From the President
William Meintel, BTS Newsletter Editor

As you may recall from my last column, I talked about The Future of Broadcast Television (FoBTV) Summit taking place in Shanghai, China in Nov. 10–11, 2011. BTS is one of the founding organizations of the FoBTV Summit along with 10 other organizations representing North and South America, Europe and Asia. As one of the founders, BTS has been very much involved, as BTS vice president Bill Hayes and I both were on the program. In addition, BTS Transactions editor Yiyan Wu served as co-chair of the FoBTV program committee as well as being one of the presenters.

The purpose of the FoBTV Summit was to foster global collaboration that may lead to the development of common strategies for the future of terrestrial broadcasting, and to exchange technical advances in the rapidly converging areas of terrestrial broadcasting, consumer electronics and networking technologies. Industry technology leaders were invited to work together to share their visions of the future of broadcasting. This bringing together of the collective perspectives of experts worldwide should benefit industry leaders as they identify their optimum national path for terrestrial broadcasting.

I can now report that the FoBTV Summit was a huge success culminating in a joint declaration signed by technical executives from 13 broadcast organizations from around the world. The full text of the Declaration continued on page 2

From the Editor
James E. O’Neal, BTS Newsletter Editor

It’s been a very busy fall season for many of us who work in the field of broadcasting. There’s the annual BTS Symposium, of course, and also the AES Conventions, and the SMPTE Technical Conference. Throw in a regional or local broadcast-related equipment exhibition or two and you find that you’ve got a very full plate. (And some of us are still recovering from the IBC Show held back in September.) Thanks to Mike Bennett and Paul Shulins, we have some good wrap-up coverage of IBC2011 and the BTS Symposium in this issue. I’d like to commend them both for taking time away from their busy schedules to roll up their sleeves and crank out these articles for the Newsletter. This is my second issue of the publication to go to the printer and I am getting a much better feeling for the importance of contributions of BTS members who take the trouble to prepare news stories and reports for the magazine. It would be thin continued on page 2
can be found in this edition of the newsletter.

Two key factors led to the success of this Summit. The first was the willingness of the proponents of the various differing television systems from around the world to come together and actually discuss global collaboration. The second was the tremendous effort by the host organization the National Engineering Research Center of Digital Television, China along with the other founding partners who on short notice were able to put together an excellent program and a very well managed conference with many highly respected experts.

Although this is just the first step, and probably the easiest one, it is a very promising start to preserving a future for terrestrial television broadcasting.

Most of you know from reading my editor’s columns during the past several years that in my “day job” I have been heavily involved in the transitioning of terrestrial television in the United States to digital. As I prepared for my talk at FoBTV on “Broadcast Spectrum Issues in North America,” I got to thinking about why I believe that terrestrial broadcast television is worth preserving and probably the easiest one, it is a very promising start to preserving a future for terrestrial television broadcasting.

Today’s young adults and the computer industry have grown up together. On the other hand, my life started about the time television was beginning to make its way into homes everywhere. Although television had actually been around since the late 1920’s, it did not really take off until after World War II. My first recollection of broadcasting was via the radio, but that changed shortly thereafter, with the arrival of our first TV set in 1952. Although initially we could only receive one channel, the TV quickly became a necessity. It provided video in the home with news and entertainment with well know talent. It gave access, many cases in real time, to material that had previously only been available as pictures in newspapers or magazine, or delayed newsreel footage in a movie theater.

I remember my parents watching the political conventions of 1952 and the coronation of Queen Elizabeth at Westminster Abbey on June 2, 1953. Later on I witnessed the historic 1960 presidential debates, and sadly, the 1963 assassination of President Kennedy, and not long after that, the gunning down of his brother, Bobby, and also Martin Luther King, Jr. About the time I graduated from college with my engineering degree, television delivered real-time video of man’s first visit to the moon in 1969, and in the 1970’s there was Sesame Street.

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**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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Future of Television Summit Focuses on Global Standard

by Bill Hayes
BTS Vice President

SHANGHAI, CHINA

During the past few years, the BTS, along with 10 other international organizations, has been working to develop a cooperative venture that we have named the Future of Broadcast Television. The organization’s origins come from the founding members who have recognized that terrestrial broadcasting can plan an important role in a globally connected society. However, in order to insure the participation of terrestrial broadcasting, there must be cooperation and harmonization within the core elements, so that connection to the consumer is maintained regardless of location. This is a daunting task when we consider that terrestrial broadcasting has developed in different ways using different standards throughout the world. As communications have globally transition to digital, many of the old analog standards have fallen by the wayside, and as new digital standards are developed and refined, there is an opportunity to eliminate much of the incompatibility that renders a terrestrial DTV receiver capable device useless outside of a particular location.

It was this vision that lead to the inaugural Future of Broadcast Television Summit that was held Nov. 10-11, 2011 in Shanghai. The opening program provided an overview of the current status of terrestrial television from the perspective of Europe, North America, South America, Asia, and the rest of the developing world. The second session focused on the attributes of the next-generation terrestrial broadcast system. The third session examined the challenges and opportunities presented by better spectrum use. The fourth session looked at the technologies on the horizon and how they might be used...
to ensure that terrestrial broadcasting reaches its full potential globally. The final session consisted of a panel made up of many of the presenters who fielded questions from the audience about the future role of terrestrial broadcasting, and how the dynamics of the global environment will influence and change over time.

The FoBTV Summit attracted more than 200 attendees from all over the world, and was considered to be a tremendous success for such a first event. The founding organizations have already begun working on the elements and details required to formalize the organization. There is a tremendous challenge for all of the member organizations in working together as a team to ensure that as the world becomes increasingly more connected and mobile, terrestrial broadcasting continues to be one of the fundamental tools used to reach audiences, wherever they may be. In recognition and of that commitment a joint declaration was read to the audience and signed by all 11 of the member organizations on Nov. 11, 2011 at 11:11:11 a.m. This document is presented in its entirety in the following pages of the Newsletter.

The path that broadcast television will take in the future will not necessarily be an easy one. I think it is safe to say that there will be changes and surprises along the way. However, for what I believe to be the first time in the history of broadcasting, the organizations that will be responsible for that future have come together and agreed to cooperate in creating a global system that won’t be restricted by technology differences, incompatible standards, or political borders. Through communications of this nature we are able to gain a better understanding of each other, and through such an understanding come better relationships.
Future of Broadcast Television Summit

Joint Declaration

November 11, 2011

FOBTV 2011, Shanghai
A Global Approach to the Future of Terrestrial Television Broadcasting
FOBTV Shanghai Declaration

It has been nearly a century since the birth of broadcasting. Amid the tremendous changes and innovation taking place in communications, the broadcasting and television industry will evolve and continue to play a critical role in bringing information and entertainment to all: to the rich and the poor; to rural communities and city dwellers; and to viewers in their homes and on the move.

The attribute of wireless delivery of media content to an 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.

We, broadcasting and television practitioners from all over the world, are gathered in Shanghai today to plan the continued evolution of television broadcasting and, in some respects, a revolution.

From monochrome to colour TV, and from analogue to digital, television technology has undergone revolutionary changes. In the analogue age, colour television technology fragmented into three major systems (PAL, NTSC and SECAM, with many sub-variations). In the digital age, the splintering has continued across the globe with multiple, separately developed digital systems. While television has prospered, it has not been possible for the world to take full advantage of the convenience and economies of scale of a single broadcast standard.

Today, technological innovation may be able to break down many of the long-standing barriers that have prevented common systems. This would enable us to remove the gaps between the different television signal formats and transmission systems used around the world.

Digitization has opened the door for a broadcasting renaissance. We need to explore new ways of cooperation, seek the progressive unification of standards, and realize technology sharing so that the efficiency and convenience enabled by digitization will be realized – not reduced by system fragmentation.

The 21st Century is an era of integration of broadcasting, Internet, and communications, all of which have evolved in parallel. Consumers are calling for more convenient and user-friendly services. The development of digital technology opens the possibility of cooperation among all the different networks and transmission systems.

The world’s resources are limited, and we need to avoid unnecessary spectrum and resource consumption fueled by competition between different sectors or delivery platforms. We must seek the best balance among economic prosperity, technological advances and sustainable development, and we hope to explore the possibility of cross-sectoral,
cross-border and cross-regional cooperation. Low power consumption, low-cost and environmentally-friendly technology and industrial development models should be our common goals.

Guided by these goals, we undertake our common initiative to:

Define the requirements of future terrestrial broadcast systems
We recognize the critical importance of mobility in future broadcast systems and desire that mobile, handheld and portable devices be capable of working across borders and across different communications networks. We also recognize the benefits of deploying higher-resolution systems toward a closer representation of reality, and human friendly services for those who require special needs. Furthermore, the collaboration between broadcast and Internet content will play a vital role in providing attractive services. The broadcast industry is committed to developing necessary technologies to create and deliver new media and information services by taking advantage of future broadcast systems. We also know the critical role played by broadcasting in times of emergency.

