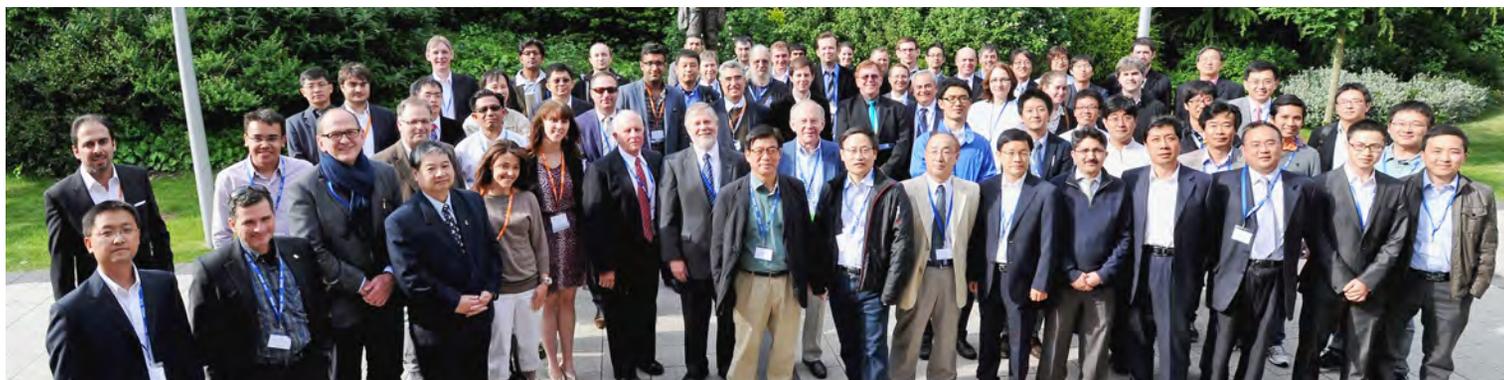


IEEE

Broadcast Technology Society Newsletter

The technologies to deliver information and entertainment
to audiences worldwide, at home and on the go.



Some 160 delegates representing 25 countries and most regions of the world attended the Eighth annual IEEE Symposium on Broadband Multimedia Systems and Broadcasting.

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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:

Issue	Due Date
Winter	October 28, 2013
Spring	January 23, 2014
Summer	April 26, 2014
Fall	July 21, 2014

BMSB 2013 Examines Television's Future at U.K. Summit

TV experts from around the world converge on London's Brunel University for three-day June event

By James E. O'Neal

UXBRIDGE, U.K.

Some of the world's foremost television engineering experts assembled in this quiet West London suburb June 5–7, 2013 to offer their take on where the medium is heading in the next few years, and to offer technological assessments and suggestions for making it more accessible and user-friendly.

This eighth annual IEEE Symposium on Broadband Multimedia Systems and Broadcasting (BMSB) event was hosted by London's Brunel University and attracted more than 160 broadcasters,

researchers, consultants, manufacturers, standards group members and engineering students from 25 countries, with most regions of the world represented. It was organized and coordinated by John Cosmas, multimedia systems engineering professor at Brunel University, and Yiyun Wu, principal research scientist at Canada's Communications Research Centre (CRC).

Agenda topics included the nearly universal tightening of spectrum available for broadcasting, new and evolving TV standards, ultra and super high-definition television, the latest developments in high-efficiency coding, 3D and

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President's Column

William Meintel, BTS President



Before going further, I would like to take the opportunity to thank John Cosmas and Yiyang Wu for the first class job they did with this year's Broadband Multimedia Systems and Broadcasting Symposium (BMSB). I believe that all of those who attended should have come away with the same impression—this was a well-planned event with great presentations, wonderful social events and an outstanding venue.

Numerous times over the past couple of years I have discussed spectrum issues as they relate to the broadcast industry and in particular to television. The discussion first focused on the U. S. Federal Communications Commission's (FCC) National Broadband Plan wherein it was proposed to take 120 MHz of spectrum from the UHF television band and reallocate it for wireless broadband.

The idea of a large wireless broadband network, as opposed to a wired network, would appear to the uninformed as a good idea. It is, in fact, a very poor use of spectrum. Unlike using a wired system with coaxial cable or fiber, it is a finite resource. Even though it may initially be more expensive to lay more fiber, the ability to do so allows for essentially unlimited bandwidth. On the other hand, spectrum has a finite bandwidth and can quickly be saturated—even when pushed to the theoretical limit. Wireless connections for the transmission of large amounts of data (e.g. video) in a non-broadcast system should be limited to very short distances where it can be offloaded to an efficient wideband wired network. Such an arrangement is a much better use of scarce spectrum since properly designed systems allow for spectrum reuse with minimal separation distance. That would be the best use of scarce resources and provide the best benefit to both individuals and businesses.

However, contrary to the above, the idea of a massive wireless broadband network is still moving forward with the FCC receiving spectrum auction authority from the United States Congress.

The FCC now has authority to conduct both a reverse and forward auction of television spectrum. In the reverse auction, television broadcast stations will set a dollar amount that they would accept for giving up the rights to their spectrum. The forward auction is the more traditional style where the spectrum obtained through the reverse auction will be made available for wireless broadband use.

In that the spectrum to be made available for broadband use will need to be in reasonably sized contiguous blocks, there will almost certainly be a need to relocate at least some, if not all, of the television stations that choose not to participate in the auction. The authority granted the FCC requires that participation be voluntary. In addition, the FCC is required to pay the cost of any needed relocation.

In order for the auction to be successful there must be enough broadcasters willing to relinquish their spectrum at a price that will allow the FCC to recoup the cost of buying the spectrum, pay for any required relocation, and make a profit. The profit is to fund improvements in the public safety communication infrastructure.

In view of this, the first question that comes to mind is will the auction be a success? The real demand for more wireless broadband spectrum is in areas of dense population, which, of course, corresponds with the top television markets. A look at the top three U.S. television markets reveals that currently there is essentially no available television spectrum that can be reallocated for wireless broadband. Of course, as the markets get smaller some spectrum is available; however, any reasonable amount will not be realized in the markets where the broadband demand is the highest, unless television spectrum is relinquished.

Therefore, unless a significant number of television stations in the top markets not only choose to participate, but also price their spectrum at a level where it is economically viable to go forward the auction will fail.

Most of those I talk to believe the auction will fail. That being the case, then life in the television broadcast industry goes back to normal (whatever that is). Not so fast—yes the auction is very likely to fail and the FCC has no authority to force stations to give up their spectrum. However, those who want the spectrum have tried to make the case that this is absolutely necessary for the good of the country. Since spectrum is very valuable, they will almost certainly lobby the Congress for additional “tools” that can be used to obtain the desired spectrum at the expense of the broadcast industry.

The main reasons for the explosive demand for wireless spectrum are video and that the wireless industry has been hard at work developing technology to do broadcasting. Their target is not broadcasting to the home, but to a multitude of portable and mobile devices. The reason for the lack of interest in reaching the large home devices is simple. That market is already dominated by cable and satellite providers, and in addition, more bandwidth is required to provide quality video on a large screen.

The future of over-the-air broadcasting is to reach portable and mobile devices, and a failed spectrum auction may buy the broadcast industry the time it needs to ramp up for that future. Although work is underway (ATSC 3.0 and the FoBTV initiative) to meet this challenge, the time is short. The broadcast industry has the advantage of their long history of efficiently providing video service to the public, as well as the fact that they already have the spectrum and a built-out infrastructure. Although that infrastructure will need to be modified and enhanced, the “bones” are there. All that is missing is the will to move forward to a profitable future. The alternative is being a program provider at the mercy of those who actually deliver that material to the customer, and sooner rather than

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From the Editor

James E. O'Neal, BTS Newsletter Editor



It seems that as we move further along into life's pathways things get busier and busier. As I write this, this IEEE Symposium on Broadband Multimedia Systems and Broadcasting (BMSB) has just ended and the annual IBC fall event and the BTS Broadcast Symposium are looming quite large. Your editor, along with quite a few other BTS members, made the trek to London this June for the BMSB event and before the last bit of paperwork has been filed away, it seems that it's already time to start travel plans for Amsterdam and San Diego.

The BMSB event is well covered elsewhere in this issue of the **Newsletter**, but I do need to say that it was a very well planned and organized event. In addition to bringing in some of the best and brightest international players in the field of television, co-organizers John Cosmas and Yiyang Yu hit upon the idea of holding the conference at the campus of London's Brunel University between sessions. Not only was the venue first class in terms of presentation venues (several lecture halls in a common building provided an ideal setting for multi-track paper presentations and panel discussions), school dormitory space provided housing for registrants, keeping costs at very reasonable level. Ditto the use of the University's food service for breakfasts and noon meals. Brunel is also located within close proximity to London's Heathrow airport, so taxi fares were not outrageous either.

The conference wasn't just about dissemination of the latest television engineering information either—several very nice social events were built into the schedule, giving participants the chance to unwind a bit, see some of London, socialize and make new friends.

My compliments to John and Yiyang for a very well done job, and also to Brunel's Rebecca Byrne and Carole Carr, and our own Amanda Temple who also had a hand in keeping things running smoothly. I think that everyone attending this year's BMSB Symposium came away with a lot of very useful

information, some great memories and possibly a lifelong friend or two.

