



Proceedings of the 2021 Broadcast Engineering and IT Conference

Table of Contents

AI and Cloud Technologies for Broadcasting

Cloud Live Production: The New Resource Perspectives for Media Tech Broadcasters – A Case Study

Carlos Cesar Abrahão, *Globo, Rio de Janeiro, Rio de Janeiro, Brazil*

ColorNet 1.5: Improving Machine Learning Color Correction for Video

Michelle Mayer, Erica Walker, D. Hudson Smith, *Clemson University, Clemson, South Carolina, United States*

Handling Event-Based Frame Rate Conversion in OTT Streaming Services

Paola Hobson, *InSync Technology Ltd., Petersfield, Hants, United Kingdom*

Valentijn Siebrands, *M2A Media, London, United Kingdom*

How to Maximize Hybrid Cloud Capabilities for the "New Normal"

Julián Fernández-Campón Montero, *Tedial, Málaga, Spain*

Is The Cloud There Yet? (Winner, 2021 BEIT Conference Proceedings Best Paper Award)

Peter Wharton, *TAG Video Systems, Tel Aviv, Israel*

Live Video Transport in the Cloud with JPEG XS and AWS CDI

Thomas Edwards, *Amazon Web Services, Santa Monica, California, United States*

Smart Compression with Artificial Intelligence

Richard Fliam, Nelson Francisco, *MediaKind, Frisco, Texas, United States*

The Importance of Remote Access, Virtualization, and Hybrid Cloud for Live and Postproduction

Karen D. Gondoly, *Leostream Corporation, Waltham, Massachusetts, United States*

Mitigating Facility Risks – Cyber & Physical

Can I Really Protect my Broadcast Plant from a Cybersecurity Attack?

Wayne M. Pecena, *Texas A&M University – KAMU, College Station, Texas, United States*

Cyber Hygiene – Protecting Content in a Work-From-Home Environment

Gary Olson, *GHO Group LLC, New York, New York, United States*

Living with Current Faults at End-of-Branch Broadcast Facilities

Thomas LaBarge, John Broccoli, Nancy Swartz, John H. Belk, *Groundlinx Technologies, Blue Ridge, Georgia, United States*

Proceedings of the 2021 Broadcast Engineering and IT Conference Table of Contents

Next Gen TV Technologies

ATSC 3.0 Statistical Multiplexing – The Journey Continues

Mark M. Myslinski, Jovo Miskin, *Synamedia, Lawrenceville, Georgia, United States*

Benefits and Limitations of the Updated FCC DTS/SFN Licensing Rules

S. Merrill Weiss, *Merrill Weiss Group LLC, Metuchen, New Jersey, United States*

Broadcast Positioning System (BPS) Using ATSC 3.0

Tariq Mondal, Robert D. Weller, Sam Matheny, *National Association of Broadcasters, Washington, DC, United States*

Conformance and Interoperability in ATSC 3.0: Achieving the Promise of Next Gen TV

Bob Campbell, *Eurofins Digital Testing, Bristol, United Kingdom*

Delivering Broadcast Internet Services with ATSC 3.0 by Using Public Gateways

Aldo Cugnini, Louis Libin, *Interactive Wireless Technologies LLC, Woodmere, New York, United States*

Glenn Reitmeier, *GlennReitmeierTV LLC, Yardley, Pennsylvania, United States*

Digital Spectrum Sharing (DSS) and Next Gen TV

Lynn T. Rowe, *Alchemedia SG LLC, Atlanta, Georgia, United States*

Ali Dernaika, *HPE Telco Experts, Houston, Texas, United States*

Ensuring Quality of Service with Next Gen TV “Lighthouse” Rollout

Laurent Roul, Nicolas Guyot, Carmen Kerloc’h, *ENENSYS TeamCast Inc., Beltsville, Maryland, United States*

First Live Production and Transmission of Immersive Audio on Commercial OTA Digital Television in Latin America

Helio Kuwabara, Rubens Carvalho, Uirá Moreno Rosário e Barros, *Globo, São Paulo, São Paulo, Brazil*

Humber College Broadcast-Broadband Convergence B²C Lab

Orest Sushko, *B²C Lab, Toronto, Ontario, Canada*

Mobile ATSC 3.0 Measurements and Coverage Studies

François O. Gauthier, Eric Juteau, *Octave Communications, Granby, Québec, Canada*

Next-Generation Audio Console Supporting the Serial-Audio Definition Model (S-ADM) for Live Production of Immersive and Personalized Sound