Explore unified terrestrial broadcast standards
We aim to promote cooperation among broadcasters, communications companies and manufacturers of broadcast equipment and all types of receiving devices. We recognize the potential of modern communications technology to fulfill the needs of a connected society. For widely demanded information and entertainment content, communities will continue to be served by terrestrial broadcasters. We seek to maximize proper and efficient use of spectrum resources, as well as exchanges and cooperation among communication systems and broadcasting on both a technological and business level. We support full exploration of the benefits of common tool sets and interface points in the development of new digital systems and standards that can be globally supported and eventually deployed worldwide. By fully exploiting the advantages of different technology systems, we aim to explore global standard unification and to achieve industrial convergence with technology integration.

Promote global technology sharing
A future broadcast ecosystem, with collaboration among broadcasters, research institutes, and manufacturers, will foster new broadcast technological innovation. We seek the elimination of broadcasting technological gaps. We realize that advances in broadcasting technologies should benefit both developed and developing countries. Global technology sharing should be an integral part of the future broadcast system standardization.

We, the undersigned, pledge our support for this joint declaration and look forward to future collaboration to chart the future course of the television industry as a converged future that benefits viewers, broadcasters and manufacturers around the world.
Mark S. Richer  
President,  
Advanced Television Systems Committee (ATSC)

Bernard Caron  
Vice President,  
Communications Research Center (CRC)

Lieven Vermaele  
Director, Technology & Development,  
European Broadcasting Union (EBU)

Fernando Bittencourt  
General Director of Engineering  
Globo TV Network

Kevin Gage  
Executive VP & Chief Technology Officer,  
National Association of Broadcasters (NAB)

Keiichi Kubota  
Director-General,  
NHK Science and Technology  
Research Laboratories

Liliana Nakonechnyj  
President,  
SET-Brazilian Society of Television Engineering

Anthony Caruso  
Director, New Broadcast Technology Department  
CBC/Radio-Canada

Phil Laven  
Chairman,  
Digital Video Broadcast Project (DVB)

Ho-Jin Lee  
Senior Vice President,  
Electronics and Telecommunications Research Institute (ETRI)

William Meintel  
President,  
IEEE Broadcast Technology Society

Pingjian Xia  
President,  
National Engineering Research Center of Digital Television

John S. McCoskey  
Chief Technology Officer,  
Public Broadcasting Service (PBS)
ALEXANDRIA, VA.
The 61st annual IEEE Broadcast Technology Society Symposium took place at the Westin Hotel here Oct. 19–21, and attracted more than 140 paid registrants from all over the world. The three-day event featured an almost continuous flow of informative, lively, and relevant presentations on radio and television engineering from some of the industry’s top leaders. More than 35 papers were presented, in addition to a full first-day tutorial program. A special feature of this year’s Symposium was live streaming of event activities via the Internet to those unable to participate in person.

Here’s a brief rundown of some of the Symposium highlights.

Wednesday, Oct. 19, was devoted to tutorial sessions, with the morning block providing information about the relatively new topic of “Connected TV.” Rich Chernock chaired the session, and speakers included Skip Pizzi, who offered “The U.S. Broadcast Perspective;” John Simmons from Microsoft, who spoke about “Emerging International Standards for Internet Television;” and Scott Lincke from Yahoo!, whose presentation was entitled “The Connected TV Landscape.”

After a break for lunch, and a presentation on “Bridging the Gap—A New IEEE BTS Initiative” by John Luff, the day’s tutorial activities continued with Bob Surette chairing a session on some of the newest developments concerning HD radio. The afternoon’s papers covered topics on power level measurement, auxiliary data services for HD radio, rule changes affecting HD radio broadcasting, auxiliary services for HD radio data, and the business of HD radio.

Following the tutorial sessions, a Symposium welcoming reception held in the hotel’s Wright Room provided an opportunity for attendees to unwind from the day’s activities and socialize a bit. Live background music for the reception was provided by the always popular Da Vinci Strings.

Thursday Morning’s Session covered radio engineering and RF infrastructure, and was chaired by Roz Clark from Cox Radio. Papers presented covered transmitter cooling, new data on asymmetrical sideband broadcasting for HD radio, the Brazilian Association of Broadcasting’s report on AM and FM stations operating with IBOC, linear power amplifiers, and a report on the TIA-222-G structural standards for broadcast towers.

The mid-day joint BTS/AFCCE luncheon featured Peter Doyle, chief of the audio division at the FCC’s media bureau, who provided his thoughts on several issues concerning today’s broadcasters. Doyle’s presentation sparked much interest and he fielded a large number of questions at the conclusion of his speech.

Thursday afternoon’s session included papers on network distribution and Mobile DTV and was chaired by James O’Neal. Topics included CBS Television’s Pitch Blue real-time store and forward content delivery system, the CBC’s newest program delivery network, Mobile DTV conditional access and digital rights management, advanced T-DMB transmission field trials, ATSC mobile/handheld coverage map parameters, and ATSC service prediction modeling.

The day’s activities ended with a reception held in the Westin’s Wright Room and sponsored by industry manufacturers.

Friday’s program was all about DTV implementation, with Charles Einolf chairing the morning sessions which dealt with digital television, and included a report from Brazil providing an overview of the ISDB-T selected for DTV transmission in that country. Other topics included single frequency networks, resolving DTV...
interference issues, and an update on the National Broadband Plan by BTS President Bill Meintel.

The Friday afternoon Awards Luncheon featured as its keynote speaker, Sterling Davis, who recently retired from Cox Media Group as engineering vice president. Davis shared his thoughts on where our industry may be headed. The luncheon served as the backdrop for presentation of numerous awards, including special recognition to Kathy Colabaugh, who served as the BTS’s senior administrator for the past several years before moving into a position with the IEEE’s Robotics and Automation Society earlier this year.

Symposium activities wrapped up late Friday afternoon with a session on the future of digital television chaired by former BTS president Bill Hayes. Papers were presented by some visionaries in the field of DTV, including Mark

**Worldwide Symposium Availability**

As mentioned, the 2011 Broadcast Symposium was streamed worldwide via Internet for the first time ever, and a lot of credit for making this happen is due Tom Gurley, who led a team of five committee members to make arrangements for the Webcast. This new virtual component included an interactive component that allowed virtual attendees to interact with physical attendees via computer, and to even ask speakers questions in real time. In addition, the entire Symposium was recorded for free on-line access within the next year by all paid attendees. Special thanks are also extended to Mark Vasquez from IEEE TV, and the folks at NewTek for making the virtual component possible.

By all measures, this year’s event was a huge success, attracting a near record crowd, offering virtual attendance options, attracting world class experts to the sessions, and featuring more sponsors than ever before.

This year’s Symposium program was co-chaired by David Layer, director of advanced engineering at the National Association of Broadcasters, and myself, and we will be taking on this task again next year. We’re both anxious to build on the success of this year’s event and are already thinking about how to top it next fall. Your suggestions are always welcome.

If you would like further details on the 61st BTS Symposium, please visit the BTS Website at [www.ieee.bts.org](http://www.ieee.bts.org).

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**IBC2011 Draws Record Crowd**

by Mike Bennett, AdCom Member, IEEE, BTS Representative on the IBC Partnership Board

This year’s IBC Show spanned Sept. 8–11, and was again hosted by the RAI Center in Amsterdam, Netherlands. The IEEE Broadcast Technology Society is a partner/owner of this very large European convention.

More than 50,000 people attended IBC2011, making it not only the biggest IBC Show ever, but also generating a worldwide buzz of news, views and business.

This year’s event witnessed the launch of the IBC Leaders’ Summit, the expansion of the IBC Connected World and major keynote presentations from Facebook, Sony Corp., Virgin Media, and Vodafone. In addition, there was a special appearance from James Cameron and the awarding of the IBC International Honor for Excellence citation to the BBC’s Sir David Attenborough.

**Record-Breaking Attendance**

The official attendance tally for this year’s event was 50,462, making it the biggest IBC Show ever. The number of industry professionals visiting IBC this year swelled attendance to a four percent increase over that at the 2010 Show. Unlike some other trade shows, IBC total attendance figures are based on the number of people who actually attended the show, not the total number of registrations. This very strong number is a clear indication that the industry is robust and well on its way to recovery, and also that IBC continues to be relevant to everyone involved in creation, management and delivery of electronic media.

**Strength in Depth at the IBC Conference**

Leading industry figures provided many attention-getting presentations on a broad range of hot topics at this
year’s conference. Among these were Mainardo de Nardis, CEO of OMD Worldwide; Toby Syfret, chief analyst at Enders Analysis; Steve Hewlett, writer, broadcaster and media analyst; Nick Thexton, senior VP of research and development, and new initiatives at NDS; and Sir Martin Sorrell, chief executive at the WPP Group, who presented their views on “The Challenges for Advertiser Funded Broadcasting.”

