getting it right makes involving the viewer that much more effective.

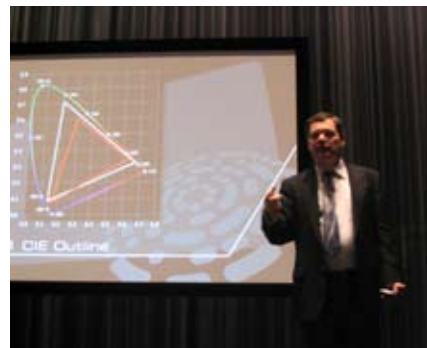
During production and in many post-production facilities, an image is monitored on expensive CRT-based video displays that are carefully designed and fastidiously calibrated in accordance with SMPTE and other relevant standards, to help ensure consistency and high image quality. Transmission of the image to local stations and consumers typically maintains that quality, within the limits of the modulation scheme and data reduction algorithms used.

The greatest divergence in characteristics from the image, as originally created, occurs in the consumer display. Pixelated displays, whether LCD-, DLP- or plasma-based, exhibit substantially different visual characteristics from the CRT, which is the reference to which all current image quality standards have been designed.

With the migration to digital video—SD and HD—a new issue arises: the need to monitor digital transmission and MPEG-2/MPEG-4 AVC/VC-1 data reduction artifacts. Because a calibrated CRT display was assumed in design of these video codec algorithms, an uncalibrated display will be more likely to hide certain artifacts and enhance others, distorting



Presenter Joe Kane and SMPTE DC Section Manager David Weinberg.



Joe Kane discusses the CIE diagram.

perception of the video data stream quality.

Since the 1970s, Joe Kane has professionally been committed to helping provide viewers with the opportunity to experience storytelling as it was created and intended to be seen. A basic story idea can come across on any TV set, but it takes a really good system to draw a person into the events unfolding on screen. Kane wants to help make sure that viewers have the opportunity to see the creation of the film or video artist—experience their idea of how the story should be told. He delivers display device calibration seminars throughout the industry, consults for manufacturers on video product quality, and assists the professional world in achieving better technical quality in program production.

Kane gave many examples from movies and television program creation experiences that provided real-life context to the issues.

Throughout his lecture, he put industry decisions in perspective (e.g., explaining why the specific phosphors were selected for red, green, and blue in 1953, and the SMPTE C phosphors in 1979) and gave the history behind some of the earliest broadcasts.

He gave an introductory tutorial on light and visual perception, explaining how that fit into the design of the TV color system, and why certain supermarket-products' packaging colors could not be properly reproduced on TV. He even explained why the green phosphor standard for the PAL TV system would not work for the NTSC system (at 50 fields/sec, the phosphor persistence did not cause image motion problems, whereas at 60 fields/sec it did).

Kane reminded the audience that video and film do not have the same image capabilities, and that reviewers need to keep in mind that the video of a movie might, or might not, have image characteristics similar to those of film; converting from film to video, a movie undergoes a transformation, creating a new look. For example, James Cameron is well known for adjusting the look of his movies for video release, taking into account the strengths and weaknesses of that medium vs. film as well as taking the opportunity to improve the believability of certain effects. Filmmaker James Ivory never had enough money to color-time his films, as he desired, but when it came time to master the video, he had made enough money to create the image he wanted; thus the video versions of Ivory's movies are the definitive versions. Kane's point was that the post-production community has to be very careful how it sets up its canvas (the display)—display calibration is critical.

From its inception to the present, the entire video communications system—camera to display—is based on the characteristics of a CRT, and to see the image as created, the display—regardless of the technology—must mimic the CRT's characteristics.

Throughout the 1960s to 1990s, when display calibration was not considered particularly important, TV manufacturers included circuits that attempted to compensate for image errors, making the problems worse. Finally, by the mid-1990s, production and post-production facilities had become fairly diligent at keeping their monitors properly calibrated.

The situation is getting worse now that content is being created on computers,

with no color-space standardization in most PC monitors, potentially leading to chaos.

Kane described many of the display parameters that are important to ensure a properly performing and calibrated display, including single-pixel transitions between black and white in the vertical and horizontal direction.

The SD and HD math are different relating to how red, green, and blue are combined to create gray. The SD system is based on the math from the 1931 CIE diagram, while the HD system math is based on the 1976 version. This means every HD display must have two decoders. Most consumer HD displays have no ability to properly perform HD math. Kane used his Samsung SP-A800 projector, employing some of the test patterns he has created to evaluate the performance capabilities of any display, to demonstrate and explain how to determine the difference between SD and HD color decoding.

The gamma curve and the need to adjust the transfer function of non-CRT devices to match that of CRTs is critical in getting the correct image characteristics. The inverse gamma incorporated into professional video cameras enables the system to act as a compressor/expander, reducing video noise in the displayed image—a great benefit in early color TV broadcasts, and still helpful even though equipment performance has substantially improved.

Manufacturers use focus groups, viewing displays setup with various image characteristics, to determine what consumers are more likely to buy, thus determining how to factory-adjust displays. Kane, who once changed only the test room background, demonstrated that changing the environment substantially changes perception. He discussed LED backlighting for displays and projectors, the dynamic iris (severely compromises picture quality), screen gain (hot-spot issues), and materials (the screen and the projector are an integrated system), including the need for uniform relative spectral balance vs. viewing angle (many screens do not exhibit this important characteristic), the need for a very fine-grained screen surface (with 1920 x

1080 projection, many screens exhibit a moiré interference between the image's pixel structure and the screen grain), plus many other display characteristics that affect picture quality.

Several years ago, Kane ran tests using the JVC D-VHS D-Theater HD tape format at a peak video bit rate of 24 Mbits/sec and saw that a perforated home theater screen masked the difference between MPEG-2 and WMV encoding and hid image details, while on a non-perforated screen. The difference was obvious to all observers. The Digital Cinema Initiative ran similar tests at the University of Southern California processing laboratory in Hollywood and found that a perforated movie screen mostly masked the difference between 2K and 4K projected images, yet the difference was obvious with a non-perforated screen.

Kane demonstrated the same source material shown in sequence—one in 1080p24 frames/sec, the other in 1080i30 frames/sec—and attendees observed the effect of 3:2 pulldown on image motion.

He spoke about the low-pass filtering used in MPEG-encoding 1080i program material that results in image detail that is often less than that found in a 720p program.

He talked about the image-quality compromise from use of an anamorphic lens in consumer projectors (even as expensive as these lenses are, he sees chromatic aberrations and geometric distortion, however slight).

This synopsis does not do justice to the amount of valuable information presented. The attendees paid rapt attention and seemed a little overwhelmed with the facts and concepts that most had never realized they needed to consider or how much their display affects their job performance.

It is impossible to present the full impact of his lecture without seeing the slides and images, which prove beyond doubt the ability with current technology to realize the image quality promised by the HD format.—*David Weinberg, Section Manager*