The 2014 BMSB Symposium is being held in Beijing, China and also promises to be a great experience. While it will be difficult to top this year's event, I'm sure that it will be a first-rate conference too.

The next major BTS event—the fall Symposium—is being held a bit closer to home (San Diego, in case somehow you somehow haven't gotten the word yet) and promises to be bigger and better than ever, with co-chairs David Layer and Paul Shulins working hard to make sure that all of the conference pieces fit just as they should in the new West Coast venue.

Early on, I mentioned the IBC show in Amsterdam. While the BTS doesn't run this show, it is a major stakeholder. Our interface with the IBC event for a very long time has been Mike Bennett. I've gotten to know Mike quite well during the time I've been involved with BTS AdCom affairs and just recently received word that he will be stepping down from both IBC and BTS AdCom slots to pursue fulltime retirement. Mike has done a first-rate job during his tenure and we're going to miss him. However, I do understand his desire to take a well-deserved rest, spend more time with his lovely wife Addie, and make some time to smell the flowers. We all wish you well Mike and hope that you'll keep in touch.

On another note, after a little prodding, the number of articles being submitted for publication has picked up a bit, with some very interesting material being submitted for this issue of the **Newsletter**. Please keep it coming and thanks!

This time around, we're even publishing some "letters to the editor" once again. Please keep those coming too.

Be sure and send your letters and articles for publication directly to my email address: BTSEditor@IEEE.org.

I'll see you in Amsterdam in a few weeks! Safe travels,

James O'Neal

Editor

BTS Newsletter

BTSEditor@IEEE.org

BMSB 2013 Examines Television's

continued from page 1

holographic imaging, increasing the robustness of transmission systems, spectral conservation, consideration of human factors in television viewing, and more.

The Challenge of Shrinking Broadcast Spectrum

One of the big issues confronting many BMSB delegates is increasing competition for UHF television spectrum by wireless broadband providers and the effect that this may have on television's future. This was a recurring topic at the



Bill Meintel

conference, with BTS president Bill Meintel offering his views on the situation in an opening-day presentation, "U.S. Spectrum Issues and the Spectrum Auction," in which he described the impact of the impending federally-

mandated "incentive" auctioning of a large portion of the remaining U.S. television broadcasting spectrum. "We've got 294 MHz of spectrum altogether and broadband wants to take away 120 MHz of that," said Meintel. "We've got a problem."

The auction referred to by Meintel would not force broadcasters to abandon their television channels, but rather would allow them to offer frequencies up on a freewill basis for auction on a television market-by-market basis. This could prove profitable for some owners, especially those who are currently operating with small, or no, profit margins. The intent is to turn off a sufficient number of stations so as to provide a worthwhile block of spectrum for telcom use. However, due to the number of markets involved in the United States, the frequencies in the cleared blocks of spectrum may not be universal.

Meintel forecast some problems with this scenario.

"If you're not going to have the same spectrum available throughout the country, you're going to have the situation where you have broadband and television sharing channels," Meintel said. "You can separate them a good ways apart and this works until you have ducting. Then for several hours these things that were spaced far enough apart aren't far enough apart anymore. You've got this high-power television station out there with its signals booming in hundreds of miles away wiping out all of your broadband service for maybe two or three hours. It doesn't happen very often, but it's going to happen.

Concerns about the ever-dwindling amount of spectrum allocated for television broadcasting were also voiced in a panel discussion—"The Future of Broadcast Television" which was held near the end of the BMSB conference and featured participants from the United Kingdom, Japan, China, Korea, Canada, and the United States.

"There is never going to be enough spectrum [for] the output and quality of what we want to put out, and with



Andy Quested

the options that we want to add to that," said Andy Quested, head of technology for BBC HD and 3D. "My gut reaction—and this is almost heresy to some people in here—is I think we should give up all of it to telcos

and say you must carry us, slide us up the frequency band—because they are desperate for our low frequencies that go through walls and into basements, but there's plenty of room further up that they're afraid to use. Make them carry us to mobiles and to main televisions and to whatever we want. I think that they should start to deal with the 99.8 percent coverage that we're supposed to deliver, [and with] mobile

connectivity to places with very poor television connectivity. I think that the whole usage thing...has to be about how we get more content, better content, higher quality content to more devices."

Looking at Tomorrow's TV Set

The BMSB conference offered several peeks into television's future, with James Walker, technical director in the New



James Walker

Initiatives division at NDS-Cisco, providing one of the more revealing of these in his "Wall-to-Wall TV" presentation.

Mindful of the present-day push for larger and larger screen sizes and higher picture resolutions, Walker

speculated that the manufacture and distribution of gurgitation plasma, LCD, and LED displays would eventually end and a "one-size-fits-all" display element would become standardized.

"We think that the key to large TV is to take small regular screen elements [tiles] and put them together onto the wall to make a large display," said Walker. "This has a lot of practical advantages. It gives us flexibility of size, so I could create a display to fill the space that would be appropriate in my room."

Walker cited an example of the impracticality of constructing bigger and bigger integrated display devices.

"A colleague of mine has a friend who bought a 105-inch plasma TV. The cost was about £80,000; however, part of that cost was for removing some of the roof of his house and hiring a crane to lower the TV into the house."

Walker offered that a "tiled" display approach would be a lot more practical and will probably be the direction that home television viewing takes. He stated that once the display industry had reached a "sweet spot" in terms of

optimum display “tile” size and manufacturing costs, these size-standardized panels would be available in a price range that would allow a consumer to literally fill up a wall with these borderless and seamless tiles to create a display as large as desired. The composite display screen could even turn corners and spread onto adjacent walls.

Walker predicted too that the number of tiles activated for viewing might vary, depending on content.

“[Historically] we always fill the frame regardless of the content—it doesn’t matter whether we’re watching a movie, sports, a drama, or even if the TV is switched off and we’re just watching black, we always see the same size pictures,” Walker said. “But we maybe shouldn’t be so constrained and have pictures that are an appropriate size for the content that we’re watching.”

Walker also thought that the home TV screen of the future might not remain a non-entity when television shows weren’t being viewed.

“With the TV today, there’s a natural antagonism between what the TV looks like when it’s displaying beautiful pictures and then when it’s switched off and the screen turns black. The larger the TV the stronger that antagonistic tension is,” said Walker. “There are a lot of people who are not prepared to have a large black object on the wall of their living space when they’re not watching TV.

“So we think that if there’s going to be a very large display, it really ought to blend into the environment. These systems—when you’re not actively watching television content—will be able to have personal information, personal content displaying on the room surfaces. Not necessarily something that you’d sit down to watch with a cup of tea or a beer, but possible information about ... your daily live at home or something you might find of interest.”

Walker further illustrated this point by stating that such tiled displays might be designed to achieve a transparency of sorts, displaying the room’s wallpaper behind them when not in use so as to be nearly completely unobtrusive.

Where Television May Be Heading

In addressing a question from the floor about the possibility of broadcasters setting up their own wireless networks, Meintel offered the following:

“The answer is yes [for broadcasters] who really understand where the future is. The future is not in television to the home. It’s portable and mobile devices. The homes are mainly being served by cable now and [by] satellite service. The future is [television] to iPads and cell phones. That’s where the forward thinking broadcasters are going. That’s where the future is.”

The future of the medium and how it will be disseminated remained items of discussion throughout the conference, with additional comments offered in a concluding session on Friday afternoon.

“The first thing we [the BBC] got rid of was our transmitters—we don’t own any—and that didn’t stop us from being one of the best broadcasters in the world,” said the BBC’s Qusted. We transmit to every single platform—we don’t differentiate between satellite, cable, mobile, terrestrial,” said the BBC’s Qusted. The fastest-growing HD service in Europe is terrestrial. Freeview just passed Sky five to one. We’re content makers; we’re not broadcasters anymore. We will supply content to anyone who will show it. None of us in Europe differentiate between service platforms—satellite is just another way of getting our content to people who cannot receive terrestrial.”

“We have to be content creators, and in the U.S. we create local content about the areas we serve and that’s our value to viewers, said Bill Hayes, BTS



Bill Hayes

vice president and head of engineering for Iowa Public Television. “Quite frankly we don’t care what the over-the-air channel, satellite, cable—those are now just the enablers that let me deliver the

content that I’ve created because that’s my reason to exist.”

Qusted also offered his thoughts on another element that may direct the direction television takes.

“Interference—the amount of interference we’re getting in the terrestrial spectrum from the mobiles, from power line cables, from white space devices that could make the quality of service you get from terrestrial [decrease to the point] where nobody’s watching because the quality of service is too bad,” said Qusted. “Yet terrestrial at the moment is a hugely robust and popular platform in many countries. From the point of view of the technologies as an engineer let’s do the best we can in terms of providing the enabling technology and then let’s see which business model wins. I wouldn’t like to guess at the moment.”

The Social Side of Things

In addition to lining up some top-notch technical presentations, BMSB



John Cosmas

conference organizers Cosmas and Wu also recognized that engineers have a social side too and lined up some equally compelling before- and after-hours events. Actually, the entire conference was a “themed” event,

celebrating the various nations that make up the United Kingdom.

