(L-R) Amanda Temple, Bill Mentel, Lanny Nass, Bill Hayes

BTS Members Converge on Las Vegas for the 2012 NAB Show

By James E. O’Neal

For one week every April, this city becomes the focus of the broadcasting and teleproduction world, with the NAB Show drawing tens of thousands of radio, television, and cinema professionals from all over the world. This year’s registered attendance was officially pegged at 92,112, with individuals traveling from some 151 countries to mingle with their peers, see the latest broadcast technologies demonstrated, and be brought up to date on these technologies at workshops, technical seminars, and training sessions. BTS members, of course, wouldn’t choose to be anywhere else during that special week.

Sore feet and sleep deprivation offer mute witness to the enormity of the show and the long hours spent every day in trying to take it all in. Whether it was making presentations, receiving awards, staffing exhibits, meeting up with old friends and making new ones, or just taking in the sights, BTS members were very much part of the 2012 NAB Show.

The April 14-21 event was also the setting for the annual Spring BTS AdCom meeting. Turnout was very good, continued on page 4
President’s Report

William Meintel, BTS President

The BTS Newsletter has a new look. We are now in “living color” although I doubt it makes me look any better. Thanks to our forward looking editor James O’Neal we have taken the long overdue color plunge. I believe this will greatly enhance your enjoyment of the Newsletter and allow us to provide material that just doesn’t work without color. James tells me he is working on a number of ideas to make this a first class publication.

While we are on the subject of improving the Newsletter and possibly turning it into a magazine at some point, there is one thing that is of vital importance and that is content. I would like to thank those who have contributed and continue to do so. However, we need more of you to step up and put pen to paper or should I say your fingers to the keyboard and share your thoughts and knowledge. If you don’t have time to write an article, don’t like writing or just can’t think of a topic then suggest the idea to friend or colleague who might have something to share. The author does not have to belong to BTS or even IEEE. We are happy to use good material no matter where it comes from. Our editor would enjoy having the problem of receiving too much good material.

Since last time another NAB Show has come and gone and it was great to see and talk to some of you at the BTS booth on the show floor, or in hallways. Once again BTS put on a great tutorial “Broadcast and the Internet Connected TV.” Thanks go to Yiyan Wu and Bill Hayes who put it together and chaired the session, and I’d like also to offer also special thanks to the presenters who took the time to share their knowledge and insight.

I want to draw your attention to what may turn out to be a historical event that occurred at the 2012 NAB Show. On April 17, 2012 technical executives from 13 television broadcast organizations from around the world, including IEEE-BTS, completed signing a landmark memorandum of understanding to officially form the global Future of Broadcast Television (FoBTV) initiative. You may recall from previous issues that this is a follow-on to the FoBTV Summit that occurred last November in Shanghai. Please take a moment to read the article about this event elsewhere in this issue.

As many of you are aware, spectrum for television broadcasting is under attack, not only the United States, but all over the world. Therefore, the FoBTV initiative could not come at a better time, as it makes clear that many technology leaders from around the globe still believe in broadcasting. If this effort meets even some of its goals then it will provide a strong argument for supporting continued spectrum allocations for broadcasting.

One of the keys to retaining television broadcast spectrum is to make it available to devices other than the big screen in the home. It ultimately needs to be available on tablets, other portable devices, as well as in all forms or transportation.

Although FoBTV envisions doing just that, we are seeing devices that work with our current ATSC system in the United States that can get us there now. Although these devices are not capable of all that we would like, or that we expect in the future, they are a start and show the promise of what is to come.

If cell phone technology had to work perfectly when it was first introduced, we would not have that service today. The public is used to technology that improves over time, and has accepted the fact that their electronic devices do become obsolete and require periodic replacement. Think about how many times you have replaced your PC or cell phone to get new functionality—television is no different.

At the NAB Show there were small dongles shown for the iPad that could receive ATSC-Mobile DTV Standard A/153 (M/H) transmissions. And there was also a commitment from at least two major manufacturers to provide cell phones this year with M/H reception capability. Two groups, which represent the majority of U.S. broadcasters, have committed to rolling out service this year. The service will likely not be perfect at first, requiring some additional work and investment. However, this is the path to the future, and television broadcasters must embrace it or they will lose their spectrum.

Broadcasting is the most efficient way to deliver video content to large audiences. Millions of people watch the same exact content every day in their homes, and I believe many would like the capability to do that while on the go. Over-the-air broadcasting is the only practical way to do this. No amount of spectrum can support a one-to-one model for such large audiences.

Speaking of the future, please make your plans now to attend the 2012 Broadcast Symposium which is set for Oct. 17-19 at the Westin Hotel in Alexandria, Va. Our Symposium committee has been hard at work to carry out the BTS educational mission, and also to make this three-day event enjoyable and beneficial for all who attend.

As society president, I welcome your input about this or any other issues affecting BTS.

Bill Meintel
President
wmeintel@ieee.org
From the Editor

James E. O’Neal, BTS Newsletter Editor

I don’t think I need call anyone’s attention to the fact that the Newsletter has a very different look. I promised some changes an issue or so ago and what you’re seeing now is one of the biggest—full color! After all this is the 21st century and for quite some time now virtually everything you read in print or watch on television or in the cinema has been appearing in color. This includes even the smallest weekly newspapers. And when you think about it, some things just don’t come across in black and white (picture a televised billiards game).

In case you’re wondering why it took so long to make the full color move, it was a matter of cost. For some time the Newsletter has been printed in two colors. A few years ago the matter of taking it to four was investigated and the cost was found to be very prohibitive. However, things do change. For instance, for those of you who still embrace silver halide photography, how easy is it to find black and white film? In the five or 10 years prior to the digital/flat screen transition, how many television set manufacturers still offered b&w receivers? Ditto computer displays? I decided it was time to revisit the matter and was pleasantly surprised by the price differential nowadays. Bill Meintel and Lanny Nass gave the go ahead and now we’re in full color (and no increase in Society dues is necessary!). My thanks to Bill and Lanny for allowing me to make this really big change.