John Smith, CEO of BBC Worldwide; William H Roedy, former chairman and chief executive of MTV Networks International; and Luke Johnson, founder and chairman of Risk Capital Partners presented their collective insight on “The Future of Broadcasting.”

Andrew Barron, COO of Virgin Media; Mike Fries, CEO of Liberty Global; and Thomas Wrede, VP of reception systems for SES ASTRA, shared their views in the presentation “Cable and Satellite: Future Directions in a Hybrid World.” Joanna Shields, VP and managing director of Europe, the Middle East and Africa at Facebook, made the prediction that “All TV will be social” in the IBC’s “Convention Keynote: Social Media.”

Roberto Viola, secretary general at AGCOM; Richard Feasey, public policy director for Vodafone; and Gina Nieri, director of Mediaset, discussed the management of increasing wireless services in “Radio Spectrum Policy: Can Broadcast and Telecom Worlds Cooperate for the Benefit of the Citizens?”

Hiroshi Yoshioka, CEO and executive deputy president at Sony Corp.; Neil Gaydon, CEO at Pace; Michael Comish, CEO of Blinkbox; and Romulo C. Pontual, executive VP and chief CTO at DirecTV, discussed a core IBC hot topic in “Connected TV: Re-making the TV industry: the battle for the home screen.”

The BTS also provided a tutorial, “Evolution and Convergence of TV and the Internet,” which was chaired by Yiyan Wu.

Insight, Information and Inspiration
At an event with so many show-stoppers it was hard to see everything and harder still to pick out highlights. Some of these included the IBC Connected World; the IBC Certified Training Programme; and the opportunity to get hands-on experience with the latest acquisition technology at the IBC Production Village. Director James Cameron shared an exclusive 18-minute preview of “Titanic,” which was spectacularly converted into 3D. There was also an equally astonishing 3D production of Cirque De Soleil for attendees to also view on the impressive IBC Big Screen.

IBC prides itself on being more than an exhibition and aims to add value to everyone’s visit with all there is to discover at the show.

For full details on what happened at IBC2011, please visit www.ibc.org, and don’t forget to add IBC2012 to your diaries. This next Show will run Sept. 8–13, 2012, and again will be held at the RAI in Amsterdam, Netherlands.
London Calling....
by Mike Bennett, AdCom Member, IEEE, BTS Representative on the IBC Partnership Board

One of the events you may not have been aware of at this year’s IBC Show is the BTS sponsorship of two students from Russia’s St. Petersburg University for Film and Television. This was organized through that school in the form of a student paper competition. As part of the prize, the winning students would have their airline and hotel expenses in connection with attendance at the show paid, and would be given free entry to the conference.

A requirement of our sponsorship was that each student would have to produce an essay on what they gained from being at IBC. The winners were Artem Ditkovskii and Daria Grebenyuk, and their essays are being printed adjacent to “London Calling” in this issue of the Newsletter to make their conference experiences and impressions available to our members. (As you may be aware, the Broadcast Technology Society is a partner owner of the IBC Show.)

I have requested that the Newsletter editor present these two papers with very minimal editing so that they don’t lose their essential message. Please bear in mind that English is a second language for these students, and also the difficulty that most students or other persons in other European countries and/or the United States would have in preparing a report in the Russian language.

With Kind Regards,

Mike Bennett
mikebennett@supanet.com

Student Impressions of IBC 2011
By Artem Ditkovskii, Student, St. Petersburg University of Film and Television

I heard about IBC for the first time in 2008 from my tutor who works in the video systems department. She told us how students from our university could attend the largest exhibition of broadcasting industry in Europe. This information came from ex-student who was a winner of the student competition and visited Amsterdam. [However], it was unattainable for us all to attend the conference of such large scale at that time. So, a few years later my supervisor advised me to take part in student conference and competition, where the main prize was a fully-paid trip to Amsterdam. I was one of the winners. It was an indescribable feeling. One of the tasks at the conference was to draw up a report on [functions] that I would attend and visit at the exhibition. I clearly knew that I would be interested in IBC2011.

IBC2011 was conducted in the RAI—the big exhibition center in Amsterdam. This biggest television and media event in Europe gathered together 50,000 visitors and over 1,300 companies for one week. It was an optimal place for people [whose] aim was to generate sales leads, raise their profile and gather market knowledge or [to] network with peers. IBC is the event for all who interested in creating, producing and delivering media content in the real world. Modern broadcasting systems, new ways of delivering content, new methods of device connection are hot topics at IBC2011.

My personal aim was investigate the evolution in video production [in connection with] DSLR cameras. This new trend has had a high resonance all over the world and companies have begun to develop and manufacture devices helping to use photo cameras like a video camera—for example kits, rigs, follow-focus systems, Steadicams and other [items]. More than 100 companies working with DSLR cameras presented their products at the exhibition. The American company, Zacuto, one of the famous companies producing such equipment demonstrated many devices for stabilization and control [of] picture quality. Many external monitors, viewfinders, rigs, quick changers were widely presented for visitors [consideration]. The king of image stabilization, Glidecam, presented new image-stabilization system for 3D cameras. In addition, they showed a huge variety of their famous equipment, which has already become an important part of low- to mid-budget film production. Merlin, Zephyr and Blackbird also present original realizations of balance [systems used] in Steadicams.

Rising Stars [at the] conference included a seminar devoted to production media with DSLR cameras. Nowadays it is very popular among young directors to shoot films using DSLR cameras, as it’s a very cheap way to achieve great picture. In narrow rooms or in similar situations where high mobility is needed are ideal situations for using DSLR cameras.

The IABM 2011 award ceremony took place on Saturday evening. Companies, engineers and scientists were presented awards for the most valuable
achievements and inventions. [Awards went to] a new light, a high-speed camera with real-time review—[the] Hi-Motion II Ultra Slow Motion Camera System from NAC Image Technology that can capture at more than 10 times normal speed in full HD, software for the Internet and Sony’s new monitor for color correction and picture quality control. The final first-place went to Sony Company. This was an event where I was honored to be near so [many] famous people.

One of the latest solutions to solve the problem of video signal stream quality is AVC Intra-stream lossless coding. This is a new method of coding based on MPEG-4 AVC, which provides the same quality as uncompressed video after coding/decoding process. [Such a] codec is used in a new Panasonic camera AG-HPX250EJ.

Many companies demonstrated new software products, versions, add-ons, plug-ins and other update setups for media content processing. The best updates were from Adobe and Nuke. Adobe presented new add-ons and versions of own software. For example, there was a new Photoshop [that] can work with video frame-to-frame files and enable the addition of effects and filters to video. New Adobe Effect supports all popular special file formats of other powerful editing and composing software systems such as Avid or Final Cut. This add-on gives more freedom to jump between editing systems. Also, this famous software product [has] become more specialized for work with 3D and HD content by interface optimization and creation-ready presets. Practice seminars with experienced and veteran producers and editors, businessmen and engineers, [as well as] Adobe’s programmers and workers were conducted at the Adobe stand at the IBC2011 Exhibition.

The Super Hi-Vision [from] NHK was at the core of many discussions. Super-HD quality content was transmitted from London in real time. 4K format pictures were shown on the large screen. Video was encoded using H.264 encoder with a bit-rate [of] 250 Mbps. The goal is to achieve the same picture quality at 100 Mbps using High Efficiency Video Coding (HEVC). Next year’s London Olympic Games will be transmitted in Super-HD.

Some 3D movies were presented on the big screen. The first was “Transformers 3: The Dark Side of the Moon,” and [the] second was “Titanic” in 3D. James Cameron presented this remastered legend of cinematography in 3D. He said that all frames from start to the end were converted by his [own] hands without using [any] automatic computer settings. As a joke, James called such movies 2.5D. Also, he showed the short live performance captured from Las Vegas’ Cirque du Soleil in the big auditorium.

My trip provided me with a lot [of information] for my further scientific work and study. It was a great opportunity to meet professionals and talk with them, and made use of it. I saw many amazing things in the Future Zone: a six-camera real-time panorama, laser imaged 3D, a 32-channel audio system, [an] original 5D attraction with smells and the possibility to touch subjects in 3D space, [as well as an] eye-control system for home TV and other things. I tried [out] many types of equipment for DSLR shooting, and it was great to [get the chance to test it]. I saw innovations and future’s advanced technologies in broadcasting. It was [a] very special opportunity to [experience] all of these [things].

Great thanks IEEE, and especially to Mike Bennett, for [the] opportunity to attend IBC 2011!

IBC 2011—Report on a Trip to the Convention
By Daria Grebenyuk, Student, St. Petersburg University of Film and Television
St. Petersburg, Russia

When I had been told that I would go to IBC 2011, I thought “Wow, it’s unbelievable!” It was really amazing, because I had dreamed about it [for] two years, and now I [was] one of four lucky students! It happened because I had taken part in the international conference and competition at my university with my scientific research on High Dynamic Range Imaging. I reached the final stage, but had difficulties with the English language, because prior to this I never talked in English only. I am very grateful to the judges, for despite this, I won an invitation to IBC2011.