“I tried to theme it on the strength of U.K. culture—the U.K. consists of the nation states—England, Wales, Scotland, Northern Ireland,” said Cosmas. “We’re also a multicultural society as we have an Indian population, an African population, a European population, a Chinese population, an East Asian population—so that’s why we tried to include something that represents them all.”

In keeping with the multicultural theme, each day of the conference was dedicated to a U.K. nation—“Scottish Day,” “Irish Day,” and “Welsh Day.” The

June 4 pre-conference 3D TV tutorial session was dubbed “British Day.”

Social events were tied to this theme, with a performance by a Scottish bagpiper to lead off the BMSB opening session on Wed. June 5. The GOLD dinner that evening—a rather special event itself, as it took the form of a barbecue dinner held on a river boat plying the waters of London’s Thames River—featured authentic Irish music by an Irish band. The event’s Gala Dinner, which was held the next evening (June 6) in the heart of London featured music by a Welsh harpist and additional entertainment from a dance troop performing traditional English Morris folk dancing, complete with

shin bells and clanking sticks. All in all, conference attendees were exposed to a wide variety of U.K. culture and



Yiyuan Wu

hospitality with never any “downtime” outside of the conference’s technical sessions, thanks to a great deal of planning and hard work by Cosmas and Wu.

“I felt that it was hard work, but very rewarding,” said Cosmas. “And it has helped us to communicate much better.”

Conference co-organizer Yiyuan Wu also shared his thoughts about BMSB 2013.

“We had a very successful conference,” said Wu. “Even the weather helped. We had four consecutive sunny days in London. Thanks to Professor Cosmas for his help in arranging things for the conference.”

All in all more than 100 papers were presented at the 2013 BMSB conference, the eighth such convening of that group. In past years the United States, Spain, China, Germany, and South Korea have hosted the group’s meetings.

The 2014 BMSB meeting is scheduled for June 25–27 and will take place in Beijing, China.

President’s Column

continued from page 2

later, that service provider will realize that they can do what you do and then you are out of business.

If a broadcast industry apart from the wireless providers is to have a future, then the time to act is now. Any further delay will doom the industry as we know it. More importantly, it will create a new and very inefficient use of scarce spectrum that will in the end severely limit the United States, or any other country taking such a course, to compete with those who take a more sensible approach to the use of the spectrum and the available technology.

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

Bill Meintel
President
wmeintel@ieee.org

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IEEE

IEEE 2013 BTS Symposium Draws Near

Large turnout anticipated for Oct. 9–11 event

By Paul Shulins
BTS Symposium Co-Chair

SAN DIEGO, CALIF.

The 2013 BTS Symposium will be held Oct. 9–11 at the Westgate Hotel in San Diego. If you haven't registered yet, this would be a great time, as a large crowd is expected and the seating this year will be limited to the new venue size. In addition, the room rate is more economical than it has been in previous years and the hotel's central location allows for easy access to the best of San Diego.



Paul Shulins,
BTS Symposium
Co-Chair

Event Includes An All-Day Tutorial Session

This year's Symposium will feature a Wednesday tutorial session on the future of television technology and will highlight transmission techniques and HEVC Coding. There will also be a panel discussion on audio for the next generation of broadcasting.

On Thursday the theme is technology for television's future, with papers on point-to-multipoint-overlay for LTE-advanced, enhanced content distribution, mobile broadcasting, ATSC 3.0, passive intermodulation measurements, the artist experience for HD radio and much more.

Friday's sessions will focus on radio, including papers on FM signal repeaters,

MPX over AES, all-digital AM IBOC and more. The Symposium wraps up on Friday with sessions on spectrum issues worldwide and the next generation of television.

Outdoor Luncheons Planned

As usual, a joint BTS/AFCCCE luncheon is scheduled on Thursday, and the IEEE BTS award luncheon will take place on Friday. Both events will be held outside the hotel, property weather permitting. And don't forget the Thursday evening manufacturer's reception.

Symposium attendance is expected to grow this year as the new location offers easy access for a new crowd of West Coast broadcasters. Also the newly formed San Diego BTS chapter, chaired by Murat Karsi, has been promoting this event in Southern California and assisting with local conference arrangements.



The IEEE BTS Symposium is attended each year by broadcast engineers from all over the world, and for the first time in more than 60 years this world-class event is being taken on the road, and is also available on-line as well. Don't miss it, as we will make history in beautiful San Diego this fall.

Complete registration information is available at <http://www.cvent.com/d/hcqy3j/4w>.



SAN DIEGO WEST GATE HOTEL

BMSB 2013 In Review

By James E. O'Neal

UXBRIDGE, U.K.

Several days in early June 2013 will always be special for those who traveled to the United Kingdom to attend the Broadband Multimedia Systems and Broadcasting symposium



Brunel University, located in the west London suburb of Uxbridge, hosted this year's IEEE Broadband Multimedia Systems and Broadcasting Symposium. Mother Nature cooperated with beautifully clear skies and very pleasant temperatures throughout the event.



PHOTO BY JUAN CARLOS JACOME FERNANDEZ

At the conclusion of the first day of paper presentations and forums, attendees boarded buses for a trip into the heart of London for the GOLD dinner which was held aboard a riverboat cruising the Thames. (The only "glitch" in an otherwise perfectly planned and executed conference occurred while the buses were en route to the waterfront. An earlier automobile accident shut down several London thoroughfares, considerably delaying the arrival of the buses and the casting-off of the ship. However, the late start did nothing to dampen spirits or interfere with the GOLD dinner.)

held there. The **Newsletter** is proud to present some photographic recollections of this event, which involved more than 160 attendees from virtually all areas of the world, along with a very large number of behind-the-scenes support personnel.

(With the exceptions noted, all photographs are by the author.)



PHOTO BY JUAN CARLOS JACOME FERNANDEZ

BMSB organizers planned this year's conference to be a "themed" event, representative of the peoples and culture of the United Kingdom. Day One saluted Scotland and began with a close-up demonstration of Scottish music rendered on the bagpipe by this piper.



(l-r) The IEEE's Amanda Temple and Brunel University's Rebecca Byrne were on hand to greet conference registrants, issue credentials and provide information.



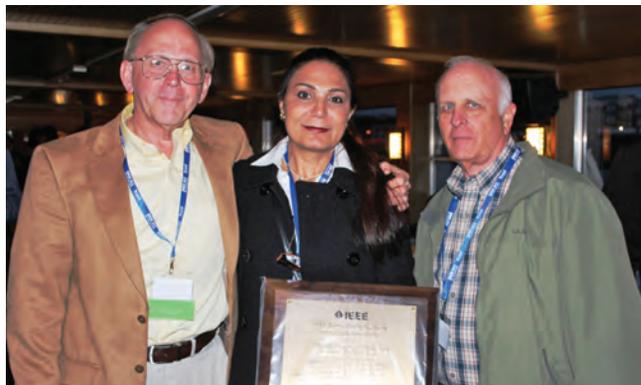
When they finally boarded the river boat, GOLD dinner attendees were greeted with plenty of hospitality along with music from an Irish band.



The late riverboat's "sailing" produced an unexpected benefit in that passengers aboard got to witness some beautiful London nighttime scenery and photo opportunities along the river they might have otherwise missed.



The GOLD dinner and cruise ended near the Houses of Parliament and landmark Elizabeth clock tower with its great "Big Ben" bell tolling the late hour.



After enjoying music, conversation, and a barbecue meal prepared on the boat's upper deck, it was time for presentation of some awards. In this photo your editor and Bill Meintel pose with Ms. Eman Alazawi, who accepted the 2013 Student Paper Award for "Adaptive Depth Map Estimation from 3D Integral Images" on behalf of herself and co-authors A. Aggoun, O. Abdul Fatah, M. Abbod, and M. R. Swash. Ms. Alazawi and the others are students at Brunel's School of Engineering and Design.



Another of the numerous illuminated Thames River bridges.



Noontime student poster sessions have become popular at BMSB conferences and this year was no exception with the exhibits receiving a lot of attention.



After presentations concluded on Thursday it was time to board buses for downtown London and #2 Savoy Place to attend the conference's Gala Dinner event. (There were no traffic incidents this time and the buses arrived on schedule.) This historic building has served as headquarters for the U.K.'s Institute of Engineering Technology (formerly the Institute of Electrical Engineering) for more than 100 years.



The dining room high atop #2 Savoy Place served as the venue for the Gala Dinner.



Entertainment at the dinner was multicultural also, with a harpist from Wales providing music from that country.



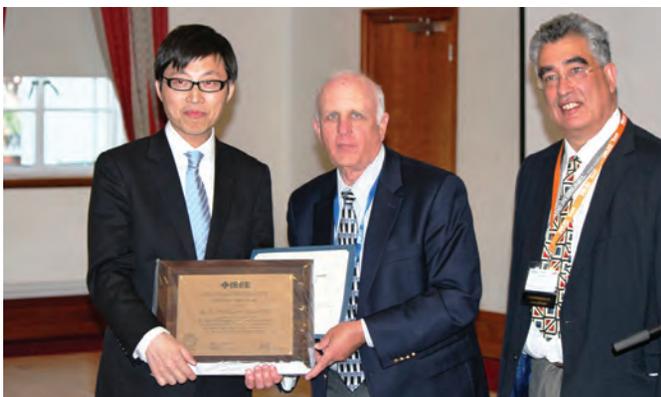
There couldn't be a more fitting place for a broadcasting conference dinner, as evidenced by this stone marker at #2 Savoy Place, informing visitors that the BBC early on set up shop here in space leased from the IEE.