Another change you’re certain to notice is the layout of the first page. We’ve received criticism that every issue looks the same—and yes, I had to agree. From now on, every will be distinctive, at least as concerns page one. Watch for more changes in future issues. By the way, if you have suggestions for improving the Newsletter, please send them along. After all, this is your publication and its sole purpose is to serve the needs of BTS members. Along these lines, I’m hoping that the switch to full color will prompt members to send in more photos and color artwork with their editorial contributions. (Just remember that our minimum size for photos is 250 KB, with one MB preferred. Also, please send these as .jpg attachments, not embedded images. Thanks.)

While I’m on the topic, I know that it’s been a very busy spring for many of us with the NAB Show, planning sessions and paper selection for the Fall Broadcast Symposium, ATSC meetings, and more. Hopefully, as we approach the summer months, things will settle just down a bit and allow some of you to put pen to hand (or more likely, hand to keyboard) and create articles for the Newsletter. I know that I’m sounding like a broken record, but we do need to hear from you. Your literary contribution doesn’t need to be a perfectly polished work of art either. That’s one of the reasons I’m here as editor. Please send in your chapter news, information about events that involve BTS membership, items to be included in our calendar of events, technical articles that may be of interest to readers, or suggestions for articles. We welcome your input. Thanks.

Changes to the issue have been keeping me busy, but I certainly don’t want to overlook another change to the BTS organization, and that’s the addition of Amy Reeder to our administrative team. (Please see the article about Amy’s arrival elsewhere in this Newsletter.) Welcome aboard Amy! We look forward to interacting with you in the very near future.

In parting, I do need to ask a favor of all BTS members or others who are submitting material for the Newsletter, or are otherwise trying to contact me via e-mail about Newsletter-related matters. Please be sure to use my editor’s address—BTSeditor@IEEE.org I have multiple business and personal e-mail accounts and, just like a lot of us, don’t always see the “important stuff” when it’s buried in a sea of junk mail. This is why I had the BTSeditor account created. No junk or mundane e-mail goes to this account, and as I check it several times a day, if you send something for the Newsletter or want to reach me in regard to BTS business, I’m going to see it. Otherwise, your message could get ignored, accidentally deleted, or shunted off to the “junk mail” folder. Thanks.

James O’Neal
Editor
BTS Newsletter
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The sprawling Las Vegas Convention Center was again host for the annual NAB Show. While attendance was not at the record levels of a few years ago, it was still up slightly from last year’s 91,932 mark.

with 27 members participating. (President Bill Meintel has put together a complete report on the meeting elsewhere in this issue.)

The BTS also had a strong presence with a booth in the mainstream of traffic in the Las Vegas Convention Center’s Upper South Hall. Our new senior administrator, Amanda Temple, was there, along with support from several BTS members to greet and meet show attendees and provide literature and Society information. She reports that there were new member sign-ups, as well as a number of membership renewals; however, the really big booth activity was centered on the “Bridging

The number of exhibitors at this year’s NAB Show increased by almost 10 percent over the 2011 Show, with 1,600 companies, organizations, and other groups occupying some 815,000 square feet of exhibition space.

The NAB Show also served as the backdrop for the April 15 BTS AdCom meeting. The meeting was held in the newly re-named Las Vegas Hilton (now the Las Vegas Hotel & Casino, or LVH) and a dinner for AdCom members and their guests followed in the hotel’s TJ’s Steakhouse restaurant. No one went away hungry or thirsty!
LAS VEGAS

The IEEE BTS provided a tutorial session on broadcast and Internet-Connected television at the 2012 NAB Show. The April 16 presentation was part of the NAB Broadcast Engineering Conference. Session chairs were William Hayes, BTS VP and director of engineering at Iowa Public Broadcasting, and Yiyan Wu, principal research scientist at the Communications Research Centre, Canada.

The tutorial offered a global view of state-of-the-art practices and various industry projects in connection with Internet-connected TV services. Topics covered included the TV portal strategy, seamless navigation within both the Internet and broadcast television, synchronization of television and Internet-delivered content, and broadcast linkages to Internet content.

Presenters representing North America, Europe and Asia provided information on what is happening now and what we can look forward to in the future in connection with the growing convergence of the Internet and television.

A presentation of the capabilities of the ATSC 2.0 system was conducted by Rich Chernock, chief technology officer at Triveni Digital, which is one of the groups behind development of that standard. Although not yet implemented, the standard is very far along in development, and is expected to be finalized and released by late 2012 or early 2013. It’s designed to bring the capabilities to the U.S. broadcast standard allowing delivery of non-real-time content via the broadcast service to ATSC 2.0-equipped receivers, as well as the signaling and synchronization of content delivered to the receiver via a broadband connection.

Hisakazu Katoh, head of the Advanced Broadcast Platforms Research Division of NHK, provided an overview of the soon-to-be-deployed Japanese Hybridcast system. He described how broadcast-delivered and Internet-delivered content are synchronized and displayed, and included demonstrations of actual content from the service.

Larissa Görner, general manager of marketing and sales from IRT, discussed Europe’s widely-deployed HbbTV service and provided some static examples of the service content. The HbbTV consortium, made up of broadcasters and consumer product manufacturers, has created an open platform to deliver a blend of traditional broadcast content with added value on-demand services. HbbTV is listed as standard TS 102796 under the European Telecommunications Standards Institute (ETSI).

The session concluded with John Simmons, Microsoft’s media platform architect, offering an overview of the emerging international standards that are being developed and deployed, including digital rights management, HTML5, and authorization protocols. The presentation not only focused on first-generation Internet-connected television sets and standards, but also looked into the future, considering the more interesting areas of second screen synchronization and the blending that will eventually cause the consumer not to be able to distinguish between broadcast- and Internet-delivered content.

This BTS tutorial offered a snapshot of what’s happening in the world of hybrid broadcast broadband television. In addition to highlighting where various portions of the globe are in the development and deployment of technologies, it also illustrated that the blending of television and Internet is a global phenomenon, with a great amount of participation and cooperation among those involved.
Future of Broadcast Television (FoBTV) Initiative Update

The last edition of the Newsletter covered the Future of Broadcast TV (FOBTV) Summit held in Shanghai, China in November 2011, where world broadcasting leaders established a framework for cooperation to chart the future course of terrestrial television broadcasting.

