



BTS

**IEEE Broadcast
Technology
Society**



2014 IEEE Broadcast Symposium Technical Program

**15 –17 October 2014
Hilton Palacio del Rio
San Antonio, TX, USA**

For more information about the
IEEE Broadcast Technology Society
please visit us on the web at:
bts.ieee.org



Welcome Message from the Symposium Chairs

Fellow Broadcast Technology Professional,

On behalf of the IEEE Broadcast Technology Society and Symposium Technical Program Committee Guy Bouchard and I would like to welcome you to the 2014 IEEE Broadcast Symposium here in the heart of San Antonio at the beautiful Hilton Palacio del Rio. Guy and I are co-chairing this year's symposium and have worked with the Symposium Technical Program Committee to put together a comprehensive list of sessions that are relevant to the present and future concerns of broadcasters. All 3 days of the symposium are jam packed with technical content covering RF, Baseband, Digital audio, Green Energy, Future TV technology, Safety, Regulatory and more. Keynote speakers from various industries such as Tower Worker Safety, Connected Vehicle Communications and Green Energy will provide a broad range of interesting technical content for lunch. Guy and I are honored to serve as Co-Chairs of this year's IEEE Broadcast Symposium. We would like to extend our heartfelt gratitude to all of our sponsors for their dedicated commitment to this event.

Please enjoy, and we hope to see you in 2015 in Orlando, Florida!

Roswell Clark and Guy Bouchard



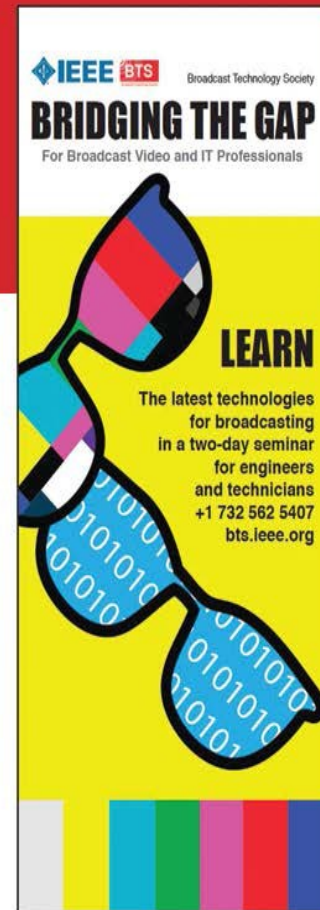
BROADCAST TECHNOLOGY SOCIETY

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

MEMBERSHIP BENEFITS:

- Access to Society Publications
- Worldwide Chapters
- Support of IEEE Standards
- Annual Broadcast Symposium
- Annual Broadband Multimedia Symposium
- Awards and Recognition
- Cutting Edge Training for Broadcast Engineers and Technicians

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MISSION: The mission of the BTS is to serve its members by helping them maintain and enhance their technical proficiency and professional standing through the activities of the Society and its chapters worldwide.