IBC was located in the huge area at RAI. It was a great territory with 13 halls, and more than 100 companies. Every company had a stand where they could show their products. There were several parts: IBC Production Village, IBC Connected World, Future Zone and an Auditorium with a Big Screen and Conference zone. I spent whole week on Exhibition, there was so many interesting, brand-new and unbelievable things!
The exhibition introduced me to new products from the most popular manufacturers like Canon, Panasonic, Sony, Samsung, and Adobe. We had a chance to learn about products and production from experts. For me the most interesting stand was Adobe’s in Hall 7. There were daily presentations devoted to their new software: Adobe Photoshop CS5, Adobe Premier Pro CS 5.5, Adobe After Effects CS 5.5, and Adobe Final Cut. It is possible to edit video using Photoshop CS 5, and it is possible to easily gain 3D effects from 2D motion picture using After Effects CS 5.5. Presentations were not dull; speakers tried to answer questions immediately and make their presentations accessible for understanding by all. So it was very inspiring and informative.

The latest hi-speed optics, DSLRs and integrated 3D camcorders were demonstrated at the IBC Production Village. Also there were a lot of examples of Steadicam supports, with attendees being able to try them in operation. As an added attraction, this hall [included the] IBC TV news studio.

The most unusual place was Future zone. There was a Super Hi-Vision auditorium where we could watch a demonstration with 22.2 audio channels on a big screen. It was a high-quality video presentation from space—very detailed—of a football match, where everybody can see all details, even faces of football players and people behind them! The creators said that next year’s Olympic Games will be shown from London using this technology. I hope that in Russia we’ll enjoy it too. And in the Future zone were some places exhibiting virtual reality. In one of them you could watch through glasses three balls and use a needle to destroy them. In another stand you could control a menu on computer by your eyes only.

And of course I couldn’t miss [the]

IBC Big Screen—Auditorium. I was there for the 3D session “3D Live at the Big Screen: Movie and Programme Makers Show How it Works in Real Time.” It was amazing watching high-quality 3D video on big screen. Session participant Steve Schklair told about technologies of making 3D by using a camera with two lenses. And he showed a 3D video from the IBC Beach created by this camera, with four guys playing volleyball. Also there were videos about different sport games, so spectators could be convinced that 3D has a great future in sport television. After the reports, there was a discussion on 3D technologies (for example, participants spoke about 3D without glasses, because this is inconvenient for people who already wear glasses).

Next day I again was in the Auditorium watching “Monday Night 3D Showcase.” More than 500 people were there, and one of the reasons was to see James Cameron’s performance. I was very glad to hear such great director. He spoke about the future of the cinema and about the role that 3D is playing in it, and after that we watched some episodes of [the] 3D version of “Titanic.” In 1997 when “Titanic” was shown in cinema theaters, I was too young to be there, so on September 12 I got to see it for the first time on the big screen with 7.1 audio. It was unbelievable! After “Titanic” we saw two episodes from “Cirque du Soleil,” and I want to note that sometimes it seemed that the dancers soared outside of the screen. And it was very detailed video, practically without loss of details of movement. The last film was “Flying Monsters 3D,” created by Sir David Attenborough. The evening illustrated that 3D technology can be especially useful, not only in sports, but in dance shows and concerts, in documentary films, and of course, in feature films. I think that it’s a wonderful idea—to remake cult films in 3D and show them on a cinema theater’s big screen again.

Only one thing was more interesting than the new technology for me—meeting people! At the IABM party I met some French students who had won an invitation to IBC like I did. We spent three days together talking about our countries, cultures, professions and plans for future. At the IBC party I [also] met an Italian software developer and German producer. We talked about their companies, and discussed new technologies and possibilities. And there were a lot of other great meetings with many different, talented, creative and interesting people.

In conclusion I want to say, that I’ll never forget this trip, because it was first time that I saw so many talented, keen and successful people in one place, and so many brand new technologies about which I didn’t know earlier. And certainly, I have found new friends from different countries who have the same interests as me. Many thanks to organizers for excellent conditions, to developers for new achievements, and to Mike Bennett and Konstantin Glasman for helping me get there.
LAS VEGAS
At the 2011 NAB Show, I had the opportunity to co-chair the very timely IEEE BTS Tutorial on 3D TV: “Content, Systems and Visual Perception.” There is a tremendous amount of research going on now on a global basis regarding 3D, and specifically targeting delivery to homes.

The creation of cinema content in 3D is not a new phenomenon as there is a rich history of examples dating back to the 1920’s. 3D cinema has had a number of revivals during the last century, including a flurry of features released in the early to mid-1950’s. However, by the late-1950’s the novelty or “wow factor” had worn off and the shortcomings of anaglyph-based stereoscopic 3D caused the public to lose interest.

3D Re-Energized
Many in the film industry recognized that there must be a better way to present 3D in theaters, but with little mainstream interest, research slowed due to high costs and high risks. However, the concept didn’t die out entirely, as cinematographers and movie makers continued to produce 3D content for specialized venues such as IMAX theaters. Additionally, the use of polarized light or alternate projection replaced the traditional red/green anaglyphs, and this greatly improved the quality of experience for the audience. These advances began to make inroads in traditional cinemas, as the single large-scale theater has given way to smaller multiplex theaters. This has allowed theater owners to convert a small percentage of their facilities to high-ticket 3D projection systems and specialized screens, while still servicing their primary 2D audiences. 3D productions ramped up as more theater seats became available and the film producers and theater owners realized that they could charge a premium for 3D viewing.

Animated features and films heavy with computer-generated elements have been the leaders in mainstream 3D content, and the enormous success of James Cameron’s “Avatar” in 2009 has seemingly cemented the concept of 3D permanently in the cinema landscape.

What may make this revival of 3D permanent is a relatively new condition that exists with regard to digital television displays in consumers’ homes. Some of these displays now have the performance capabilities on par with that of movie theater projection. Television has always been more convenient than going to a movie theater, but it never had comparable image quality until recently. Whether the display is the traditional big screen in the family room, or the high-resolution display on a laptop or personal computer is not so relevant, as the convenience factor of home viewing is high and now the quality of the experience is also high. Post-release sales of theatrical content have long been a significant source of revenue for film makers, and given the interest in 3D coupled with the huge potential base of technology purchases, both the film making and display industries are highly motivated to invest in the research necessary to make 3D at home successful.

Production and Distribution to the Home
The primary focus of the BTS tutorial at the 2011 NAB Show was to provide an understanding of the science and technologies fundamental to producing, distributing and displaying high quality 3D content.

The critical area of understanding human visual perception was the topic of Dr. James Tam of the Communications Research Center Canada. His presentation explained some of the key concepts in how human binocular vision works. The images received by our eyes take independent paths to our brain where they are fused into a single 3D image. The horizontal disparity between elements within the two images, coupled with the physiological operation of our eyes (crossed/uncrossed disparity, focus distance, etc.) allows us to perceive the image and determine relationships of elements in 3D space. Displaying 3D content on a 2D surface dissociates the image disparity from the physiological operation of the eye and great care has to be taken in how this is done in order to avoid eye strain, fatigue and discomfort for the viewer.

Coding and transmission formats for 3D also present some interesting challenges and this was the topic covered by Dr. Anthony Vetro of the Mitsubishi Electric Research Laboratory. He observed that broadcasters face several challenges when considering the distribution of 3D content. Capacity, whether within the broadcast RF channel, or within the infrastructure of the broadcast facility, is a prime concern. In the United States, terrestrial broadcasters are required to provide an MPEG-2 stream of at least standard-definition quality. Most are already providing high-definition content, and many include additional multicast streams as part of their overall service offering. Finding space to accommodate the additional stereoscopic data requires compression technologies far in excess of MPEG-2’s capabilities.

One interesting solution to this problem was the subject of the Electronics
and Telecommunications Research Institute’s Dr. Namho Hur, who examined and explained the terrestrial 3D trial broadcasts now happening in Korea. There, the stereoscopic broadcast consists of two completely independent high-definition streams. The left-eye stream is MPEG-2 encoded and sent out as a normal HD broadcast. The right-eye stream is encoded using AVC, and is multiplexed into the ATSC transport stream. 3D-capable receivers decode and synchronize both the left- and right-eye streams, and provide them to the appropriate inputs of a 3D-capable display. Legacy receivers decode only the left-eye stream as a traditional 2D high-definition program. The system delivers full high-definition resolution content within the space available in the RF channel.

Making use of two separate full-resolution streams is certainly one way of distributing 3D content. A number of other methodologies are also possible, including use of a difference signal created from the full-resolution left- and right-eye streams. Currently a number of distribution platforms are using a frame-compatible approach in which the two full-resolution images are anamorphically combined (either horizontally or vertically), and transmitted via an existing channel. This method suffers though, in that the resolution of the final image is halved in either the vertical or horizontal direction depending on the how the images are combined, and this detracts from the quality of the final 3D image.