Further developments in this project occurred on April 17, 2012, when technical executives from 13 television broadcast organizations from around the world, including the IEEE-BTS, signed a landmark memorandum of understanding (MOU) to officially form the global FoBTV Initiative.

The announcement of this historic signing took place during a well-attended general session on the FoBTV Initiative at the recent NAB Show conference in Las Vegas. This MOU builds on the initial Shanghai FoBTV Summit.

The signatories of the FoBTV MOU believe that terrestrial broadcasting is uniquely important, as it is wireless (supports receivers that can move), infinitely scalable (point-to-multipoint and one-to-many architecture), local (capable of delivering geographically local content), timely (provides real time and non-real time delivery of content) and flexible (supports free-to-air and subscription services).

Wireless delivery of media content to a potentially unlimited number of receivers makes terrestrial broadcasting a vital technology all over the world. Broadcasting is, in fact, the most spectrum-efficient wireless delivery means for popular real-time and file-based media content, according to the MOU.

This MOU underscores the goals of the FoBTV Initiative, which include:

• Developing future ecosystem models for terrestrial broadcasting, while taking into account business, regulatory and technical environments
• Developing requirements for next generation terrestrial broadcast systems
• Fostering collaboration of digital television development laboratories
• Recommending major technologies to be used as the basis for new standards
• Requesting standardization of selected technologies (layers) by appropriate standards development organizations

The MOU was signed by technical executives from the 13 founding organizations and is available at http://www.FoBTV.org.

On April 25, 2012, subsequent to the signing of the MOU, the management committee of the FoBTV Initiative announced its leadership team. Mark Richer, president of the Advanced Television Systems Committee, was elected FoBTV chairman; and Phil Laven, chairman of the Digital Video Broadcasting project, was named FoBTV vice chairman.

In addition, Dr. Wenjun Zhang, chief scientist at NERC-DTV, was named chairman of the newly formed FoBTV technical committee. Dr. Zhang is joined by three vice chairs: Dr. Yiyan Wu, CRC principal research scientist; Dr. Toru Kuroda, director of NHK’s planning and coordination division; and Dr. Namho Hur, general director of ETRI’s department of broadcasting system research. This group will lead the FoBTV technical committee’s solicitation and evaluation of technical proposals, and the recommendation of major technologies to be used as the basis for new standards.

Founding FoBTV members comprise the Management Committee. These include, the Advanced Television Systems Committee (ATSC), the Canadian Broadcast Corp. (CBC), the Communications Research Centre Canada (CRC), the Digital Video Broadcasting project (DVB), the European Broadcasting Union (EBU), the Electronics and Telecommunications Research Institute (ETRI) of Korea, Globo TV of Brazil, the IEEE Broadcast Technology Society (BTS), the National Association of Broadcasters (NAB), the National Engineering Research Center of Digital TV of China (NERC-DTV), NHK Science and Technology Research Laboratories (NHK), and the Public Broadcasting Service (PBS).

FoBTV is a voluntary, non-profit association that is open to any organization that signs the MOU underscoring the goals of the FoBTV Initiative.

As one of the founding members, the BTS intends to take an active role in this important new Initiative. As a result of being one of the founders, the BTS has a permanent seat on the management committee. Although officially representing CRC, it is noted that technical committee vice-chair Yiyan Wu is also the editor of the BTS Transactions and an active BTS member. It is further noted that other BTS members will be active in the work of FoBTV by either representing their employers or directly representing BTS on various committees.

Newsletter Deadlines

The BTS Newsletter welcomes contributions from every member. Please forward materials you would like included to the editor at BTSeditor@ieee.org. Here are our deadlines for upcoming issues:

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Early Television Conference Celebrates 10th Anniversary

By James E. O’Neal

HILLIARD, OHIO

Aficionados of television’s past once again journeyed to this Columbus, Ohio suburb for two days of non-stop presentations, demonstrations, and information exchanges, coupled with auctions and flea market activities—all centered on yesteryear’s video technology.

The Early Television Conference is an annual activity sponsored by the privately-owned Early Television Foundation and Museum, and the 2012 event marked the 10th such get-together of antique television equipment collectors, history buffs and video experimenters. According to the founder of the Early Television Foundation, Steve McVoy, a record was set this year, with the conference attracting 109 participants.

Most conference activities take place at the Early Television Museum, which contains a very large number of antique television receivers (some going back to the 1920s), as well as a sizeable collection of camera tubes and CRTs, along with studio cameras, a 1948 RCA remote truck, and even a large 1950s VHF television transmitter.

A highlight of the event is presentation of papers on early television technology and this year was no exception, with reports on the contributions of Hazeltine Laboratories to the NTSC color system by Dr. George Lemaster, a description of RCA’s developmental color receivers by Ed Reitan, a slide show of early TV cameras by Chuck Pharis, an update by Mike Molnar on the restoration of a very rare Zenith field sequential color set purchased at last year’s ETF.

continued on page 8
Highlights of WRC-12

By Christine DiLapi

GENEVA

The Jan. 23-Feb. 17, 2012 WRC-12, World Radiocommunication Conference 2012, held here dealt with several spectrum management-related issues that directly impact the UHF broadcasting bands on a global basis.

Not surprisingly, the main pressure on broadcasting spectrum has been from the mobile industry interests.

A lot of the time and resources of WRC-12 were devoted to making sure that the next WRC, WRC-15, has a prominent agenda item regarding the additional allocation of spectrum to mobile broadband applications. Participants of WRC-12 also heavily debated the issue of making additional allocations to the mobile service in the 694-790 MHz band in EMEA (Europe, Middle East and Africa), under the auspices of an agenda item that was to study only sharing/co-existence conditions in the 790-862 MHz band, but many African nations took this item a step further and used it as a vehicle to seek more mobile spectrum. A Resolution approved by WRC-12, Resolution 232, called to allocate the 694-790 MHz band to the mobile service in EMEA and the resultant allocation modification is already present in the Table of Allocations.

WRC-15, which will likely take place sometime in 4Q 2015, is already being called the “broadband WRC” and the parts of the 470-862 MHz band that do not already have a primary mobile service allocation will most likely be considered for mobile broadband applications.