IEEE International Symposium on Broadband Multimedia Systems and Broadcasting

June 17th – 19th, 2015, Ghent, Belgium

<http://www.bts.ieee.org>
<http://www.wica.intec.ugent.be/bmsb2015/>

The IEEE International Symposium on Broadband Multimedia Systems and Broadcasting 2015, the 10th in the series, will be held in Ghent, Belgium. 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"> Wout Joseph, Ghent University/iMinds, Belgium <p>General Co-Chair & International Steering CMTT:</p> <ul style="list-style-type: none"> Pablo Angueira, U. of Basque Country, Spain Bill Hayes, Iowa Public TV, USA Albert Heuberger, Fraunhofer IIS, Germany Shuji Hirakawa, Toshiba, Japan Namho Hur, ETRI, Korea Luc Martens, Ghent University/iMinds, Belgium David Plets, Ghent University/iMinds, Belgium Peter Seibert, DVB, Switzerland Ulrich Reimers, TU Braunschweig, Germany Jian Song, Tsinghua Univ., China Yiyan Wu, IEEE BTS/CRC, Canada Wenjun Zhang, Shanghai Jiaotong U., China <p>Technical Program Co-Chairs:</p> <ul style="list-style-type: none"> Amalia Arrinda, Univ. of Basque Country, Spain Sung-Ik Park, ETRI, Korea David Plets, Ghent University/iMinds, Belgium Demin Wang, CRC, Canada Jintao Wang, Tsinghua Univ., China Jian Xiong, Shanghai Jiaotong Univ., China Yue Zhang, Univ. of Bedfordshire, UK Ce Zhu, U. Electronics Sci. and Tech., China <p>Financial Chairs:</p> <ul style="list-style-type: none"> Amanda Temple, IEEE BTS, USA Isabelle Van der Elstraeten, Ghent University/iMinds, Belgium Joke Staelens, Ghent Univ./iMinds, Belgium | <p>The symposium seeks technical papers on the following topics:</p> <table border="1"> <tr> <td data-bbox="451 540 741 784"> <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 technologies and services of broadcasting </td><td data-bbox="741 540 1005 751"> <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 </td></tr> <tr> <td data-bbox="451 800 741 963"> <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 </td><td data-bbox="741 760 1005 1060"> <p>5. Transmission and networking</p> <ul style="list-style-type: none"> 5.1 Channel modelling & 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 5.9 Convergence of broadcasting and Broadband Wireless </td></tr> <tr> <td data-bbox="451 979 741 1109"> <p>3. Multimedia quality and content:</p> <ul style="list-style-type: none"> 3.1 Performance evaluation 3.2 Objective evaluation techniques 3.3 Subjective evaluation techniques 3.4 Audience measurement and behavior study </td><td></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 technologies and services of broadcasting | <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>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>5. Transmission and networking</p> <ul style="list-style-type: none"> 5.1 Channel modelling & 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 5.9 Convergence of broadcasting and Broadband Wireless | <p>3. Multimedia quality and content:</p> <ul style="list-style-type: none"> 3.1 Performance evaluation 3.2 Objective evaluation techniques 3.3 Subjective evaluation techniques 3.4 Audience measurement and behavior study | |
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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 2015, 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 18th, 2014 Notification of acceptance: March 2nd, 2015 Submission of camera-ready paper: April 26th, 2015</p> | | | | | | |

All inquiries to wout.joseph@intec.ugent.be

IEEE Broadcast Technology Society President

William Meintel - Meintel, Sgrignoli & Wallace, USA

IEEE Broadcast Technology Society Awards Chair

Guy Bouchard - CBC Radio, Canada

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 Roz Clark - Cox Media, USA

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 Eric Wandel - Wavepoint Research, Inc, USA
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BTS Staff

Amanda Temple
 Amy Reeder
 Jennifer Barbato

Wednesday, 15 October 2014

Morning Session

**Tutorial— In-plant broadcast distribution
infrastructure in a 4K 8K landscape**

Session Chair - Guy Bouchard, CBC
Radio, Canada

8:30AM - Tutorial - Where are we going? A discussion on the evolution of the broadcast networking requirements and the impact on plant architecture—Guy Bouchard, CBC Radio

9:00AM - Evolution of the SDI standards and it's impact Distribution Infrastructure - John Hudson, Semtech, SMPTE

9:30AM - In-plant Distribution infrastructure considerations for future television plant - Sara Kudrle, Grass Valley, a Belden Brand

10:00AM-10:15AM-BREAK

10:15AM - Copper/Fiber wiring/ interface considerations for in plant super high speed networks - Michael Masucci, Belden

10:45AM—Mixed Fiber/coax plant interface considerations - Sarkis Abrahamian, Embrionix

11:15AM - Joint task force on networked media, an update on the JTNM process and broadcast evolution strategies - Brad Gilmer, JTFNM

11:45AM - Panel Q&A

**SAVE THE DATE!!!**

All broadcast engineering professionals should plan to attend the IEEE Broadcast Symposium next year being held Oct. 14-16, 2015 in Orlando, FL. This annual event is produced by the organization's Broadcast Technology Society and is the pre-eminent conference in this field.

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 will be its 65th year. The Broadcast Symposium will be held in the Caribe Royal Hotel, with easy access to and from Orlando Airport.

Details will be posted soon 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

Thank you to all of the 2014 Sponsors!

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Wednesday Afternoon RF Exposure Safety Session Sponsor:



Friday Breakfast Sponsor:



Friday Award Luncheon Sponsor:



Wednesday Lunch Keynote

Tower Safety

**Keynote Speakers– Tom Silliman ,ERI , USA
and
Kathy Stieler, ERI, USA**



Biography **Tom Silliman** attended Cornell University graduating in 1969 with a Bachelors of Electrical Engineering, and Tom received his Master of Engineering (Electrical) from Cornell in 1970. After graduating, Tom went to work at Electronics Research as Director of Engineering. Tom is currently the President of Electronics Research. Tom is a registered Professional Engineer in the field of Electrical Engineering, and Tom is currently registered in three states. Tom is a two term past president of the Association of Federal Communications Consulting Engineers (AFCCE). Currently, Tom is the secretary of the IEEE Broadcast

Technology Society as well as a board member for Tri-State Public Radio and TV in Evansville, Indiana. Tom is a Fellow of the IEEE and the 2008 recipient of the NAB Engineering Achievement Award for Radio.