Also important in the delivery chain is the consumer’s display, and Dave Bancroft, an independent consultant, presented his views on this aspect, stating that as screen resolution capabilities continue to grow, it is critical for the 3D content producers and distributors to understand and take advantage of the display’s capabilities.

Dr. Takayuki Ito shared some future-looking research that is being conducted by NHK on the use of spatial imaging in which an array of micro-lenses overlays the image device (both at the record and display ends of the chain) so what’s captured is a multitude of different views of the image with slightly different horizontal and vertical disparities. When viewed on a compatible display, the image is presented in 3D without the need for special glasses. Since it is a matrix of lenses, it also offers a wider field of view. This is future technology that will require the development of both capture and display imagers with much higher pixel counts and resolution than standard HD devices. In turn, this will increase the capacity requirement for transport of data, and this should drive the need for more efficient encoding and compression technologies.

Whether or not 3D for home viewers becomes a common technology, or fades as the novelty wears off, remains to be seen. Unlike any previous 3D renaissance, the technology within the consumer’s home has reached a point where the quality of experience is very close to that of the theater, and that huge potential customer base may provide the impetus and funding necessary to allow development to get 3D past the novelty stage and into the mainstream.

**Chapter Reports:**

The Newsletter is interested in reporting news from BTS chapters, both in the United States and worldwide. Reports submitted for publication should be addressed to BTSeditor@IEEE.org and must be in the form of a Word attachment. Any accompanying photos should be sent as JPG files and must be sufficiently large for publication (at least 250 KB; 1 MB preferred). Please do not embed photos within Word documents. All persons visible in photos must be clearly identified. Reports contain the name of their author and his or her position within the chapter. We will try to publish all chapter reports received in a timely fashion; however, due to space considerations and the date received, some reports may have to be published in future editions of the Newsletter. We reserve the right to edit reports for clarity and to fit space requirements.

**Argentina BTS Chapter Plans Dinner and Transmitter Programs**

Submitted by Valentin Trainotti

The IEEE’s BTS Argentina is hosting an end-of-year dinner for members on Dec. 5, 2011 at the Hotel Las Naciones in Buenos Aires.

A Dec. 7, 2011 chapter meeting is also scheduled, with a planned presentation on “New Digital HDTV Transmitter Efficiency and Reliability Systems” being presented by Juan Carlos Guidobono.
Montreal Chapter Hosts Technical Session at CCBE Convention
Submitted by Manijeh Khataie, chair, IEEE BTS, Montreal Chapter

Presenters Focus on DTV Transition Issues
A recent highlight of Montreal BTS chapter activities was a special technical session on DTV transition issues that was presented on Sept. 16, 2011 in Barrie, Ontario. (The location, about 620 Km distant in an adjoining province, was initially a bit confusing for some members. However, it had been recommended by one of our chapter’s key supporters, Guy Bouchard, and proved to be an ideal location for the event.) I should explain that the BTS program was part of the activities at this year’s Central Canada Broadcast Engineers (CCBE) convention, which was held at the Horseshoe Resort in Barrie, about 80 Km north of Toronto, on Sept. 15–18.

(The CCBE is a member-driven organization, with its executive committee composed of active members in the broadcast industry who volunteer their time to provide information about the latest technologies. This year the organization was celebrating its 60th anniversary, with hundreds of engineers from central Canada getting together to discuss the latest activities in broadcast technologies and enjoying a bit of fun in Barrie.)

After some discussion with Harrie Jones, the CCBE convention’s paper co-chair, we were allocated a two-hour technical session slot on Sept. 16 at 3:45 p.m. Thanks to all the participants, speakers, and the CCBE, the event proved to be a great success. The only difficulty that we encountered in joining with the CCBE conference was that it happened closely after the IBC, and it was difficult to find speakers.

Fortunately, we were able to come up with some good presentations, with topics and the speakers as follows:

- “PSIP Operation Issues,” by Leon Urban of Triveni Digital, Inc.
- “Advances in Video Coding,” by Tony Howard, Ericsson TV
- “ATSC Standard Enhancements,” by Skip Pizzi, NAB director of Digital Strategies
- “Mobile Television,” by Bijan Soleymani of AMD
- “ATSC Emission Mask Measurements,” by Guy Bouchard of Radio Canada (CBC)

Mr. Bouchard got the session started with a few words about IEEE BTS, mentioning that in addition to publishing new R&D ideas, the roll of IEEE is to define and maintain new standards that can be used within the industry. I want express the chapter’s appreciation, and offer special thanks, to the NAB’s Skip Pizzi, who with very short notice presented an interesting talk on an ATSC standard enhancement. He discussed both ATSC 2.0 and 3.0 and what they bring to the future of digital TV.

Bijan Soleymani’s presentation on mobile television was the subject of special interest, as he brought along a demonstration model of a mobile-TV product from Quebec’s PSQ Technologies. (Soleyman was the key engineer in its design.) After the session, he turned on the equipment (which consisted of a full DVB-H headend and low power...
UHF transmitter) and demonstrated the service on two cellular phones equipped with the DVB-H option. Eight channels of video were transmitted, with the attendees being able to make a selection via a simple Electronic Service Guide in the cell phones.

Guy Bouchard wrapped up the session with his presentation, cutting it a bit short to allow everyone to enjoy the rest of the evening’s activities. We’re planning to have him give the long version of his presentation on ATSC Emission Mask measurements in the near future.

Peter Warth, CCBE’s vice president, presented some gifts to the speakers, and I also presented them with IEEE certificates of appreciation.

Once again, I’d like to thank all of the speakers for their wonderful presentations. I regret that there was not enough time for extended presentations; however, I am planning to organize a similar technical session in Montreal with adequate time for all speakers to make their unabridged presentations.

Yiyan Wu Speaks at Seoul BTS Chapter Meeting
‘Cloud Transmission’ Topic in Distinguished Lecturer Program

by Prof. Byeungwoo Jeon, senior member at Sungkyunkwan University, and chair of the Seoul IEEE BTS chapter


In his lecture, Dr. Wu explained the concept of cloud transmission and presented an overview on several technical issues concerning the efficient use of RF spectrum with regard to broadcasting activities, with particular emphasis on white space utilization issues. His remarks on the recent issues on spectrum squeezing, analog transmission switch-off in 700 MHz bands, and spectrum reuse-friendly techniques such as “cloud transmission” for next-generation broadcasting drew much interest from the audience. He explained that cloud transmission was a new and robust transmission system for mobile digital broadcasting and broadband multicasting services for single frequency network operation and spectrum reuse.

This was an interactive session, with Dr. Wu fielding numerous questions from those present for the lecture. Audience members stated that they were eager to learn more about next-generation broadcasting, spectrum issues, and converged services in broadcasting, and that Dr. Wu’s presentation was very beneficial in this regard.

After the presentation and question and answer session, participants were afforded the opportunity to meet informally with Dr. Wu and participate in a photo session.

Special thanks are offered to Prof. Yoonsik Choe, director of the Center for Advanced DTV Broadcasting Technology, and to Yonsei University for hosting this BTS Seoul chapter meeting.

From the Editor continued from page 2

about seven miles airline from the transmitters in northwest Washington, I get by with a very unsophisticated indoor antenna for pulling in both the new UHF and remaining VHF stations and have not had any reception problems since the June 2009 DTV switchover took place. The country place—on, the other hand—would, I suppose (in the good old analog days) be considered to be in a “fringe” area and required a little more in the way of antenna systems (I have separate V and U antennas elevated about 25–30 feet above ground.) Reception there is good too—for the most part. Recently, my wife was watching a show that I had little interest in and I excused myself to head down to the basement to do some work in my shop. It wasn’t long before I was summoned back upstairs to witness some severe breakup (blocking and “stuttering”) in the picture that had been crystal-clear when I left. I tried a couple of other channels and they were rock solid. Had our local Channel 7 somehow lost transmitter power?
I decided that it might be instructive to measure signal levels at the TV set and hiked back down to the basement to round up some test gear. Knowing that I probably wouldn’t be returning for a while, I shut off the workshop lights. When I arrived topside, Channel 7 was once again solid. What had changed? On a hunch, I trekked downstairs and turned on the workshop lights again. Bingo! I was rewarded by my wife’s cry to undo whatever I had just done. To make a long story short, I tracked the trouble down to a bad tube in one of the fluorescent fixtures in the shop. It made plenty of light and didn’t flicker, but somehow was generating enough RF at 175 MHz or so as to make off-air reception problematic.