Three agenda items for WRC-15 that should be of interest/concern to broadcast interests are listed below – the aforementioned mobile broadband item, one that focuses on co-existence issues in the 694-790 MHz band, and one pertaining to spectrum issues for public safety-type applications:

• 1.1 Consideration of additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution COM6/8 (WRC 12).

• 1.2 Examination of the results of ITU-R studies, in accordance with Resolution COM5/10 (WRC 12) on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and the implementation of appropriate measures.

• 1.3 Review and revision of Resolution 646 (Rev.WRC 12) for broadband public protection and disaster relief (PPDR) in accordance with Resolution COM6/11 (WRC 12).

The spectrum sharing and co-existence studies for agenda items 1.1 and 1.2 will take place in an ITU-R Joint Task Group, JTG 4-5-6-7, created expressly for these two issues so that the studies can be discussed in a neutral and impartial group. The mobile broadband proponents had wanted these spectrum compatibility issues to be studies in the ITU-R group controlled by the mobile proponents, but there was general concern among other spectrum stakeholders that incumbent spectrum issues would not be sufficiently taken into account. Credit especially goes to the international broadcasting community—those that participate in ITU-R Study Group 6—for their effective advocacy of an independent forum for the mobile broadband spectrum studies.

In summary, the TV broadcast frequency bands will continue to be subject to spectrum reallocation pressures, on a domestic, regional, and international basis, in the coming years.

Early Television continued from page 7

event, a look at television and film color reproduction by Wayne Bretl, and an in-depth report on the recent discovery of a very unusual RCA color receiver on an Internet auction site, and its subsequent purchase and identification effort.

The receiver, now owned by Nick Williams, appears to be a one-of-a-kind model constructed during RCA’s “Manhattan Project” to develop backwardly compatible color television in the early 1950s. It has been tentatively identified as having been used in field testing of an early iteration of the evolving color signal—in this case, one embodying color phase alternation or “CPA.” (CPA technology was discarded by the second NTSC, which established U.S. color standards in 1953, as too costly to implement due to the requirement for a one-line delay. Later, PAL color incorporated this principle.)

In his presentation, Williams provided information gathered to date about the set, and plans for its restoration. (Another participant at the conference has offered to modify an existing television standards converter for generating the non-standard color signal needed by the receiver.) Remarkably, the set’s CRT—an RCA developmental color tube—is still under vacuum and has good emission.

In other conference activities, several early television artifacts were auctioned, including a Meissner pre-WWII television receiver and two mid-1950s color filter wheel adapters for displaying NTSC color on black and white television TVs. A date has not been set yet for next year’s ETF Conference.
GHENT, BELGIUM

This March I had the opportunity to attend and speak at the first Broadcast Technology Society GOLD (Graduates of the Last Decade) Workshop here.

For those unfamiliar with GOLD, it is an IEEE-wide initiative to reach out to younger engineers after they have completed their technical studies and are beginning their careers. Virtually all of the societies that make up the IEEE have a GOLD program in one fashion or another, and BTS is no exception. Our GOLD committee has conducted social events at the last couple of Broadband Multimedia Systems and Broadcasting (BMSB) Symposiums, but this was their first standalone workshop that was actually targeted at providing an educational program in addition to social events.

Globally, broadcasting is undergoing challenges and changes as the Internet, broadband, and wireless technologies all converge. One of the most popular and demanding of these is wireless delivery of audio/video content that in analog days was the exclusive domain of broadcast services. Adding to the challenge is the technological revolution that now allows receivers for this technology to be mobile. Determining what role traditional broadcasting and broadcasters will play in the future delivery of audio/video content—and how they will meet the challenges associated with the changing environment—was the focus of this most recent workshop.

Topics presented at the workshop were extraordinary as might be expected. The goal was not to tell people what path to follow, but rather to expose them to an almost limitless variety of paths from which to choose.

I presented a view of the future of broadcasting in North America. As a career broadcaster in the United States, I have seen many changes during the last few decades. The goal of my presentation was to offer a snapshot of what’s currently happening and where it appears to be headed. A similar presentation was made by my colleague, Lieven Vermaele, of the EBU, in regards to Europe. Each of us showed how the blending of technologies and conditions is changing the world, and how broadcasters have a role to play in the new environment if we choose to embrace the challenges and change with the audience.

Additionally, the workshop offered practical presentations from colleagues in Spain, Canada, England, and Ireland on the challenges associated in planning and deploying mobile broadcast networks. While converting from analog to digital broadcasting presented many challenges for broadcasters globally, the mobility of their audiences’ receivers has magnified those challenges. When this is coupled with the scope of the mobility, you can quickly see that we’ll need a vast amount of brilliant and creative thinking to grapple with the forthcoming issues and challenges.

A person that uses their tablet or other portable device to wirelessly consume audio/video media on a regular basis will expect to use that device no matter where they travel, domestically or internationally. In his 1962 book “The Gutenberg Galaxy,” author Marshall McLuhan referred to the “global village” as a way of describing what electronic communications was doing to bring the various peoples and cultures of the world together. Mobility has further amplified that concept by increasing the amount of direct interaction possible.

Additionally, the workshop offered even more forward-looking presentations examining the deployment of Ultra High Definition video and sound, as well as stereoscopic three-dimensional images. Prototypes and working models of these technologies are currently in use and there are more to come. Scientists and students in universities and labs throughout the world are working on holographic imaging, multi-view three-dimensional imaging, and other yet-to-be-realized methodologies for communicating and allowing persons to engage with one another. GOLD Workshops such as this one provide an opportunity to look into the future and examine some of the unexplored territories that are just over the horizon.
BTS ‘Bridging the Gap’ Course Now a Reality

By Ralph Hogan, CPBE, CBNT, DRB
Associate General Manager
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President
Society of Broadcast Engineers

The BTS “Bridging the Gap” training course is now a reality, with the first class offered at the April PBS Tech-Con2012 held in Las Vegas. The course has roots that go back to 2007 when the IEEE BTS AdCom directed the education committee to develop a training program for broadcast engineers. After a couple of false starts and many lessons learned, the program has now evolved into a series of training modules.