In keeping with the event organizers' multicultural theme, flags representing the United Kingdom, Wales, Scotland, Northern Ireland, and England formed the centerpiece for the banquet tables.



Next on the bill was this dance troop demonstrating traditional English Morris dancing.



After a very special and enjoyable dinner it was time for presentation of a number of awards. One of these was for 2013 BMSB Best Paper "Strip Based Media Retargeting via Combing Multi-Operators." It was jointly authored by Hao Wu, Jia Wang, Hongkai Xiong of the department of electronic engineering of Shanghai Jiao Tong University and the Key Laboratory of Digital Media Processing and Transmission in Shanghai. Here, Prof. Xiong (l) receives the award from Bill Meintel and John Cosmas.



This year's Scott Helt Memorial Award went to Yiyao Wu, Bo Rong, Khalil Salehian, and Gilles Gagnon for the paper entitled "Cloud transmission: A New Spectrum-Reuse Friendly Digital Terrestrial Broadcasting Transmission System." Here Yiyao (second from left) accepts the award as John Cosmas, Bill Meintel and Pablo Angueira offer their congratulations.



Brunel University's Carole Carr received special recognition for her assistance in connection with BMSB 2013.



Additional entertainment for the evening came from within the BTS ranks. Bill Hayes "just happened to have" his Steinberger Spirit guitar with him and demonstrated his musical abilities.



Brunel's Rebecca Byrne was also honoured by President Meintel for her help in organizing and coordinating conference activities.



After Bill had played through his repertoire, it was Rich Chernock's turn to entertain.



Although the official BMSB proceedings ended with the last technical session on Friday, associate editors were treated to a special all-day Saturday tour of London landmarks. These included the London Eye—the 443-foot high “Ferris Wheel” that provided some breathtaking views of the city.



The giant wheel carries 32 “capsules,” with each holding some 25 people. The ride lasts for about 30 minutes.



BTS members beam as they enjoy a bird's-eye view of London.



All good times have to come to an end eventually, but not after a hearty meal at a Greek restaurant not far from the Brunel campus and a lively bit of impromptu dancing.

Get the Most Out of Your Digital Radio Signal

By Paul Shulins
Director of Technical Operations
Greater Media Boston

BOSTON

When HD Radio was authorized a decade ago, it was immediately apparent that the coverage of the signal at 20 dB below the analog carrier did not come close to replicating the analog signal coverage in the real world. This problem became even more apparent when HD2 stations started popping up that had “nowhere to blend to” but instead just cut out abruptly.

In January 2010, the FCC produced a Report and Order allowing FM radio stations all over the United States to increase their power levels for HD Radio broadcasts. Basically, it was a blanket authorization for virtually every FM station to increase the power level of the HD signal by 6 dB or, in other words, quadruple the existing power.

The great thing about this ruling is that it does not require any application but simply an electronic notification to the FCC within 10 days of commencing, using digital notification on the FCC’s Consolidated Database System (CDBS). (A link to the CDBS is available at radioworld.com/links.)

The only exceptions are for “super-powered FM stations” that have different limitations. Interested broadcasters in that category can determine their potential by using the Audio Division’s Digital ERP calculator, also listed at the above URL.

But wait, there’s more! Power level increases beyond -14 dBc are possible in many cases, and in some up to -10 dBc. This is a 10-fold increase in power, which has been shown in field studies to pretty much replicate your existing analog coverage. In order to obtain this authorization, stations must make a simple calculation to determine the station’s maximum digital ERP as detailed in the R&O, then submit an application to the FCC in the form of an informal request.

After much input from broadcasters and manufacturers, this ruling is the FCC’s best effort to help broadcasters make the most of their HD Radio signals while taking responsible and reasonable precautions to prevent new interference to adjacent channels.

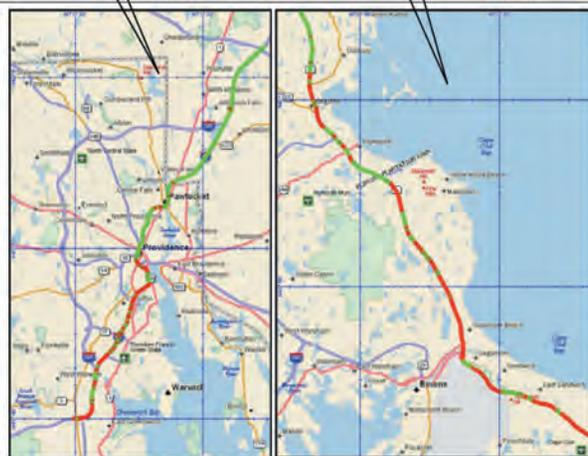
If you are broadcasting HD Radio signals and have not taken advantage of this rule, you

are not getting the most out of your license. Sure, upgrading your facility will cost money; but remember, this is our livelihood, it is what we do. Investing in HD Radio is investing in our future. Every other broadcast entertainment and information medium is digital, and radio must move forward with new technology to continue to compete. This rule allows us to do just that.

*The article was first published in **Radio World Engineering Extra** and is used by permission. We would like to thank that publication and NewBay Media for allowing us to include it in this issue of the **BTS Newsletter**.*



The map shows measured HD Radio coverage of FM station WKLB in Boston vs. predicted FCC protected contour with -14 dBc digital power.



COURTESY RUSS MUNDSCHEIN

Upcoming Events of Interest to BTS Members

- **Sept 12–17, 2013** – IBC 2013 Conference and Exhibition; Amsterdam, Netherlands
- **Sept 14, 2013** – BTS IBC AdCom meeting.
- **Sept 18–20, 2013** – NAB Radio Show; Orlando, Fla.
- **Oct 9–11, 2013** – Broadcast India Conference and Exhibition; Mumbai, India
- **Oct 9–11, 2013** – IEEE BTS Annual Broadcast Symposium; San Diego, Calif.
- **Oct 17–20, 2013** – Audio Engineering Society 135th Convention; New York
- **Oct 22–24, 2013** – SMPTE Technical Conference & Exhibition; Hollywood, Calif.
- **Oct 29–30, 2013** – Society of Broadcast Engineers National Meeting; Indianapolis, Ind.
- **Jan 7–10, 2014** – Consumer Electronics Show; Las Vegas, Nev.
- **Feb 17–21, 2014** – Hollywood Post Alliance (HPA) retreat; Indian Wells, Calif.
- **Feb 22–25, 2014** – NRB Convention & Exposition; Nashville, Tenn.
- **April 5–10, 2014** – NAB Show: Las Vegas, N.V.
- **June 25–27, 2014** – IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB); Beijing, China

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.



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Digital Radio in the United Kingdom – Part One

By Dave Bancroft



Dave Bancroft

*(Editor's note: While digital (HD or IBOC) radio has been available in the United States for some time now, there has been no official mandate issued for the discontinuation of analog radio broadcasting as there was for television transmissions. It's interesting to compare the transition to digital broadcasting as it exists in other countries. BTS AdCom member Dave Bancroft has provided us with a look at the digital radio situation as it exists today in the United Kingdom. This is the first installment of a two-part article and provides information on U.K. digital radio's history and implementation. The second part will be published in the Winter **BTS Newsletter** and will provide readers with information on the technical details of the U.K. digital radio standards used for transmission, as well as the author's personal experiences with digital radio reception.) We would like to express our appreciation to Dave for providing this insight into the U.K.'s shift to digital broadcasting.*

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Background

In 2005, the European Commission issued a communication¹ to the European Parliament and to EU member states on “accelerating the transition from analog to digital broadcasting...” and proposing that “. . . the beginning of 2012 be agreed for switch-off in all Member States.” As the representative of an EU member state, the British government drew up plans and legislation for such a process in the United Kingdom, covering both television and radio². Television switchover was completed pretty much on time, but radio, based primarily on the DAB system,^{3,4} turned out to be a more stubborn problem.

The government initially said that all major (*some smaller local stations and community stations would continue to broadcast via analog FM*) BBC and commercial FM radio station broadcasts were to be switched off by 2012 and replaced by a digital service, provided that national DAB coverage had become comparable to FM, with local DAB broadcasts reaching 90 percent of the population, as well as all major highways; and—crucially—that 50 percent of all radio listening had changed over to digital. This deadline initially slipped from 2012 to 2015, and now, instead of a setting a fixed date, the government only has to issue a two-year notice period for analog switch-off. In fact, digital penetration in 2013 as defined by listening percentage has so far grown to little more than one-third of all radio listening (34.3 percent in Q1 2013 according to the U.K. government). However the decree also allowed that if the listening threshold was not

reached, analog switch-off would be deferred until it was attained. 2019 now looks like the earliest possibility for this. There is a promotional and information organization for DAB in the United Kingdom, “Get Digital Radio” (<http://www.getdigitalradio.com/>) that was commissioned by the government, but is contracted out to the private sector.