A couple of weeks later (Thanksgiving Day), my family was gathered around the big screen to watch the annual Macy’s parade being carried on the D.C. NBC affiliate, WRC-TV, which operates on a high UHF frequency. Without any deep things, the otherwise beautiful HD images began to block up and freeze. This time it was my wife who was to blame (actually it was the electric mixer she was using to prepare part of the Thanksgiving meal). It was quite evident that the mixer was the culprit, as the kitchen is located just off the family room and it was easy to correlate mixer sounds with breakup.

A couple of days later, the blocky and frozen images appeared again; this time just as the Alabama/LSU football game was getting underway (The game was a must-see, as my son, who was home for the holiday, is in grad school at the University of Alabama). His first reaction was “let’s reorient the antenna,” as some years earlier he’d been deeply involved in my initial foray into 8-VSB reception and knew how critical antenna aiming could be. Having lived through the two other recent challenges to DTV reception already described, I offered that something else might be to blame. We’d been watching a different station prior to the big game with no problems, and saw the trouble appear only when channels were changed at game time. I should note that my son had brought his laptop computer home and was using it a few feet away from the television receiver. I suggested—strictly in the interest of science—that he turn it off or take it out of the room before we broke out the step ladder. Somewhat reluctantly, he powered it down. Bingo! Perfect kick-off reception! (I’ve never noticed any problems when using my laptop around the TV receiver, but it’s not the same brand as my son’s.)

Is there a lesson here?

Yes—Mr. Rhodes was right on target with his predictions about interference to DTV reception from sometimes unsuspected sources. (We all remember the good old analog days when TVI was blatant and instantly recognizable by picture tearing, horizontal lines, and/or noisy audio. Not so with digital.) I wonder how many viewers have given up on trying to watch off-air DTV broadcasts, finally throwing in the towel and calling the local cable company office to start a subscription. More than a few I would imagine. Can we do anything about this? Well, yes and no.

One of the things that broadcasters could do would be to run an occasional PSA advising the public about such things and possibly providing a phone number to call for more information. (Are there any DTV help-desks still in operation after the June 2009 cut-off?) I will admit that this is a bit far-fetched, given the staffing level at most TV stations these days. However, if people at home can’t or won’t try to watch us off-air, that just adds that much more fuel to the telecom argument for shutting down TV broadcasting and deeding the spectrum over to wireless broadband data communications.

Something else that, in my humble opinion, should have been in done years ago on the federal government level is very strictly limiting the amount of RF interference that consumer devices can emit. Yes, I know the FCC’s “Part 15” is supposed to cover this, but practical experience leads me to believe otherwise. I would have to say—again based on my experience with several consumer devices that I’ve owned—no lab or real world testing was done before such items were given “rubber stamp” approval.

Mr. Rhodes and others have been voicing (quite correctly) their concern over the amount of man-made RF pollution that exists in the low-band VHF spectrum, so much so that it is no longer that valuable for television purposes anymore, especially with the move to 8-VSB transmission.

And it’s not just the television broadcasters who are suffering from man-made TVI—ask any AM broadcaster about how effective their signals are in reaching into listening environments anymore—even in vehicles far removed from power lines and computers. (My last three new cars have been equipped with AM/FM/satellite radios, but generate so much on-board interference that many otherwise good AM signals are drowned out.)

AM isn’t the only radio service to be affected either. Whether you love or hate IBOC digital radio, you have to admit that man-made RFI has its effect on this sort of transmission too—one of the reasons for the continuing escalation of FM IBOC signal levels is to try and overcome indoor interference sources in the 88 to 108 MHz region.

Lax regulations and/or inadequate enforcement of these regulations have allowed once useful spectrum to become a cesspool of noise.

I know that the bull is already out of the barn with all of the gazillions of light dimmers, personal computers, CFLs, DVD players, and other consumer devices in use, but these things wear out after a while and are deactivated and tossed in the trash. (When’s the last time you called in a TV repairman?) When replacement time does come round, wouldn’t it be worth spending a few extra pennies to purchase devices that don’t spread invisible pollution? Yes, I believe that we as a nation and society are already grossly over-regulated, but this is one area that somehow seems to have escaped a lot of federal scrutiny—much to the detriment of broadcasters and viewers/listeners alike. Maybe we do need some strict RF interference standards, or perhaps we should just go with the telecom flow and shut our transmitters down and turn the spectrum back in to be auctioned.

Your thoughts, please.

James E. O’Neal
BTSeditor@ieee.org
**Television in Los Angeles: W6XAO, the Don Lee System, and Harry Lubcke**

By Brian Belanger

**Introduction**

Thanks to the Don Lee Broadcasting System (DLBS) and a man named Harry Lubcke, electronic television came to Southern California long before it became available in most other parts of the country. U.S. history books sometimes state that electronic television began in 1939 at the World’s Fair in New York when David Sarnoff and NBC kicked off regular broadcasting. Certainly that was a major milestone in the history of television, but regular experimental electronic television broadcasts in the U.S. predated the World’s Fair by roughly a decade. (Regular electronic television broadcasts began in Europe in the mid-1930s.) As noted in this article, during the 1930s, a small number of viewers in Los Angeles had access to electronic television.

Very little has been written about television entrepreneur Lubcke and how during TV’s infancy he promoted it in the Los Angeles area. The various books and Internet postings that mention Lubcke and the Don Lee television activities sometimes disagree on details, which makes it difficult to ensure that the story told here is completely accurate. The two best overall sources of information on this topic that I have found are:

- The Internet posting of the Early Television Museum. (Thanks to museum director Steve McVoy for granting permission to use images from that Website.)
- Michael Ritchie’s book on early television, *Please Stand By.*

**The Don Lee Broadcasting System**

Before getting into radio in the 1920s, Don Lee became wealthy by cornering the market in California for Cadillac dealerships. In 1926 Lee bought station KFRC in San Francisco, and in 1927, station KHJ in Los Angeles. Soon the stations were connected by telephone lines, sharing programs. (At the time, NBC was also just a fledgling radio network.)

By the late 1920s, stations in other California towns, (e.g., Fresno, Stockton, and Sacramento) had joined the Don Lee Network, and it became a true regional radio network. In 1929 the network affiliated with CBS, and in the 1930s, with the Mutual Broadcasting System. Reference 2 says that by 1939 the Don Lee network had 31 affiliates, four of which were directly owned by the DLBS. In 1953 Don Lee Broadcasting included nearly 50 stations in California, Washington, Oregon, and Idaho. The network lasted until 1967.

When Don Lee died in 1934, his son Thomas took over management of the radio empire. After the two Lees met Harry Lubcke in 1930, they became convinced that television had a great future. Lubcke must have wowed them with the potential of this new medium and talked them into committing substantial funds to develop television broadcasting in Southern California.

**Harry Lubcke**

Harry Lubcke was born in 1905 and died in 1991. He received a B.S. in electrical engineering from the University of California, and apparently was keenly interested in radio technology. While still in his teens, he wrote an article about new developments for *Radio News,* a major national magazine at the time.

In an oral history interview, Lubcke described how he got his start in television:

“In 1928, I gave a talk at the Institute of Radio Engineers in San Francisco. When I finished speaking, Philo Farnsworth approached me and asked if I would be interested in working for him. While I was at Farnsworth, I heard Don Lee was interested in television. He had a network of radio stations. I went to see him, and the next day I was hired.”

Other sources say it was 1929 when Lubcke began working in Farnsworth’s laboratory. Perhaps it was late in 1928 when he gave the IRE talk, and early in 1929 when he actually joined Farnsworth. In any case, Lubcke stayed with Farnsworth long enough to absorb his latest technology for electronic television.

Some sources say that it was Don Lee’s son Thomas who was actually the one pushing for television. Probably both Don and Thomas Lee concluded that television was worth pursuing when they hired Lubcke as director of television in 1930. The DLBS had sufficient funds to bankroll research efforts to make it happen. By November 1930 Lubcke had a development program.
under way, and by May 1931 images were being transmitted and received in the lab. Given the embryonic nature of camera technology at the time, live telecasting was not the emphasis; instead, the focus was on obtaining images from movie film. Several different approaches to scanning movie film were tried.  

The Don Lee System Experiments with Both Mechanical and Electronic Television

According to Joseph Udelson, the Don Lee Network experimented with both mechanical television and electronic television in the early 1930s. Station W6XS began broadcasting to scanning disc set owners in 1931 using a 2100 to 2200 kHz channel (80 lines, 20 frames per second). By December 1931 Lubcke had received an experimental VHF station license (W6XAO), and was on the air on a frequency of 44.5 MHz and a power of 150 watts. The station broadcast daily for an hour, Monday through Saturday. The scanning disc transmissions on W6XS were discontinued in the mid-1930s so that Lubcke could concentrate on all electronic television and station W6XAO.

By December 1932 Lubcke was broadcasting television signals every night, with synchronized sound being broadcast by Lee’s radio station KHJ. Lubcke built prototype TV receivers that apparently worked satisfactorily, using parts purchased from Southern California radio manufacturer Gilfillan Brothers and picture tubes that he purchased from RCA and Manfred von Ardenne in Germany. Lubcke also built some picture tubes in his own lab. He provided detailed set construction plans to anyone who requested them.