Other companion courses are now in the beginning stages of development. The first course consisted of 16 hours of lead instruction given during a two day period. The class size at the first course offering was some 25 students.

“Bridging the Gap” was developed to address the changing broadcast facility, which for some time now, has been migrating to IP technology and file-based technologies, with software-driven systems the norm. These changes require re-education of our existing workforce. The “Bridging the Gap” series is targeted at maintenance engineers and IT staff, introducing core concepts and providing a discussion of real-world options.

The course begins with a review of video and audio fundamentals to ensure that all the participants have the same technical foundation. More advanced concepts are then introduced in the areas of networking, storage, metadata, file management and transmission. Monitoring, troubleshooting and preventative techniques are also introduced. Continued on page 11

John Luff is shown teaching the “Bridging the Gap” course at Caeser’s Palace in Las Vegas on April 11 where it was presented as part of the PBS TechCon2012 event. Wes Simpson is also a member of the instructional team.
Highlights of the April 15, 2012 AdCom Meeting

By William Meintel

LAS VEGAS

The BTS Administrative Committee (AdCom) met on Sunday April 15, 2012 during the NAB Show in Las Vegas. As the NAB event attracts many people from our industry, attendance at the AdCom meeting was high.

Treasurer Lanny Nass reported that the BTS continues to be in good financial shape with continued significant revenue as a result of our partnership in IBC. On that note Mike Bennett, our IBC representative, reported that the September 2012 IBC Show appears to be on track in terms of filling available exhibit space at the Amsterdam RAI exhibition center. It was also reported that Yiyan Wu, on behalf of BTS, will lead a collaborative effort with Phil Lavin, chairman of the Digital Video Broadcasting Project, to place a major presentation related to the FoBTV initiative (see the story on FoBTV elsewhere in this issue) at the IBC event. This will be in place of the usual BTS tutorial that has been very popular at recent IBC Shows.

The conference committees reported that work on both the Symposium on Broadband Multimedia Systems and Broadcasting (June 27-29, 2012 in Seoul, South Korea) and the 2012 IEEE Broadcast Symposium (Oct. 17-19, 2012, Alexandria, Va. USA) is progressing well and both promise to meet the high standards expected by the BTS.

The AdCom also voted to provide funding to continue support of the experiment of adding a virtual component to the Broadcast Symposium that was first tried at last year’s event. The entire 2011 Symposium was streamed live, as well as archived for on-demand viewing after the event. As the availability of this component was not that well publicized prior to the event, it has been decided that it should be given a second chance before a determination is made concerning its continuing value.

The IEEE Broadcast Symposium which has been held annually for more than 60 years now, and in recent years has had dwindling attendance and profitability. In an attempt to change this, a committee has been formed to explore the causes of the decline and make recommendations to return the Symposium to the prominence it once held. The committee, under the leadership of Eric Wandel, is now at work and expects to have a full report for the January 2013 AdCom meeting.

The long awaited Bridging the Broadcast/IT Gap course that’s been under development by BTS is now a reality. After some test runs that provided very positive feedback and praise, the course is being launched, with the expectation that it will be offered in at least three different venues in 2012.

Part of the AdCom meeting involved a discussion about the participation of the BTS in spectrum issues, both through IEEE-USA and with the ITU. It was reported that there is the potential that broadcast spectrum could be reallocated for other uses not only in the United States, where this is an ongoing discussion, but internationally at the ITU. In view of this, a committee was formed to develop and implement a BTS strategy to insure that the importance of preserving spectrum for broadcasting is properly addressed.

An announcement was made with regard to the decision made at the January 2012 AdCom meeting to create an additional BTS staff position at IEEE headquarters. That position has now been filled by Amy Reeder, who comes to IEEE from the Council of Chapters, American Association of University Professors (AAUP) where she held the position of senior staff representative. Amy joins our BTS team headed by senior administrator, Amanda Temple, and Jenn Barbato.

Bridging the Gap continued from page 10

A real-world hybrid video/IP/software broadcast facility model is created in stages during the course to provide a platform for teaching core concepts, and also to serve as a model to introduce troubleshooting and monitoring techniques. The application of real-world operational scenarios against this hybrid facility model allows participants to see how they can immediately apply what they learn to their facilities. In addition, this course approach provides an opportunity to discuss system choices and tradeoffs, configuration considerations, and preventive maintenance techniques.

The hybrid facility model evolves and becomes more complex during the course, starting as a simple post facility and—through four iterations—is built out into a geographically distributed complex hybrid interconnected facility, including a local station with news capability.

A sister course will soon be introduced for IT staff members who support a hybrid facility. The appendix for each “Bridging the Gap” course will include reference material (IT or maintenance engineer) from the companion course.

The focus, depth and presumed prerequisites differ for the two groups. For maintenance engineers it is presumed that a basic understanding of IP networking and its configuration and management exists. More complex networking concepts are taught and applied to the hybrid broadcast facility model.

The BTS “Bridging the Gap” Website (http://bts.ieee.org/btg) has the most current information on future class locations and cost.
Do We Need Video Systems “Beyond HDTV”?  

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“BeyondHDTV” is a very appealing notion for people involved in the development of video systems. Thinking outside the box, such a television system could be constructed in a completely original manner, but to design an actual working system in the present, the system would relate to current HDTV and follow in the footsteps of television systems that have come before it. This being the case, resolution, frame rate, scanning method, colorimetry, aspect ratio, and other parameters must be targeted for study. As for advanced 3DTV systems, a variety of systems can be considered, and by progressing in the order of multiview, integral, and holographic 3D systems, we can envision the configuration of a “dream system” far removed from the traditional concept of 2D systems. Depth information of the 3D video systems, in general, is converted to 2D images when recorded and transmitted. Therefore, a drastic improvement of resolution enables the system to carry enough depth information. Given that system, we consider that if we can realize an extremely high-resolution system, we can also reach a sufficiently compelling 3D system.