Digital Radio in the United Kingdom

The platform for digital “radio listening” in the United Kingdom is for the most part the DAB terrestrial system, but “digital” in this context is also allowed to include other digital forms of radio reception, such as:

- radio stations on digital terrestrial multiplexes (sharing space with TV channels);
- radio stations similarly multiplexed on satellite direct-to-home TV broadcasts
- radio over the Internet (e.g. BBC iPlayer).

Note that there is no dedicated radio-only satellite service⁵ in the UK comparable to Sirius/XM, for example. All radio stations are free-to-air, supported either by a user-payable license fee (BBC channels) or by advertising; i.e. exactly the same as for FM and AM.

Digital Radio Reception Issues

With a fixed-location receiver connected to a rooftop antenna receiving a strong signal from a reasonably local transmitter, DAB reception is solid in all except the more sparsely-populated regions of the United Kingdom. However, radio reception today really needs to be more portable than ever, and of the above digital transmission methods, the only completely portable and relatively ubiquitous form is DAB. This is where the United Kingdom has some difficulties, principally expressed by the limited takeup by consumers, which can be ascribed to a number of factors:

- First, DAB radios are more expensive to purchase than their FM counterparts (approximately U.S. \$50 to \$300 equivalent in July 2013⁶). Despite some progress in silicon integration, this is mostly due to their increased parts count and complexity.
- Second, it is difficult to make DAB radios as portable as present-day FM receivers; they tend to be heavier due to the increased battery mass needed to power the more extensive circuitry. In fact, many DAB radios—other than those in cars—seem to stay in a fixed place at home, in the kitchen for instance, where they remain permanently plugged into an AC outlet and users can keep their long telescopic antennas optimally adjusted. The receivers may



The United Kingdom with lower DAB coverage areas corresponding approximately to yellow and brown shading on map).

Wales and the Scottish Borders and Highlands. Although the aggregate national coverage (for BBC stations) is currently around 93 percent,⁷ on a more localized basis (county or city) it can range from 0 to 100 percent, depending on the region within the United Kingdom and whether the receiver is stationary or mobile. The figures for reception of commercial DAB radio stations are even generally lower than for BBC stations, since these are repeated on fewer transmitters and/or with lower power.

This compares to something in excess of 97 percent for FM coverage. The BBC has plans to increase these figures,⁸ although this would still not be equivalent to current FM coverage. Comparison with the latter is in fact somewhat difficult, since the boundaries of the gradual analog reception rolloff in FM are less distinct than those arising in DAB from the “digital cliff” effect. However, it can be empirically stated that FM coverage in the United Kingdom is considered to be “complete,” while that of DAB remains incomplete. A particular difficulty for DAB in the United Kingdom is that its transmission frequencies (approximately 175 to 229 MHz) suffer greater attenuation through walls and other building structures than those of FM in the 87 to 108 MHz band. Prior to the DAB launch there had been no experience with consumer reception at the higher frequencies with portable devices indoors, as opposed to those connected to rooftop antennas. In the United Kingdom, DAB is broadcast as a set

of single frequency networks (a given content stream will always appear on the same named multiplex, or “ensemble” as it is called in DAB-speak, and this ensemble uses the same frequency wherever it is transmitted). This is beneficial up to a point, since multipath or multi-transmission reception can be constructive instead of destructive as it would be with FM. However, the “guard band” that allows multiple signals to reinforce each other represents a limited time window, which translates into locally-transmitted signals adding constructively, but signals transmitted from sites more than about

- Third, U.K. DAB transmission coverage, although improving, remains patchy, and is effectively absent from some mountainous and less-populated areas, such as central

46 miles away falling outside the local signal's guard band and becoming interference. Long term, there is talk of filling the reception gaps with DRM⁹, but no definite plans have been announced.

- Fourth, the United Kingdom committed early to the original version of DAB, not the later DAB+ version¹⁰ that some other European countries (and Australia), are adopting. The original version does not use MPEG Layer 3 (MP3) or a later compression codec, but instead uses the earlier technology MPEG Layer 2 (MP2), with less efficient coding. With the limited spectrum available (part of an old VHF band formerly used for 405-line television), the lower efficiency has meant a trade-off between the number of stations that can be squeezed in versus the audio quality.

Most DAB broadcasters have opted for quantity over quality, with bit rates as low as 64 kbps, and many only in monaural, although there is the one exception: the classical music channel BBC Radio 3 that uses 192 kbps. In the beginning, DAB had been marketed as having “CD quality.” This was swiftly challenged by the audio; in fact the audio quality of many stations is poorer than FM because of the combination of a limited bit-rate and DAB's relatively inefficient compression scheme¹¹ (assuming reasonable RF reception conditions in both cases), so there is something of a lobby here to “save our FM radio.”

There seems to be an unwillingness on the part of government regulators to consider abandoning DAB in favour of the more advanced DAB+, on the grounds that the existing DAB receiver population would be rendered obsolete, and because there is no free spectrum available for a DAB/DAB+ overlap period. However, the U.K. government has specified World DMB Profile 1¹² capability as mandatory in all new DAB receivers. This Profile states: “MPEG-4 HE AAC v2 decoding is mandatory,” as well as listing the MPEG layer 2 decoding used for DAB as being mandatory. This would seem to create a future opening for the compatible introduction of DAB+, which uses HE-AAC compression but has the same channel coding (but with more rugged error correction) and other transmission characteristics as DAB. In fact, a few of the newer DAB radios sold in the United Kingdom now include DAB+ reception capability, as it is now included in the newer chip sets. There is a successful precedent for migration to a better technology within an existing service: in the DVB terrestrial standard, new television sets and set-top boxes now have to be DVB-T2 compatible for HDTV services, as well as supporting the older DVB-T standard for SDTV, which renders the older DVB-T-only equipment obsolescent. A similar progression has occurred with the DVB-S standard migrating to DVB-S2 for satellite transmission).

- Fifth, the automobile industry has only recently started offering DAB radios in new vehicles. This delay may partly have been caused by the high-speed motion environment



Several companies are offering DAB digital consumer receivers, such as this Philips model, for sale in the United Kingdom.

causing a more drastic “cliff effect” on digital as compared to analog reception due to the limited transmitter coverage noted above. This delay may also be due to a lack of confidence in the regulators' reliability in forward planning (will DAB stay or be abandoned?) causing hesitation in such an investment. In spite of this, several new cars in 2013 are available with DAB radio, and in most regions it works fairly well. However, a large and lingering population of FM radios in cars persists and its owners would not take kindly to the imposition by the government of journeys in silence.

Future of AM Radio in the United Kingdom

The BBC continues to broadcast at least two of its national network channels on AM. For example, the Droitwich, Worcestershire transmitter broadcasts BBC Radio 4 at high power on long wave (198 kHz) and also medium wave. This is augmented by nine frequencies on other transmitters in the AM medium wave band; BBC Radio 5 also broadcasts in AM on two frequencies in the medium wave band, and there are several low-power local AM radio stations.

However it is not yet clear what the future holds for the U.K.'s AM radio transmissions; there is little mention of replacing AM in the U.K. government's planning documents. However, in what seems to some a retrograde step, a new consultation document on AM radio broadcasting¹³ has recently been issued by the same agency (Ofcom) that is regulating FM switch-off. However, far from discussing AM switch-off, this document invites “switch-on” proposals for some new AM services in the form of limited service area transmissions (10 km/6 mile radius) of “community radio” stations. (There is no mention of how the service area size constraint on a medium wave transmission would be maintained during hours of darkness other than by a transmitted power limitation.)

In the background there is some realization that the simplicity and ubiquity of reception of AM might render it advisable to maintain this service in some form for the

dissemination of public service messages in time of national or regional emergencies.

Conclusion

In good reception areas, DAB radio reception in the United Kingdom is solid and the sound quality is acceptable for most listeners (but not for discerning audiophiles). However the U.K.'s FM switch-off now looks as though it will be deferred to at least 2019 or beyond, due to insufficient consumer adoption of digital radio (DAB in particular), the additional factors described above, and possibly because no British administration would want to be the one that made millions of consumers' radios go silent, at home and in their cars.

Dave Bancroft is sole proprietor of Bancroft Technical Consulting, Reading, United Kingdom. Previously, he was with Thomson/Technicolor/Grass Valley, specializing in high-speed studio interfaces, digital cinematography, digital movie post-production and color management. Bancroft's prior experience includes engineering in the BBC, as well as engineering and marketing positions with RCA, Ampex and BTS/Philips. He is a member of the IEEE Broadcast Technology Society. He is also a Fellow member of the Royal Television Society, the SMPTE, and the BKSTS, and is also a Member of the IET. Bancroft also serves as an IEEE Distinguished Lecturer, specializing in professional reference monitors and in camera imaging, and is also active in these areas in SMPTE standardization work. He has published several works on television and movie production and postproduction.