Lubcke estimated that in the early 1930s, there were about 300 TV sets in the Los Angeles area. Probably many were in department stores, appliance stores, or bars rather than in private homes.

The station’s early programming consisted of Paramount shorts and Pathé newsmagazines, plus interviews with movie stars. W6XAO probably was the first TV station to show a full-length Hollywood movie (The Crooked Circle).

At the time, getting receivers to synchronize properly with transmitters was one of the most difficult challenges. Some homes in Southern California had 50-Hz AC power but others had 60-Hz power, so using the utility power line to synchronize TV receivers was not an option.

In May 1932 Lubcke actually demonstrated television reception in an airplane flying over Southern California to prove that synchronization without resort to utility power lines was feasible.

Don McCroskey described Lubcke’s technical contributions thusly: “His [Lubcke’s] main project [while working for Farnsworth] was to develop an all-electronic scanning generator system. This was the first system using an electronic sawtooth generator producing a linear scan, blanking to eliminate retrace scan, and pulses to synchronize both transmitter and receiver. The patent (U.S. 2,059,219) also included a means for suppression of the DC component (the black level) at the transmitter and reestablishing at the receiver.”

By 1933 W6XAO was one of the few U.S. experimental television stations still on the air. Most other television promoters had fallen victim to those early Depression years when businesses of all types were filing for bankruptcy at an alarming rate. Also, the technical barriers to a successful system remained daunting. The performance of both camera tubes and picture tubes left much to be desired, as did the performance of vacuum tubes at the high frequencies needed for television. Until about 1938, when television cameras for live broadcasts had been developed to a suitable level, W6XAO’s transmissions were from scanned film only.

In 1933 an earthquake struck Long Beach, California. Very quickly W6XAO obtained and aired film footage of the damage for its viewers. Today we take rapid TV coverage of disasters for granted, but in 1933, this must have been considered rather remarkable by those Southern Californians lucky enough to own television receivers. This may have been the first television coverage of a natural disaster.

The Don Lee Television System is Upgraded

By 1936 Lubcke had upgraded his system to a 300-line, 24-frame-per-second sequential system and was giving...
public demonstrations of the new “high-definition” television.\(^{11}\) (Yes, in 1933, 300-line TV was actually called “high-definition television.”) By then the broadcasts included both audio and video (from scanned film) in what was then called channel 1 (44 to 50 MHz, with the video carrier centered at 45 MHz and the sound at 49.75 MHz.).

In 1938 RCA found it necessary to purchase patents from Farnsworth in the area of synchronization.\(^{12}\) Apparently at least some of these inventions had been made by Lubcke while he worked for Farnsworth, and presumably when Lubcke left Farnsworth, he obtained a license from him to use the technology for the Don Lee System. RCA had been striving to own all key television patents rather than purchase licenses, so it must have been painful for that company to admit that it needed Lubcke’s technology.

When the industry adopted the Radio Manufacturers Association (RMA) recommendation of 441 lines in 1939, W6XAO had to shut down briefly to reconfigure its transmitting equipment, returning to the air in November 1939.\(^ {13}\) RCA, General Electric, Gilfillan Brothers, and Stewart-Warner were said to be selling TV sets in Los Angeles, but it is doubtful that very many were sold, given the sparse programming available at the time and the high prices of factory-built sets.

During the mid-1930s, it seems likely that most of the people in Los Angeles who watched W6XAO built their own sets, since commercial receivers were not generally available. Radio News magazine for May 1937 featured a cover story titled “Build this ‘Don Lee’ Television Receiver.”\(^ {14}\) It said, “Here is the first chance presented to the television experimenter and amateur to build a really modern cathode-ray television receiver from a carefully tested and authorized design and from plans that are complete, so that the builder can make one and know that it is actually workable.” The article described the 14-tube receiver in detail and provided hints for successful construction and operation. The set used a 5-inch CRT, type 905. The back cover of that Radio News issue featured an ad from Allied Radio offering to provide all the parts needed to build the television receiver.

The same article mentioned that the W6XAO transmitter was located at 7th and Bixel Streets in downtown Los Angeles and operated at 45 MHz. Programs were broadcast according to the following schedule:

- Monday – 9 to 10 a.m.
- Tuesday – 10 to 11 a.m.
- Wednesday – 11 a.m. to Noon
- Thursday – Noon to 1 p.m.
- Friday – 1 to 2 p.m.
- Saturday – 2 to 3 p.m.
- Monday through Saturday – 6:30 to 7:15 p.m.
- Video power was 1 kW; audio power, 150 W

W6XAO may have created the first soap opera shown on electronic television when in April 1938, it began a 52-episode serial drama called “Vine Street.” In 1939 the station offered a charades game show.\(^2\)

**W6XAO in the 1940s**

Around 1940 a new transmitter site for W6XAO was built in the Hollywood...
Hills atop a hill that Thomas Lee named “Mt. Lee.” The station broadcast on channel 2 from that site until the early 1950s.

On New Year’s Day 1940, W6XAO broadcast the Rose Bowl Parade live, with iconoscope cameras purchased from RCA. By May of that year the station had another setback because the FCC had just issued Order Number 67, reconfiguring FM radio channels. W6XAO had to shut down its transmitter again and move to a new frequency. By August 1940 W6XAO had increased its resolution to 525 lines and was on the air 14½ hours per week. The station claimed that there were approximately 500 television sets in the LA area that could receive its broadcasts.15 Live remote broadcasts of special events were offered to viewers, such as boxing matches and auto races.

Also in 1940, the RMA established a committee, called the National Television Standards Committee (NTSC). The goal was to create standards that the entire television industry would embrace. The first meeting was held in July. The Don Lee Broadcasting System participated in these meetings.

In 1941 W6XAO got some serious competition when Paramount Pictures began station W6XYZ, which later morphed into station KTLA. Actually, Michael Ritchie notes that prior to WWII Los Angeles had five other experimental TV stations in addition to W6XAO.

In the late 1940s W6XAO switched from experimental status to a commercial TV station, with the call letters KTSL-TV (for Thomas S. Lee’s initials).

Harry Lubcke was one of the founders of the Society of Television Engineers.16 In 1949–50 he served as president of the National Academy of Television Arts and Sciences. He was the person who came up with the name “Emmy” for the academy’s top award. (Supposedly, it derived from the nickname for the image orthicon camera tube.)

Sadly, Lubcke died with little or no public recognition, and his papers were thrown out. What a loss!

Acknowledgment
This article originally appeared in the Sept. 2007 issue of Radio & Television Museum News (now Dials and Channels: the Journal of the Radio & Television Museum). It is reprinted here with the permission of that publication and the author. For more information, please visit www.radiohistory.org.

About the Author
Brian Belanger is the volunteer executive director and curator of the Radio & Television Museum in Bowie, Maryland. Prior to his retirement in 2000 from the National Institute of Standards and Technology, he held several senior management positions there, including Deputy Director of the Advanced Technology Program. He was a Commerce Department Science and Technology Fellow in 1983 and a recipient of Bronze and Silver medals from the Commerce Department. He is an electrical engineer, with a bachelor’s degree from Caltech and a Ph.D. from the University of Southern California. Dr. Belanger was also a research engineer at the General Electric Research and Development Center early in his career. He serves on the board of directors of the Mid-Atlantic Antique Radio Club and is co-editor of Radio Age, the club’s newsletter. He is also the editor of Dials and Channels, the newsletter of the Radio & Television Museum. Dr. Belanger also holds an extra class amateur radio operator’s license.

References
Nominate a Colleague for IEEE Fellow, Class of 2013
The March 1, 2012 Deadline is Rapidly Approaching

IEEE Fellow is a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation.

Election to IEEE Fellow grade is one of the highest honors that can be bestowed upon an individual by the Institute. Only one tenth of one percent of the total IEEE voting membership—excluding students and associates—may be elected each year.

Nominations for the IEEE Fellows Class of 2013 are now being accepted. Nominate a colleague, co-worker or friend whose career and body of work you consider eligible for elevation to the IEEE Fellow Grade. Online application is available, as are all the forms that may be needed. The deadline for accepting nominations is March 1, 2012. Whatever their careers, candidates must have made an outstanding contribution to the electrical and electronics engineering profession. Candidates from any field, including academia, government, and industry, may be nominated if they meet the following requirements at the time the nomination is submitted:

• The candidate must be an IEEE Senior Member
• The candidate must have completed five years of service in any IEEE grade (IEEE affiliate membership does not apply)
• The candidate’s membership dues must be paid in full.

Any person is eligible to serve as a nominator, with the following expectations: members of the IEEE board of directors, members of the IEEE Fellow committee, IEEE technical society/council Fellow evaluating committees (only if a nomination will be reviewed by their committee), or IEEE staff.