Looking back at the history of television, we can see that many engineers and researchers contributed to its development starting with the successful experiments conducted by John Baird in the United Kingdom and Kenjiro Takayanagi in Japan in the 1920s. The research and development of television systems continued over the years culminating in the standardization of the NTSC, PAL, and SECAM formats as standard-definition television (SDTV) systems. These SDTV systems spread throughout the world and fulfilled their role well. In addition to broadcasting, television has found use in many fields in the form of video systems and has taken root as a social infrastructure. Today, these SDTV systems are being reincarnated as HDTV and expanding anew.

The motion picture, which was invented by the Lumiere brothers in 1895, has progressed dramatically since the invention of the television. Movies have moved, inspired, and enlightened people through great works and documentaries. The introduction of digital video in image capture and editing has made the work of producing movies more efficient, and more recently, the implementation of digital projection techniques in movie theaters has helped drive the expansion of digital cinemas.

Development of devices for digital video technologies has been especially remarkable in recent years. It is now becoming possible to fabricate semi-conductor devices — which form the basis of elemental technologies essential to video systems — at a submicrometer level of precision. As a result, image sensors and display devices (LCOS type) are coming to be manufactured with fine-pitch pixel structures under 5 µm. At the same time, the pixel pitch of mainstream liquid crystal displays (LCDs) is reaching around 50 µm, and other novel display devices such as electroluminescent displays (ELs) are becoming practical. These display devices are coming into use in compact mobile terminals as well; some have a high number of pixels reaching the HDTV level. In short, the application of fine-pitch techniques is becoming a reality. These advanced technologies are providing a foundation for constructing even higher number of pixels and extremely high-resolution video systems beyond HDTV. They represent a natural progression toward the development of new video systems.

In a discussion focusing on 2D video systems, it is expected to view large screens as a precondition to developing systems beyond HDTV. In general, a value of 1.0 (20/20 vision) is used as the standard for visual acuity of people when viewing video. This comes out to one arc-minute as angle of view. Accordingly, a video system must provide resolution power corresponding to this visual acuity. The simplest way of achieving this is to adjust viewing distance.
from the equipment. For example, a pixel pitch of 0.87 mm requires a viewing distance of about 3 m. In this regard, a large 300-in screen with an aspect ratio of 9:16 provides a broad horizontal angle of view of about 100 degrees. In this case, the total number of pixels is about 8,000 (horizontal) x 4,500 (vertical) providing an ultra high-definition image. Now, assuming that the viewing distance is 25 cm, which corresponds to the distance of distinct vision, pixel pitch would be around 70 µm. Consequently, for the same aspect ratio and pixel count as the 300-in screen above, screen size would come out to be A3-wide and horizontal angle of view would be the same at 100 degrees. With this kind of screen, we can envision a display used much like a handheld magazine foldout. In this way, both large screens that most people view from a distance and compact screens viewed up close are attractive for displaying extremely high-definition images.

It is common knowledge that video technology is being used in a wide variety of fields in response to social needs. In the field of medicine, computed tomography (CT), magnetic resonance imaging (MRI), and other forms of tomographic imaging have become essential for visualizing internal parts of the human body affected by disease from outside the body. In imaging systems such as these, higher resolutions are always being sought to improve the accuracy of diagnoses. In the area of manufacturing production as well, cameras are being actively used in the role of robot eyes to automate production lines and inspection processes. Needless to say, improving camera accuracy, that is, increasing its pixel count helps the camera significantly to fulfill its role as an observing eye. Video technologies spanning cameras, display equipment, signal processing, transmission equipment, etc., are also becoming wide spread in many other fields including security, digital signage, and gaming. In other words, video technology is becoming an essential element

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**Upcoming Events** of Interest to BTS Members

- **June 27-29, 2012** – IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB); Seoul, Korea
- **Aug. 5-9** – SIGGRAPH Conference and Exhibition; Los Angeles, Calif.
- **Sept. 6-11, 2012** – IBC 2012 conference and exhibition; Amsterdam, Netherlands
- **Oct. 23, 2012** – Society of Broadcast Engineers National Meeting; Denver, Colo.
- **Jan. 8-11, 2013** – Consumer Electronics Show (CES); Las Vegas, Nev.
- **Feb. 18-22, 2013** – Hollywood Post Alliance (HPA) Technology Retreat; Indian Wells, Calif.
- **Apr. 6-11, 2013** – NAB Show and Exhibition; Las Vegas, Nev.

If you have information on broadcast-related events that may be of interest to other Broadcast Technology Society members, please submit them at least three months in advance to the BTS Newsletter editor at BTSeditor@ieee.org.
An Examination of Present-Day OLED Professional-Grade Video Monitor Technology

By David J. Weinberg

(This article is based on a presentation on OLED technology evaluation-grade video monitors given by Gary Mandle, senior product manager of professional display products at Sony.)

Background:

In December 1953, the National Television System Committee (NTSC) established a color TV standard, a portion of which dealt with characteristics and specifications for color television displays. The 1953 NTSC standard was based on cathode ray tube (CRT) display technology, as this was the only practical display technology at the time. Several decades later, the CRT was still the only widely available display device when the standards for high-definition television (HDTV) were written.

In the intervening years, the CRT, despite its limitations, was the “canvas” on which all video-based artistic content was created. However, in the years after HDTV standards were developed, other video-display technology options have become available. These alternative technologies brought with them capabilities that can exceed the parameters and capabilities of the CRT in certain areas. In the last decade, the CRT has virtually disappeared as the result of environmental concerns and regulations, and the desire by consumers for lighter and “thinner” television receivers.

New color television display technologies arising in the place of the CRT include liquid crystal displays (LCDs), plasma, and digital light processing (DLP). However, there are limitations associated with each, and none seems to be the perfect solution for replacement of the cathode ray tube in critical viewing applications.

A relatively new technology for constructing television monitors is the organic light-emitting diode (OLED). It has garnered considerable excitement, primarily due to its ability to provide a high light output and a very low black level. However, until recently it has been difficult to produce cost-effective bring OLED displays in sizes sufficient for critical video evaluation purposes.

Several companies have explored OLED technology, developing displays in various sizes. Sony has been a major player in this field, starting work on OLED displays nearly two decades ago. That company has now brought to market a 25-inch (diagonal measurement) 16:9 aspect ratio active matrix OLED (AMOLED) display that matches, and in some cases exceeds the performance of professional grade CRT color monitors.