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ITU Report

By David Guerra



Editor's Note: Following up on the recent appeals for editorial material from the **BTS Newsletter's** readers, David Guerra, an assistant professor in the department of electronics and telecommunications at Spain's University of the Basque Country, has agreed to provide us with a regular column on the latest developments at the International Telecommunications Union. (For those not familiar with the ITU, it is a Geneva, Switzerland-based agency of the United Nations that is responsible for coordinating the sharing of the radio frequency spectrum on a global basis, as well as working to develop communications infrastructures in developing nations, establishing worldwide telecommunication standards, and coordinating the location of communication satellites). David attends ITU-R meetings as a delegate of the University of the Basque Country. We welcome David aboard and are pleased to present his first column in this issue of the Newsletter. We thank him for volunteering to deliver ITU news and will be looking forward to his regular reports.

GENEVA

The International Telecommunications Union has recently published 2013 statistics regarding global information and communication technology (ICT) developments. Indicators such as mobile-cellular telephone subscriptions per 100 inhabitants, Internet use and the like are calculated on the basis of the information provided by national administrations of member states, which currently total almost 230.

Beginning with the largest figure—mobile/cellular telephone subscriptions—that number reached 6.8 billion this year, corresponding to a global penetration of 96 percent. The rate of adoption per has slowed to five percent during the past two years, down from about nine percent between 2005 and 2010.

Internet Penetration Continues to Grow

The reach of the Internet has widened so that it is now reaching almost 40 percent of the world's population and is maintaining a steady yearly growth of about three percent. It seems that the use of wired communications has definitely come to a standstill; however, there is a steady increase of less than one percent reported in fixed broadband subscriptions, which account for a quarter of the Internet use worldwide. It is not difficult to guess where the remainder of the activity is—mobile broadband use. The number of active mobile broadband subscriptions has increased by

more than seven percent since last year; the highest jump yet observed.

The figures provided offer additional insight when they are classified as to developing countries and developed countries. In the case of mobile/cellular subscriptions, there's a split percentage which reveals a value of 128 percent in the developed countries (indicating more than one subscription per person on average), and 89 percent in developing countries. The rate of increase has been similar in both cases during the last three years. The rate of increase is also similar in both categories for Internet use, with the percentage of individuals using the Internet at 30 percent in developing countries and 77 percent in developed nations. Again, mobile broadband subscriptions have taken the lead as regards increasing use of the Internet. Statistics show 20 active mobile broadband subscriptions per 100 inhabitants in developing countries vs. 75 per 100 in developed countries, with multimedia distribution one of the most demanded services on these networks. Internet traffic statistics indicate that the growth of Webcast traffic has roughly doubled in the past few years as a consequence of increasing broadband penetration and HD video content distribution.

Off-Site ITU Meeting Participation

I should note while I'm speaking about Webcasting applications that during the past year the ITU has made provision for remote participation in ITU meetings via the Internet. Now all plenary meetings of working parties are routinely audio Webcasted along with Web SharePoint facilities for document publishing. This will allow delegates to remotely participate in ongoing activities, saving travel expenses in this day and age of limited financial resources and travel budget reductions. I'm being carefully to use the future tense here, as full remote activity has not been provided just yet. Limitations do exist. For instance, working group meetings are not currently being Webcasted. And as regards interaction, Webcasting alone can't do the trick. If you wish to actively participate in a meeting on a remote basis, you will need to indicate it in your registration process and contact the chairperson of the group involved in order to arrange and organize your off-site participation. Proprietary software will then be provided that will allow you to take part in the meetings. However, thanks to the telecommunications we enjoy today, things are moving forward to allow participants to participate in meetings on telecommunications from remote locations.

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BTS Booth Kept Busy at BroadcastAsia 2103

By Huaqun Guo

SINGAPORE

BroadcastAsia 2013 was held this year on June 18–21 at the Marina Bay Sands, a new Singapore landmark, and attracted a record-breaking 16,679 attendees from broadcasting, film, pro-audio and live event industries with visitors coming from more than 90 countries and regions of the world.

IEEE BTS was represented at the show with a membership and information booth run by volunteers from the IEEE BTS Shanghai and Singapore chapters. The BTS booth was active during the entire event, providing information, membership application forms, IEEE publications and other literature about the IEEE and BTS. A large number of visitors from Sri Lanka and India visited the BTS booth this year and show attendees from Thailand, Cambodia, Vietnam, and Singapore also stopped by to request information about our organization. Also, several businesses, including AirTel and SingTel, expressed their interest in organizational affiliation. We signed up some international visitors for BTS membership at the booth at the special IEEE rate that's available for new members at trade shows. We had requests from a number of others for membership registration forms also, with recipients indicating strong interest in joining the IEEE and BTS.



BroadcastAsia 2013 was held at Marina Bay Sands in Singapore.

This year's BroadcastAsia event featured some 716 exhibitors from 45 countries showcasing the latest technologies including 4K video, Over-the-Top content, DVB-T2, digital media asset and cloud-based video management, and a number of other cutting-edge technologies.

The next BroadcastAsia event will take place June 17–20, 2014 at Marina Bay Sands in Singapore. For the latest information about the show, visit <http://www.broadcast-asia.com>.



IEEE BTS booth volunteers included (l-r) Xin Zhang, Jian Xiong, Claus Muschallik, Huaqun Guo and Jie Chen.

A New Methodology for Evaluating the Color Spectrum of Artificial Lighting

By Quan Ou

Editor's note: BTS members attending this year's NAB Show may have had the opportunity to meet Ms. Ou and to "receive a demo of the crystal light detector" described in this article. This very simple, but effective, means of quickly evaluating the color spectrum of an artificial light source is quite ingenious, as it's self-contained, requires no power source, reacts almost instantaneously to different lighting conditions, and is rather inexpensive to manufacture and own. This article is not presented as a commercial endorsement of the product, but rather to provide some technical information about the device and its uses.

Nowadays, more and more public places and private homes have changed to CFLs (Compact Fluorescent Lamps) to save electrical energy. There are many types of CFLs available, including those that produce light at 2,700, 3,000, 5,500, and 6,100 K. Those producing 3,000 K illumination can mimic the warmth of incandescent light sources and a 2,700 K CFL appears even warmer.

In fact, the human visual system often cannot detect the difference between the warm-toned CFLs and incandescent lamps. This creates problem when shooting photographs or creating video content. The warm-toned fluorescent light may fool our eyes, but it doesn't fool the camera.

What You See Isn't Always What You Get

Pictures or video shot under warm-toned fluorescent lighting conditions can come out with green-yellowish tones, and colors often appear to be washed out. Even with Photoshop and powerful video color correction software to fix it in post, colors still don't come out exactly as they should.

The problem stems from the illumination provided by ordinary fluorescent lights. Such lights have special color temperatures that make it difficult to use a color filter to try and balance it. More importantly, ordinary fluorescent tubes do not provide a "full-spectrum" light source and thus do a relatively poor job of rendering colors when compared to the spectrum generated by incandescent lamps.

For many years, people have incorrectly believed that photo and video color are only decided by the color temperature of the light source—the thinking has been that as long as you match the color filter with the light source the results will be okay.

Actually, that's only a part of the story, as the nature of the color spectrum plays a larger role in color rendition.

The fluorescent lighting industry has long known about the missing color spectrum issue and uses a color rendering index (CRI) to measure how accurately a light source will render different portions of the color spectrum. A CRI value of 100 is assigned when an object's color looks exactly the same as it does when illuminated by a natural light source. Commonly used fluorescent light (and CFLs) only have a CRI rating of 60–70.

To overcome the gaps in the spectrum provided by fluorescent fixtures the fluorescent light industry now produces a special kind of fluorescent tube termed the "full spectrum" fluorescent light (which has a CRI of 90 or better) for critical applications such as use in galleries, art studios, trade show centers, color product showrooms and other businesses that want a light source that mimics natural daylight illumination.

In order to shoot better color pictures or video, we need to avoid non-full spectrum lights (especially ordinary

fluorescent lamps) as much as possible. However, a problem lies with the fact that the human eye can't easily tell when illumination is missing spectral components. (In other words, the eye isn't especially sensitive to gaps in the visible light spectrum.)

Camera Operators Have to Be Vigilant

A special problem for cameramen are the warm toned (2,700 and 3,000 K) CFLs that the lighting industry terms "soft white." These lights usually look visually the same as incandescent lamps, causing many photographers and videographers to use the wrong filtration and delivering images with incorrect colors. A problem exists in easily making the human eye aware of the missing spectrum components in artificial lighting sources.

To remedy this, a "crystal" light detector has been developed that can easily spot gaps in the lighting spectrum. It's based on a crystal that changes color in different lighting conditions and is especially useful for fast moving camerapersons, alerting them



Figure 1. The crystal light detector as it appears under natural lighting conditions.



Figure 2. The detector as it appears when viewed under ordinary incandescent lighting.



Figure 3. The detector under fluorescent illumination.

to changing lighting conditions and allowing them to change camera settings accordingly.

Under daylight or full spectrum conditions, the crystal appears purple, as its reflecting the blue-red portion of the full white spectrum.

Under incandescent light, it appears lavender, as this light emphasizes the color red in the visible light spectrum.

When exposed to fluorescent illumination the crystal rather dramatically loses its color, become clear almost instantly. This is due to the absence of red and blue (purple) in the spectrum produced by most fluorescent lighting instruments.