Biography **Kathy Stieler** is the Director of Installations and Safety for Electronics Research, Inc. located in Chandler, Indiana. Kathy is relatively new to the



Telecommunications Industry, just 3 years, but she has over 35 years of experience in the construction industry, with her focus on construction project management, safety, and risk management. Kathy has been an OSHA Authorized Outreach Trainer for Construction since 1991. Her initial training responsibility was with the Local 16 IBEW/NECA Joint Apprenticeship and Training Committee and was responsible for training the OSHA 10 course to all 700 members of the union. Kathy has focused her career on her safety efforts. She was a member of the ANSI A10 Committee for Construction and

Demolition Operations for 10 years, and is currently a member of the ANSI A10.33 Committee; Safety and health Program Requirements for Multi-Employer Worksites; and ANSI A10.48, the new Telecommunications Standard Committee. Kathy's reputation for effective safety programs is well-known throughout Evansville and on a national level that awarded her company Superior Corporate Safety Excellence from the Business Roundtable Construction Industry, and recognition in the National Electrical Contractors Magazine for an effective corporate safety program. Kathy holds a Bachelor of Science degree from Purdue University – School of Management.

Wednesday, 15 October 2014

Afternoon Session

Tutorial - RF Exposure Safety Standards, Practices and Regulations



Session Chair - Robert Cleveland, EMF Consulting, USA

2:00PM - Opening Remarks, Robert Cleveland

2:05PM - Standards of IEEE International Committee on Electromagnetic Safety (ICES) - C.K. Chou, Chairman of ICES TC95

2:40PM - FCC Policy on RF Exposure - Martin Doczkat, Federal Communications Commission (FCC)

3:20PM - 3:35PM - BREAK

3:35PM - Practical Considerations - Robert D. Weller, P.E., VP for Spectrum Policy, NAB, Member of ICES

4:15PM - Examples of RF Exposure Problems - J. Hatfield, Hatfield and Dawson Consulting, Member of ICES

5:00PM - Panel Q & A - All Presenters

6:00PM - Welcome Reception

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General Sponsors:



Manufacturer's Reception:



Thursday, 16 October 2014
Morning Session
Regulatory Issues



Session Chair - Tom Silliman, ERI USA

8:30AM - Opening Remarks , Roz Clark & Guy Bouchard

8:45AM - ITU/WRC issues impacting international broadcast spectrum - Christine DiLapi, Exelis Inc

9:00AM - Update on: U. S. spectrum issues / spectrum auction / repacking - Bill Meintel, Meintel, Sgrignoli & Wallace

9:30AM - Potential Interference to C-Band Broadcast receive systems by newly proposed IMT Mobile devices operating in the 3.6 GHz band - Guy Bouchard, CBC Radio

10:15AM - Comparative Field Tests of DVB-T2 and ATSC, Kelly Williams, NAB

10:30AM - 10:45AM - BREAK

Thursday, 16 October 2014
Morning Session (cont'd)
Green Energy for Broadcast



Session Chair - Roswell Clark, Cox
Media Group, USA

10:45AM - LED High Intensity Strobe Systems - Les
Kutasi, Dialight

11:15AM - Crest Factor Reduction - Tim Anderson,
GatesAir

11:45AM - Modulation dependant Carrier Control - Cris
Alexander, Crawford, presented by Ben Dawson, Hatfield
and Dawson Consulting

Friday, 17 October 2014
Afternoon Session
Session on Future Broadcast TV Technology



Session Chair - Rich Chernock,
Triveni Digital, USA

2:00PM - ATSC 3.0 Overview - Rich Chernock, Triveni
Digital

2:30PM - Progress on ATSC 3.0 Physical Layer - Luke
Fay, Sony

3:00PM - 3:15PM - BREAK

3:15PM - Overview on the Transport/Management Layer
- Charles Lo, Qualcomm Inc.