An Explanation of OLED Technology

OLED is an emissive technology, generating its own light. No backlighting or edge lighting is required, nor does it involve ionized gases and phosphors. The OLED’s physical structure is created by sandwiching several organic layers between conductive surfaces.

Organic semiconductors display advantages in the following areas: field uniformity within the material, molecules are held together by weak binding forces, a lower carrier mobility than exists within inorganic semiconductors, and a high fluorescence efficiency.

A manufacturing advantage associated with OLED technology is that epitaxial fabrication is not required, as is the case in conventional semiconductor manufacturing processes.

An OLED’s light is produced by electroluminescence (an optical/electrical process involving the passage of an electrical current through a specific material which results in the production of light). This technology has many benefits in a wide range of fields. For this reason, we have taken up the challenge of developing UHDTV [7,680 (horizontal) x 4,320 (vertical) pixels] as the system beyond HDTV, and it is called “SuperHi-Vision.” We have been exhibiting our UHDTV system at various venues, and we have heard almost no negative opinions as to the need for its development from people who have viewed UHDTV video for themselves. This outcome is extremely encouraging for researchers and developers working on UHDTV. To construct a total UHDTV system, there are still many items that must be researched and developed, but to answer the question posed by our title, we would say “Yes, we do!”

Beyond HDTV continued from page 13

of society. Further improvements in pixel count and definition in video systems will contribute greatly to further progress in these fields.

Let us return to the original question posed by the title of this article. There was a worry that negative comments would be heard in regard to the need for “Beyond HDTV” systems in terms of television viewed at home. As a superb, capable system developed with advanced technologies for its time, HDTV is coming to be widely used. However, if a new video system can be constructed exceeding the capabilities of HDTV, certainly it would bring us many benefits in a wide range of fields. For this reason, we have taken up the challenge of developing UHDTV [7,680 (horizontal) x 4,320 (vertical) pixels] as the system beyond HDTV, and it is called “SuperHi-Vision.” We have been exhibiting our UHDTV system at various venues, and we have heard almost no negative opinions as to the need for its development from people who have viewed UHDTV video for themselves. This outcome is extremely encouraging for researchers and developers working on UHDTV. To construct a total UHDTV system, there are still many items that must be researched and developed, but to answer the question posed by our title, we would say “Yes, we do!”
generation of light). The recombination of electrons (from the electron transport-layer electrode) and holes (from the hole transport-layer electrode) produces energy that is transferred to “guest” molecules. Energy absorbed by the guest-molecule electrons causes them to jump to a higher (unstable) state from which they return to their stable resting state by releasing the extra energy in the form of photons.

There are two basic OLED structures: bottom emission and top emission.

Bottom emission is characterized by the drive circuitry located between the OLED layer and the front glass surface. This requires gaps in the circuitry for the light to pass through. For a given pixel size, this structure places limitations on light output, pixel size and spacing. It also results in fabrication of a more complicated driver.

Top emission is characterized by the OLED layer radiating its light directly through the front glass surface. This results (other factors remaining constant) in higher per-pixel light output (larger emission area per pixel, which also results in higher emission efficiency) and simpler driver design. The higher emission efficiency also means that for the same light output, top-emission designs will generate less heat and use less energy (approximately one percent of the power required for a fluorescent light to radiate the same light intensity).

Sony’s OLED professional-grade monitors use the top emission approach.

Sony’s OLED pixel structure (Figure 1) has a semi-reflective cathode through which the light is emitted. This causes the light within the OLED pixel to bounce back and forth between the anode and cathode prior to emission, increasing the emitted light intensity and narrowing its bandwidth, for the same energy input.

OLED pixel drive circuitry is similar in design to that used in LCD panels.

Similar to today’s other display technologies, OLED monitors are pixelated panels—a self-luminous matrix array of pixels, each of which is individually addressed and controlled.

Properly designed and constructed OLED displays are capable of producing a light output of 150 cd/m² (approximately 44 fL) when displaying a full white field.

Display Technologies Compared
A comparison of current OLED and other video monitor technologies yields the following information:

• The CRT delivers the widest acceptable viewing angle.
• The LCD provides the highest image resolution (7680 x 4320) and has the longest useful life.
• OLED displays exhibit almost no smearing of moving objects, as compared with LCD screens
• The CRT exhibits superior motion performance as compared to the LCD; however, LCD panels can be adjusted to reduce flicker to a level below that observable in CRTs.
• Black levels achievable with high quality representative displays are as follows: LCD—slightly higher than 0.1 cd/m²; CRT—approximately 0.01 cd/m²; OLED panels—0.0003 cd/m². (A cd/m² [candela/meter-squared] is also known as a nit [approximately 0.003 fL].)
• As the luminance of an image approaches black, the color gamut of CRTs and LCD panels shrinks to monochromatic gray. OLED displays are capable of retaining a full color gamut much closer to black.
**OLED Technology** continued from page 15

- Ambient light affects an OLED display’s black level, much as it does a CRT. However, while a powered-off CRT appears slightly greenish gray, the powered-off OLED screen is as black as the display’s frame.

- OLED panel life is claimed to be approximately 30,000 hours (slightly less than 3.5 years of 24/7 operation), and maintains close to original performance until very near end of life. A CRT’s useful life is generally accepted to be approximately 20,000 hours, with gradual performance deterioration.

- OLED panels do not exhibit deterioration when not in use (no shelf-life limitation), as the organic materials from which they are constructed are sealed off from the atmosphere. There are no altitude or humidity limitations associated with OLED panels.

- At the present time, 25-inches (diagonal measurement) is the largest OLED display that can be manufactured due to production equipment limitations. This might be too small for some applications.

**Author’s Comments**

I believe that for telecine, colorist and mastering applications, the current OLED monitors may be too small to enable the artist to see necessary details to ensure certain anomalies will not be visible when exhibited on large home-theater screens. I have personally witnessed such aberrations from a number of DVD and Blu-ray discs on my own calibrated eight-foot wide front-projected display.

I expect that larger panels will become available when it becomes technically and economically reasonable to manufacture them. In accordance with basic economic theory, as sales go up and development costs are amortized, the prices likely will come down.