The crystal light detector is made from laboratory grade borosilicate glass composed mainly of silica and boric oxide, along with smaller amounts of sodium, potassium and aluminum oxides. The color changing characteristic is mainly due to the inclusion of minute amounts of vanadium and chromium, along with some other elements.

The crystal light detector is available as a camera pendant, for key chains, and as jewelry (necklaces and bracelets) for reporters and camera crews. Observing the crystal's color allows news crews to quickly find "good" spots for their "stand-ups." If a correctly lighted position is not readily available, then camera operators can take steps to try and correct for the deficit by white balancing, adding filtration or supplying supplementary lighting.

More information about the crystal light detector product may be found at www.etsy.com/shop/lightsdetect.

Quan Ou graduated from the Beijing University of Posts and Telecommunications in 1982 with a BSEE degree. Ou received an MFA degree in TV production from Brooklyn College in 1989 and taught television post-production at that institution from 1988 through 1995. Ou is currently the post-production manager at the City University of New York's CUNY 75 cable television outlet. Ou is a four-time Emmy Award nominee.

ITU Report

continued from page 19

Over-the-Air Television Broadcasting Still Has a Place

After these comments on Webcasting, this report would not be complete without mentioning its original precursor—broadcasting. One might be tempted to overlook broadcasting as regards the ICT statistics published by the ITU. After all, in the main charts, the only indicator related to broadcasting included is the "percentage of households with a TV," which is not the most outstanding one, as it doesn't hold the highest figure, 79 percent worldwide, nor has it undergone a remarkable rate of increase worldwide—rising only about five percent from 2003 to 2010. However, if we take a closer look at the numbers and split the data into entries from the "developed" countries and "developing" countries, a new insight emerges.

In developed countries the proportion of households with a television set is almost 100 percent, a figure that's really quite difficult to take much higher. This number is far above the 77 percent of households with Internet access in Europe (the highest figure among the regions), followed by the Americas with 61 percent, and the Commonwealth of

Independent States with 46 percent. The percentage of individuals using the Internet follows a similar pattern.

At the other end of the list, the proportion of households with a TV set in developing countries ranges from a low of five percent to almost 100 percent, with the highest rates of increase coming from countries with lowest penetration figures. This behavior is very similar to that observed for Internet access in Africa, where some seven percent of households have access and the rate of penetration is increasing rapidly.

This shows that a device primarily used for reception of video broadcasting is already available in half of the world's households, and that the rate of penetration in the other half is rapidly rising, with established video broadcasting technologies delivering video services to global audiences better than the more recent Web-based technologies. So, although not as trendy as the latter, broadcasting technologies are there and so is the audience. Let's make the best of it both methodologies!

David Guerra

IEEE 2015 Fellow Grade Nominations Are Now Open

Nominations for the IEEE Fellows Class of 2015 are now being accepted. Members are encouraged to nominate a colleague, co-worker or friend whose career and body of work would make that person eligible for elevation to the IEEE Fellow grade. Online application is available, as are all the necessary forms. The cutoff date for nominations is March 1, 2014.

IEEE Fellow status 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. Only one-tenth of one percent of the total IEEE voting membership—excluding students and associates—may be selected for this honor each year.

Candidates must have made an outstanding contribution to the electrical and electronics engineering profession, and may have worked in any field, including academia, government, and industry, provided they meet the following requirements at the time of nomination:

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

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 members.

Nomination Forms are Essential

The nomination process is initiated by filling out a nomination form. Accurate information is a must at this step of the process. The nominator needs to ascertain that the nominee meets all requirements, and then must provide names of the individuals who will support the nomination. The nominator must also explain why the nominee's contributions are worthy of this honor. To ensure that the form is correctly completed, the following checklist should be followed carefully:

- **Nominate before 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.

- **Use the correct forms** – As nominations must be submitted on-line, this shouldn't be a problem. However, up-to-date printable forms are available on the IEEE Fellow Website for planning purposes. Be sure that any forms you use are current.

- **Make sure the nominee is eligible for nomination** – The nominee must meet all of the requirements listed above. Don't assume that your nominee holds the correct member grade, is in good standing, or meets the minimum membership requirements. All forms are checked thoroughly, with automatic rejection of candidates that do not meet requirements.

- **Pay special attention to the spelling of the nominee's name** – Sometimes nominees' names are misspelled and/or first and last names are transposed. Also give extra attention to international names with special characters and/or hyphenated names. Names have to match those as recorded in the IEEE membership database.

- **Check eligibility of references as explained above** – Please make sure that your references do not currently serve on boards or committees that would make them ineligible to support the nomination. Also, nominators are strongly encouraged to solicit the maximum of eight references rather than minimum of five.

- **Listing endorsers on the nomination form** – When entering the name of an endorser, input the last name, first name and email address in the appropriate fields. If you are entering the name of a society, corporation, chapter or region, input the information in the "organization name" field and leave the "first name" field blank, then enter the email address for the contact issuing the endorsement.

- **Entering Email addresses** – Input only a single email address for references and/or endorsers. Entering multiple email addresses causes system errors.

- **Nominating candidates that are self-employed or retired** – Do not enter anything in the "organization's name" field.

- **Proposed citation** – This should always begin with the word "for"; e.g. *for* contributions to...; *for* the development of....

- **Keep a printout of your nomination** – Prior to submitting the nomination form, remember to hit the printable version button and print a copy of the completed nomination form for your records.

Complete information on nominating candidates for IEEE Fellow grade is available at the Fellow Website, <http://www.ieee.org/fellows>.

Letters to the Editor

Female Engineers

Editor,

I read with interest the **BTS Newsletter** article “Shining a Spotlight on Female Engineers,” as I’d [recently] watched a TV documentary on the U.S. military recruitment of high achieving female college graduates with degrees in mathematics during World War II.

Men were, of course, serving in combat. These women were recruited to develop algorithms and computer codes to predict the proper aiming of artillery, given weather conditions at the site. A launcher and shell are useless without the book which details the proper azimuth and elevation angle to be set given a target.

The computer of the day consisted of hundreds of vacuum tubes, mechanical rollers, pulleys, and the like which required constant adjustment. The latter task was mostly performed by men crawling under the large tables, etc. A large part of the story focused on a demonstration in Virginia of the computer predicted landing spot of an artillery shell versus its actual landing spot. On the first run it failed miserably. There was one woman who had a knack for studying a failure and coming in the next morning with a solution. She set some switches in a different position, placed a patch cord in a different jack and the shell landed within inches of the predicted location.

To celebrate the accuracy of this invention a dinner was held. All of the male military brass involved in the project was there. Despite the fact that females wrote the equations and the computer code, none were invited to the dinner nor mentioned in the prepared written program handout sheet.

I thought this to be very educational and very sad at the same time.

Tom Osenkowsky
Senior Member, IEEE
BTS Member

EAS Again

Editor,

The Summer **BST Newsletter** arrived with your editorial mentioning EAS and the state of AM broadcasting today.

I too agree that we need to stop fixing what is broken. An untested system is a useless system. One end-to-end test in 62 years does not constitute a working system.

The national system has been at the “ready” for 62 years in one form or another, waiting for a “message” [to transmit]. All that’s in place is a waste of effort with a system that over and over has had “messages” bypass it.

CNN does a good job in news event reporting—it should be called the nation’s alert channel. It covered the Boston event right down to capture of last suspect.

The existing alert system should be laid to rest. Alerts over cell phone will reach more [persons] than broadcasts.

Terrestrial radio broadcasting is coming to an end. At some point it’s going to be a real estate deal, as AM’s find it better to sell off antenna land and close down than continue broadcasting.

Once Wi-Fi hot spots are available for cars the terrestrial radio folks are done for. The debtor corporations will be left are holding a bag with a dead cat inside. When they can’t find infomercials to air the party will be over.

Warren Shulz
Retired terrestrial radio broadcast engineer
Griffith, Ind.

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.



Be sure to Attend!

All broadcast engineering professionals should plan to attend the IEEE Broadcast Symposium being held Oct. 9-11, 2013 in San Diego, Ca. This annual event is produced by the organization's Broadcast Technology Society and is the pre-eminent conference in this field.

The three-day event will feature radio and television tutorials along with technical presentations covering such topics as RF infrastructure, network distribution, Mobile DTV, HD radio, connected TV, antennas, RF measurement techniques and more. Broadcast experts from around the world will be making these presentations and continuing Education Units (CEUs) needed to maintain professional engineering certification will be available in connection with symposium sessions.

In addition to technical presentations, attendees will have the opportunity to network and socialize at evening receptions and industry luncheons.

Plan now to attend this important broadcast engineering event, which is now in its 63rd year. The Broadcast Symposium will be held in the Westgate Hotel located just minutes from the beautiful Gaslamp Quarter, with easy access to and from San Diego International Airport.

For details about the conference, visit the Broadcast Symposium Web site:
<http://bts.ieee.org/broadcastsymposium/>

For more information about the IEEE Broadcast Technology Society, visit our Web site:
bts.ieee.org



Tsinghua University

IEEE International Symposium on Broadband Multimedia Systems and Broadcasting

June 11th – 13th, 2014, Beijing, China

<http://www.bts.ieee.org>

The IEEE International Symposium on Broadband Multimedia Systems and Broadcasting 2014, the 9th in the series, will be held in Beijing, China. The symposium is the premier forum for the presentation and exchange of technical advances in the rapidly converging areas of multimedia broadcasting, telecommunications, consumer electronics, and networking technologies.