Before Submitting an IEEE Fellow Nomination Form

As a nominator, you initiate the process to nominate a colleague who has made outstanding contributions to the advancement or application of engineering, science and technology. The first thing is to fill out a nomination form; however, completing the form is not an easy task. You will need to check and see if the nominee meets all the requirements, then assemble the names of the individuals who will be supporting your nomination, and then explain why the nominee’s contributions are worthy of this honor. This requires some amount of effort, so allow plenty of time to do it right. To avoid mistakes, use the following checklist prior to submitting your nominations:

(1) Meet the deadline: All forms (nomination, reference, endorsement) must be received no later than March 1. When preparing your nomination, be sure to allow adequate time for references and endorsers to complete their forms. Waiting until the last minute is not a good idea.

(2) Make sure your nomination forms are current: Unfortunately, nominations submitted on old forms will not be accepted. We strongly encourage you to use the online nomination process to avoid this problem. Doing so guarantees that all the forms (nomination, reference, endorsements) are current.

(3) Make sure the nominee is eligible for nomination: The nominee must be an IEEE Senior Member or IEEE Life Senior Member in good standing with dues current, and someone who has been an IEEE member for five years or more preceding Jan. 1 of the year of proposed elevation. Don’t assume that your colleague holds the correct member grade, that he/she is in good standing, or has met the minimum requirement for membership years. All forms are checked thoroughly and candidates that do not meet the requirements will be rejected. The actual date that the nominee joined IEEE versus the years of service noted on the IEEE membership cards will be checked; system validation counts by date the individual joined the organization.

(4) Pay attention to the spelling of the nominee’s name: Many times nominees’ names are misspelled and/or the first and last name transposed. Pay special attention to international names with special characters and/or names that are hyphenated. This can cause problems later on in the nomination process. Our system validates the nominee’s name against the IEEE membership database.

(5) Check references eligibility: References must be either IEEE Fellows or IEEE Life Fellows in good standing, with an exception being made for Region 9 (Refer to the nomination instructions for an explanation). In addition, verify that your references do not currently serve on boards or committees that would make them ineligible to support the nomination. You are strongly encouraged to solicit the maximum of eight references rather than five. This strengthens the chance of fulfilling the reference requirement in the event that some references are disqualified.

(6) Listing endorsers on the nomination form: When entering the name of an endorser, input the last name, first name and e-mail address in the appropriate fields. If you are entering the name of a society, corporation, chapter or region, input the information in the
From the President continued from page 2

Street for my kids. I could go on and on about the countless news, entertainment shows and sporting events I have seen over the years. The best part was that we could get it wirelessly in our home for FREE, in exchange for watching periodic sales pitches for various products. Not a bad deal, considering that in most cases it would be impossible to be there in person for many of these events, or what the cost would be to attend movies or much more expensive live shows with top entertainers. Also along the way, we moved into digital television with high-resolution widescreen and surround sound.

Terrestrial television has been a big part of people’s lives for more than half a century, and it still has an important part to play as we go forward. Today in the United States, it is estimated that on average only about 15 percent of the households view off-air delivered television, although this figure can be as high as 40 or 50 percent, depending on the specific area of the country and program offerings available. The low average percentage is due to the increased availability of cable delivery, and to a lesser extent, satellite service.

This proliferation of these alternative means of delivery came about for several reasons. Initially it was to fill in gaps in terrestrial coverage, such as in mountain valleys far from TV transmitter sites. Later on it was to fill a gap in program offerings since analog television was limited to a single program stream. Also along the way prosperity allowed many households the ability to pay for the convenience of not having to deal with an antenna, as well as being able to access more content. In addition, some television service providers were able to strike deals to share revenue with the cable or satellite providers. This led to an entire generation thinking that television is only available for purchase from cable or satellite providers.

So why should we save terrestrial broadcasting? Why not turn the spectrum over to the broadband providers? There are several very good reasons:

(1) The argument that the broadband providers need a large amount of new spectrum is driven by the demand for video; however, delivery of video in the one-to-one methodology of broadband is extremely wasteful of valuable spectrum. Whereas, broadcasting is extremely efficient in that adding new customers in the area of a broadcast transmitter requires no additional spectrum.

(2) With the advent of digital, television stations are no longer limited to a single program stream. Therefore, a great deal of what is provided by cable or satellite service is, or could be, available wirelessly from terrestrial television.

(3) Local news and network television programming still dominate what households in the United States are watching and this is available via terrestrial television broadcasts.

(4) As I mentioned above, terrestrial television has evolved over the years to provide more service than ever before with greatly improved technical quality.

(5) Broadcasters have a vast amount of expertise in determining what content their television customers want, while broadband providers have essentially no experience in that area.

(6) The FoBTV initiative and the ideas that were presented at the FoBTV Summit show great promise for significant improvement in the spectrum efficiency for terrestrial television, as well as the ability to deliver television to a wide variety of devices both fined and on-the-go.

Terrestrial television has served us well and deserves an opportunity to once again reinvent itself to serve the changing needs of its customers. It would be a huge mistake to abandon the vast knowledge that broadcasters have and turn over all video delivery to those with little experience and a very inefficient delivery methodology.

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

Bill Meintel
BTS President
umeintel@computer.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.

Learning Has No Boundaries

You know your students need IEEE information.
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IEEE recognizes the special needs of smaller colleges, and wants students to have access to the information that will put them on the path to career success. Now, smaller colleges can subscribe to the same IEEE collections that large universities receive, but at a lower price, based on your full-time enrollment and degree programs.

Find out more—visit www.ieee.org/learning
The IBBT-WiCa-UGent (Wireless & Cable) group will be organizing a Workshop on The Future of Broadcasting at the medieval congress centre Het Pand, a former dominican convent in the city centre of Ghent, Belgium.

Experts in the field of broadcasting from all over the world, will be brought together to give their views on the future of broadcasting:

- Pablo Angueira (UPV/EHU, Spain): Challenges in Planning Mobile Broadcast Networks
- John Cosmas (Brunel University, UK): Future of Broadcasting and the Future Internet
- Hugo Gauderis & Dominique Lievens (Norkring, Belgium): Local Event Broadcasting
- William T. Hayes (Iowa Public Television, USA): Future of Broadcast Television: North America
- Peter Moss (BBC, UK): New Technical Developments in DVB-T2 and DVB-NGH
- Gabriel-Miro Muntean (Dublin City University, Ireland): Using Adaptive Solutions in the Context of Multimedia Broadcasting
- Bo Rong (CRC, Canada): Error Correction Codes for Next Generation Spectrum Green Mobile DTV Systems
- Lieven Vermaele (EBU, Switzerland): Future of Broadcast Television: Europe
- David Wood (EBU, Switzerland): 3DTV and UHDTV: Battle of the Giants?

Moreover, a marvelous social event gives you a chance to meet with broadcast engineers from around the world. A guided round trip on the canals in the historic city centre, followed by a dinner, is planned.

Registration fee:
- BTS GOLD members 75€
- Students 200€
- Others 300€

More information:
David Plets
david.plets@intec.ugent.be
+32 9 331 49 18

Visit www.wica.intec.ugent.be/workshop for more information and register today!
In 1913, Proceedings of the IEEE covered numerous key events:

- Edwin H. Armstrong, the “father of FM radio,” patented his regenerative receiver, making possible long-range radio reception.
- William David Coolidge invented the modern X-ray tube, making possible safe and convenient diagnostic X-rays.
- AT&T began installing Lee De Forest’s Audion, the first triode electron tube, in networks to boost voice signals as they crossed the United States.
- The first issue of Proceedings of the IRE began to chronicle these events.

Proceedings of the IEEE contributors are a “Who’s Who” of 20th century innovators, from Armstrong to Zworykin. Follow the ideas of Guglielmo Marconi, Lee De Forest, Grace Hopper, Claude Shannon, and John Mauchly in their own words, and feel the excitement of the greatest burst of technological accomplishment in the history of the planet.
### IEEE Broadcast Technology Society Organization

**IEEE Broadcast Technology Society Administrative Committee**

**Society Officers**
- **President**: William Meintel
- **Vice-President**: William T. Hayes
- **Treasurer**: E. Lanny Nass
- **Secretary**: Thomas Silliman
- **Senior Past President**: Thomas M. Gurley
- **Junior Past President**: William T. Hayes

**Committee on Man and Radiation**

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**Advanced Television Systems Committee (ATSC)**

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**Committee on Communications Policy (CCP)**

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**Standards Committee**

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**IBC Representatives**

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**Strategic Planning Committee**

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**Women in Engineering (WIE)**

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**2011 Broadband Multimedia Symposium Chair**

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**BroadcastAsia Representative**

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**IEEE Broadcast Technology Society Newsletter 31**
We have redesigned our Website!!!!

Please visit our new Website at http://bts.ieee.org/ to see all the changes that have been made. If you have any suggestions for our Website please send an e-mail to bts@ieee.org