Regardless of future video display technologies, key CRT characteristics will remain critical for providing an accurate rendition of all currently available content. It would be appropriate to tighten tolerances on some parameters such as gray scale tracking and flat-field uniformity, but defining gamma = 2.4 (as done in ITU-R BT.1886:2011) merely reaffirms the reality of the CRT.

*(The BTS Newsletter wishes to thank Mr. Mandle and Sony for permitting the illustrations used in Mr. Mandle’s presentation to be reproduced here.)*

David Weinberg is an engineering consultant and technology journalist in the fields of audio, video and film technology. He is also editor of “The B A S Speaker,” the journal of the Boston Audio Society. He may be contacted at WDNVBDJRJG@Gmail.com.
Amy Reeder Joins BTS Administrative Team

The IEEE Broadcast Technology Society recently welcomed Amy Reeder to its administrative team. Amy came on board in late April, joining Amanda Temple, BTS senior administrator, and Jennifer Barbato, BTS publications coordinator.

Ms. Reeder will focus much of her attention on advancing education and chapter development, providing staff oversight and coordination of education-related programs and projects. She will also act as a liaison between the BTS Education Committee and the IEEE Educational Activities Department and Educational Activities Board. She has already begun promoting the Society’s flagship “Bridging the Gap” course that is scheduled to be held in Los Angeles this August, and a month later in Atlanta.

In addition, She will organize and administer the BTS distinguished lecturer program. In her position, she will also support chapter development efforts and coordinate and promote GOLD programs and activities, providing assistance in connection with membership recruitment, retention and chapter growth strategies.

Ms. Reeder will also work with the BTS administrative team in managing day-to-day BTS activities in coordination with society planning, symposiums, meetings, projects, as well as developing new initiatives with the AdCom officers and committees.

Ms. Reeder previously worked at the Council of Chapters of the American Association of University Professors (AAUP)—a professional organization serving more than 1,400 teachers, physicians, librarians and researchers at the University of Medicine and Dentistry of New Jersey. She brings with her a broad range of experience from having served the AAUP in a variety of roles including developing membership development strategies, and communication tools for the AAUP council.

Wenjun Zhang Elevated to IEEE Fellow Grade

The BTS is proud to announce the elevation of BTS member Wenjun Zhang to the grade of Fellow, effective Jan. 1, 2012.

Dr. Zhang received the B.S., M.S. and Ph.D. degrees in electronic engineering from Shanghai Jiao Tong University, Shanghai, China, in 1984, 1987 and 1989, respectively.

From 1990 to 1993, he worked as a post-doctoral fellow at Philips Kommunikation Industrie AG in Nuremberg, Germany, where he was actively involved in developing HD-MAC system. He joined the Faculty of Shanghai Jiao Tong University in 1993 and became a full professor of Electronic Engineering in 1995. As the project leader, he successfully developed the first Chinese HDTV prototype system in 1998. He was one of the main contributors to the Chinese Digital Television Terrestrial Broadcasting Standard issued in 2006. He holds more than 40 patents and has published and/or delivered more than 90 papers in international journals and at conferences.

Prof. Zhang’s main research interests include digital video coding and transmission, multimedia semantic processing and intelligent video surveillance. He is the vice president for Research of Shanghai Jiao Tong University and the chief scientist of the Chinese Digital TV Engineering Research Centre, an industry/government consortium in DTV technology research and standardization.

The grade of IEEE Fellow recognizes unusual distinction in the profession and is conferred by the board of directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. That individual’s accomplishments shall have contributed importantly to the advancement or application of engineering, science and technology, bringing significant value to society.

IEEE Fellows are an elite group and the IEEE looks to these individuals for guidance and leadership as the world of electrical and electronic technology continues to evolve. The total number of Fellows selected in any one year may not exceed one-tenth of one percent of the total voting Institute membership.
Chapter Reports

Tapan Sarkar Addresses Argentina BTS Chapter

The Argentina BTS chapter enjoyed several presentations in May by Professor Tapan Sarkar. Prof. Sarkar presented a talk on radio’s origins on May 14, and another presentation entitled “An Exposition on the Choice of the Proper S-Parameters in Characterizing Devices, Including Transmission Lines, With Complex Reference Impedances and a General Methodology to Compute Them” on May 16.

Additionally, Professor Sarkar conducted a three-day seminar on “Smart Antennas” May 14-16.

All three presentations took place at the University of Buenos Aires.

Submitted by Marisabel Rodriguez, marisabel@gmail.com.

New BTS Chapter Formed in San Diego

A new BTS chapter has been formed in San Diego. The city is a natural home for a chapter, as it hosts numerous companies involved in broadcast technologies, multimedia entertainment and communications, and is also home to a large engineering workforce. This fledgling chapter has already begun planning and executing activities, with the first event being a visit on May 31 by a BTS Distinguished Lecturer, Dr. Lap-Pui Chau, a graduate of Oxford Brookes University, England; and Hong Kong Polytechnic University.

Dr. Chau’s presentation was entitled “Multi-Program Video Coding for Digital Video Broadcasting.”

Prior to Dr. Chau’s talk, the new BTS chapter enjoyed refreshments and an opportunity for networking. A question and answer followed Dr. Chau’s 6:30 p.m. presentation.

Submitted by Murat F. Kars, mkarsi@ieee.org.

Letters to the Editor

The IEEE Broadcast Technology Society Newsletter welcomes correspondence from its readers regarding articles published in the Newsletter or other subject matter that may be of interest to BTS membership. All correspondence will be read and acknowledged; however, due to space limitations there is no guarantee that every letter will be published. Please limit your comments to no more than 600 words. We reserve the right to edit letters received for clarity and to fit space requirements. The Newsletter assumes no responsibility for any statements made by its correspondents. E-mail comments should be addressed to BTSeditor@IEEE.org.
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New Website
Please visit our new Website at http://bts.ieee.org/ to see all the changes that have been made. If you have any suggestion for our Website, please send an e-mail to: bts@ieee.org.

New Phone Number
We have a new telephone number that’s dedicated for IEEE BTS business: 732-562-6061.