<p>General Chair</p> <ul style="list-style-type: none"> Jian Song, Tsinghua Univ., China <p>General Co-Chairs</p> <ul style="list-style-type: none"> Pablo Angueira, Univ. of Basque Country, Spain Albert Heuberger, Fraunhofer Institute II Ulrich Reimers, Tech. Univ. of Braunschweig, Germany Yiyang Wu, Comm Research Centre Canada Feng Zou, Academy of Broadcasting Science, SARFT, China <p>Technical Program Chairs</p> <ul style="list-style-type: none"> Jintao Wang, Tsinghua Univ., China Byeungwoo Jeon, Sungkyunkwan Univ., Korea Bo Ai, Beijing Jiaotong Univ., China Namho Hur, ETRI, Korea Amaia Arrinda, Univ. of Basque Country, Spain Christian Foster, Univ. of Erlangen-Nürnberg, Germany Jian Xiong, Shanghai Jiaotong Univ., China Demin Wang, Comm. Research Centre, Canada Tao Jiang, Huazhong Univ. of Science Technology, China <p>Financial Chairs</p> <ul style="list-style-type: none"> Amanda Temple, IEEE - BTS; Shaoyuan Wu, CYTS, China 	<p>The symposium seeks technical papers on the following topics:</p> <table border="0"> <tr> <td style="vertical-align: top;"> <p>1. Multimedia systems and services</p> <ul style="list-style-type: none"> 1.1 Mobile TV 1.2 IPTV & Internet TV 1.3 DTV and broadband multimedia systems 1.4 VoD, interactivity, datacasting 1.5 Field trials and test results 1.6 Content management 1.7 Service deployments 1.8 Future services of Broadcasting <p>2. Multimedia devices</p> <ul style="list-style-type: none"> 2.1 Display technology 2.2 Acquisition technology 2.3 Set-top box and home networking 2.4 Mobile, portable, and handheld devices 2.5 Program guides and navigation 2.6 New human-device Interaction <p>3. Multimedia quality: Performance evaluation</p> <ul style="list-style-type: none"> 3.1 Performance evaluation 3.2 Objective evaluation techniques 3.3 Subjective evaluation techniques </td> <td style="vertical-align: top;"> <p>4. Multimedia processing</p> <ul style="list-style-type: none"> 4.1 Audio technology 4.2 Video coding and processing 4.3 Content adaptation and scaling 4.4 Error resilient and concealment 4.5 Rate control 4.6 Retrieval and indexing 4.7 3-D and multi-view video 4.8 Content protection and watermarking <p>5. Transmission and networking</p> <ul style="list-style-type: none"> 5.1 Channel modelling and simulation 5.2 Channel coding, modulation, multiplexing 5.3 Signal processing for transmission 5.4 Propagation and coverage 5.5 Congestion control 5.6 Traffic and performance monitoring 5.7 Networking and QoS 5.8 Next generation of Broadcasting system </td> </tr> </table>	<p>1. Multimedia systems and services</p> <ul style="list-style-type: none"> 1.1 Mobile TV 1.2 IPTV & Internet TV 1.3 DTV and broadband multimedia systems 1.4 VoD, interactivity, datacasting 1.5 Field trials and test results 1.6 Content management 1.7 Service deployments 1.8 Future services of Broadcasting <p>2. Multimedia devices</p> <ul style="list-style-type: none"> 2.1 Display technology 2.2 Acquisition technology 2.3 Set-top box and home networking 2.4 Mobile, portable, and handheld devices 2.5 Program guides and navigation 2.6 New human-device Interaction <p>3. Multimedia quality: Performance evaluation</p> <ul style="list-style-type: none"> 3.1 Performance evaluation 3.2 Objective evaluation techniques 3.3 Subjective evaluation techniques 	<p>4. Multimedia processing</p> <ul style="list-style-type: none"> 4.1 Audio technology 4.2 Video coding and processing 4.3 Content adaptation and scaling 4.4 Error resilient and concealment 4.5 Rate control 4.6 Retrieval and indexing 4.7 3-D and multi-view video 4.8 Content protection and watermarking <p>5. Transmission and networking</p> <ul style="list-style-type: none"> 5.1 Channel modelling and simulation 5.2 Channel coding, modulation, multiplexing 5.3 Signal processing for transmission 5.4 Propagation and coverage 5.5 Congestion control 5.6 Traffic and performance monitoring 5.7 Networking and QoS 5.8 Next generation of Broadcasting system
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	<p>Prospective authors are invited to submit extended abstracts of about 1000 words by e-mail to btsbmsb@ieee.org. Each abstract must include at least two key words chosen from the topics mentioned above.</p> <p>Please indicate that the abstract is submitted to the IEEE International Symposium on Broadband Multimedia Systems and Broadcasting 2014, and include the corresponding author's full name and contact information including: Affiliation, address, e-mail and phone number.</p> <p>Important dates: Submission of extended abstracts: December 16th, 2013 Notification of acceptance: February 28th, 2014 Submission of camera-ready paper: April 25th, 2014</p>		

All inquiries to jsong@tsinghua.edu.cn

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Angueira, Pablo Bilbao
Engineering College
Bilbao, Spain
jtpanbup@bi.ehu.es

Di Lapi, Christine
The MITRE Corporation
McLean, VA
cdilapi@mitre.org

Joseph, Wout
Ghent University
Gent, Belgium
Wout.joseph@intec.UGent.be

Shulins, Paul
Greater MediaBoston, MA
PShulins@
greatermediaboston.com

Williams, Edmund A.
Consulting Engineer
The Villages, FL
ed.williams@ieee.org

Bancroft, Dave
Caversham, United Kingdom
dave@bancroft.tv

Einolf, Charles
Consulting Engineer
Mitchellville, MD
c.einolf@ieee.org

Luplow, Wayne
Zenith R&D Lab
Lincolnshire, IL
wayne.luplow@zenith.com

Silliman, Thomas
Electronics Research, Inc.
Chandler, IN
tom@eriinc.com

Wu, Yiyan
Communications Research Ctr.
Station H, Ottawa, Ontario
Canada
yiyan.wu@crc.ca

Best, Greg
Greg Best Consulting, Inc.
Kansas City, MO
gbconsulting@kc.rr.com

Fang, James
Consulting Engineer
Wakefield, MA
james.fang@ieee.org

Meintel, William
Meintel, Sgrignoli & Wallace
Warrentown, VA
wmeintel@computer.org

Song, Jian
Beijing, China
jsong@tsinghua.edu.cn

Publications Administrator
Jennifer Barbato
Broadcast Technology Society
445 Hoes Lane
Piscataway, NJ USA 08854
tel: 732 562 3905
j.barbato@ieee.org
bt-pubs@ieee.org

Bennett, Michael
mikebennett@supanet.com

Friedel, Richard
Fox Broadcasting
Los Angeles, CA
richardfr@fox.com

Miller, William
New Rochelle, NY
millerwc@optonline.net

Surette, Robert
Shively Labs
Bridgeton, ME
bsurette@shively.com

Technical Community Program Specialist
Amy Reeder
Broadcast Technology Society
445 Hoes Lane
Piscataway, NJ 08854
tel: 732 562 5416
a.reeder@ieee.org

Bouchard, Guy
CBC Radio
Montreal, Canada
Guy_Bouchard@ieee.org

Gurley, Thomas M.
Consulting Engineer
Rocky Mount, NC
tgurley@ieee.org

Nass, E. Lanny
CBS Corporation
Washington, DC
elnass@cbs.com

Trainotti, Valentin
University of Buenos Aires
Buenos Aires, Argentina
vtrainotti@ieee.org

Wandel, Eric R., P.E.
Wavepoint Research, Inc.
Newburgh, IN 47630
eric@wavepointresearch.com

Chernock, Rich
Triveni Digital
Princeton, NJ
rchernock@
TriveniDigital.com

Hayes, William T.
Iowa Public Television
Johnston, IA
Hayes@iptv.org

O'Neal, James E.
Alexandria, VA
btseditor@aol.com
crml14j@verison.net

Weiss, S. Merrill
Merrill Weiss Group LLC
Metuchen, NJ
merrill@mwgrp.com

Clout, Peter
Los Alamos, NM
clout@vista-control.com

Hirakawa, Shuji
Toshiba Corporation
Tokyo, Japan
shuji.hirakawa@toshiba.co.jp

Plummer, Robert
Consulting Engineer
Seattle, WA
bob@plummers.us

Cox, Tom
Escondido, CA
tomcox@clearchannel.com

Hogan, Ralph R.
Rio Salado College
Tempe, AZ
rhogan@ieee.org

Rodriguez, Bilardo, Marisabel
Buenos Aires, Argentina
marisabel@ieee.org

Weller, Robert
Federal Communications
Commission
Bob@weller.org

Dawson, Benjamin
Seattle, WA
dawson@hatdaw.com

Institute of Electrical and Electronics Engineers, Inc.
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08854-1331

BTS Business

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Phone Number

We have a telephone number that's dedicated for IEEE BTS business:

732-562-6061.

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