3:45PM - Applications and Presentation Layer - Madeline
Noland, LG Electronics

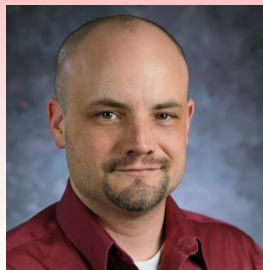
4:15PM - Broadcast Station Architecture - S. Merrill
Weiss, MWGRP

4:45PM - Closing Remarks - Roswell Clark, Guy Bouchard

Friday, 17 October 2014

Friday Lunch Keynote

BTS/TAB Awards LUNCH - Keynote Speaker - Paul Avery, SwRI - Communication Challenges in a Connected Vehicle Environment



Biography **Paul Avery** has served as the Manager of the Cooperative Systems Section at Southwest Research Institute (SwRI) since November, 2011, pursuing applied R&D in the areas of cooperative vehicle systems and architectures, and agent-based modeling and simulation techniques, with particular focus on

decentralized control architectures. He has been a primary technical contributor to the SwRI Mobile Autonomous Robotics Technology Initiative (MARTI), the Institute's multi-million dollar autonomous vehicle R&D program, and led the development of the program's suite of cooperative behaviors. Mr. Avery earned Bachelor's and Master's degrees in Mechanical Engineering from Colorado State University prior to joining SwRI in 2005, and during his tenure at SwRI has been awarded three patents with one patent pending,

Thursday BTS/AFCCE Lunch Keynote

Alternative Energy for Broadcast

Keynote Speaker– Huiett Joseph, Cox Media Group, USA



Biography **Huiett Joseph** is the Senior Manager of Energy Conservation for Cox Enterprises. With more than \$15 billion in revenue and 50,000 employees, Cox Enterprises is a leading communications, media and automotive services company. Huiet is responsible for executing strategies, initiatives and capital projects to reduce Cox's carbon footprint. In the eight years Huiet has been with Cox, he and his

team have completed more than 240 energy conservation and water conservation projects across the company's subsidiaries – Cox Communications, Cox Media Group and Cox Automotive Group. The projects have significantly contributed to Cox's sustainability program by eliminating thousands of tons of carbon and saving millions of gallons of water. Prior to Cox, Huiet served as Power Optimization Leader for Colonial Pipeline Company, the largest refined fuels pipeline in the world. Huiet was responsible for managing the \$100+ million dollar annual budget for energy consumption associated with moving fuel from the Gulf Coast to the New York harbor. In 2005, he was awarded the Colonial Pipeline Company's President's Award for reducing energy cost by changing the operation of the pipeline to an on-peak, off peak flow methodology. Huiet has also worked for the Tennessee Valley Authority and Square D PowerLogic. In these roles, he was responsible for conducting energy audits, engineering design, and power quality studies for commercial, institutional, and industrial facilities. Huiet holds a bachelor's degree in Physics from Dillard University, a bachelor's degree in Mechanical Engineering from the Georgia Institute of Technology and an MBA from Middle Tennessee State University. He is a licensed Professional Engineer and holds several certifications from the Association of Energy Engineers, including the Certified Energy Manager and the Certified Energy Procurement Professional titles.

Thursday, 16 October 2014
Afternoon Session
Advanced Radio Transmission Systems



Session Chair - David Layer, NAB, USA

2:00PM - Impulsive Noise Measurement in MW Band - Pablo Angueira, University of the Basque Country

2:30PM - Introduction of China Digital Radio in FM Band - Dr. Gao Peng, presented by Jian Song, Tsinghua University

3:00PM - 3:15PM - BREAK

3:15PM - All Digital Radio AM Field Test Project - David Layer, NAB

4:00PM - Digital Power Radio - Branimir R Vojcic, George Washington University

4:45PM - Closing Remarks - Rozwell Clark, Guy Bouchard

6:00PM - Manufacturer's Reception

Friday, 17 October 2014
Morning Session
Advanced Technology Update for Broadcast Facilities



Session Chair - Paul Shulins, Greater Media Boston, USA

8:30AM - Digital Audio Transport Update - Al Salci, SAS

9:00AM - AES67 - Gregory Shay, Telos Alliance

9:30AM - Methods for Mitigating IP Network Packet Loss in Real Time Audio Streaming Applications - Junius Kim, GatesAir

10:00AM - SNMP and ME - Real-world tales of an Ancient Protocol in a Modern Broadcast Facility - Tony Peterle, Worldcast Systems

10:30AM - 10:45AM - BREAK

10:45AM - Making Audio sound better one square wave at a time, or how an algorithm called "Undo" fixes audio - Leif Claesson, Omnia

11:15AM - Ratings Technology Measurement Methods - Paul Mears, Nielsen