Hiroki Kubo, Toshiyuki Nishiguchi, Takehiro Sugimoto, Satoshi Oode, *Japan Broadcasting Corporation (NHK), Tokyo, Japan*

Potential and Practicality of ATSC 3.0 Hybrid Broadcast/Broadband Integration

Lynn Claudy, Kelly Williams, *National Association of Broadcasters, Washington, DC, United States*

Proceedings of the 2021 Broadcast Engineering and IT Conference Table of Contents

Next Gen TV Technologies *(continued)*

RTK Correction Data Transmission Service for Autonomous Driving via ATSC 3.0 in South Korea

Hong-Gi Shin, Dong-Kwan Lee, Seung-Ho Lee, *Munhwa Broadcasting Corporation (MBC), Seoul, Republic of Korea*

Sung-Ik Park, *Electronics and Telecommunications Research Institute (ETRI), Dae-Jeon, Republic of Korea*

Technical Optimization and Efficiencies for a Post-Transition ATSC 3.0 SFN Environment

Eric Dausman, Jeff Andrew, *Signal Infrastructure Group PBC, Boulder, Colorado, United States*

OTT Television Technologies

AI-Powered Per-Title Encoding

Anita Chen, Christoph Mueller, Daniel Silhavy, Stephan Steglich, Stefan Arbanowski, *Fraunhofer FOKUS, Berlin, Germany*

From Start Up to Digital Distribution Powerhouse: Case Study on Migo's Content Management and Delivery for Emerging Markets

Bea Alonso, *Dalet, Barcelona, Spain*

Improving The Video Headend Infrastructure With DASH-IF's CMAF Ingest

Mickaël Raulet, Lucas Gregory, Khaled Jerbi, Eric Toullec, *ATEME, Rennes, France*
Rufael Mekuria, Jamie Fletcher, *Unified Streaming, Amsterdam, Netherlands*

OTT: Local Ingest at the Edge

Ronald Alterio, *Blonder Tongue Laboratories Inc., Old Bridge, New Jersey, United States*

Performance Evaluation of Low-Latency DASH and Low-Latency HLS Streaming Systems

Bo Zhang, Thiago Teixeira, Yuriy Reznik, *Brightcove Inc., Boston, Massachusetts, United States*

State-of-the-Art Multiview Experiences for Sports Fans

Thierry Fautier, *Harmonic, San Jose, California, United States*

Patrick Gendron, *Harmonic, Rennes, France*

Radio Technologies

Getting Streams Cloud-Ready and CDN Compatible: Politics and Protocols

Rick Bidlack, *Wheatstone Corporation, New Bern, North Carolina, United States*

Incorporating a Supplemental Program Service (SPS) Channel into MA3 Transmissions

David Kolesar, *Hubbard Radio, Washington, DC, United States*

Mike Raide, *Xperi Corporation, Columbia, Maryland, United States*

Proceedings of the 2021 Broadcast Engineering and IT Conference Table of Contents

Radio Technologies *(continued)*

Reception of All-Digital AM Radio in Electric Vehicles

Pooja Nair, Xperi Corporation, *Somerset, New Jersey, United States*

David Layer, *National Association of Broadcasters, Washington, DC, United States*

Saving Lives- Rapid Alerts Using RDS for Earthquake and Fire Warnings

Matthew Straeb, *Global Security Systems/ALERT FM, Sarasota, Florida, United States*

The Use of Computer Simulation for Directional FM Pattern Studies

John L. Schadler, *Dielectric LLC, Raymond, Maine, United States*

SMPTE ST2110 / IP-based Facilities

8K JPEG XS Codec Adapted to SMPTE ST 2110

Kota Itakura, Masayuki Miyazaki, *Japan Broadcasting Corporation (NHK), Tokyo, Japan*

Michael Van Dorpe, *Village Island Co. Ltd., Tokyo, Japan*

Distributing and Synchronizing Signals Between the Worlds of SDI and IP

Renaud Lavoie, Sithideth Viengkhou, Sebastien Berthiaume, Daniel Tremblay, *Riedel*

Communications GmbH & Co. KG, Wuppertal, Germany

IP Network Operations Center (IP NOC): The Future for Broadcast

Claudio Lisman, *ProximaVision Corporation, Bal Harbour, Florida, United States*

IPMX for Broadcast Installations

Jean Lapierre, Andre Testa, *Matrox Video, Montréal, Canada*

NDI in the Master Control Room

Fabio Gattari, *Etere Pte Ltd., Singapore*

TV Enhancements

Haptic Perception System Synchronized with Live Broadcasts

Masaki Takahashi, Taichi Ishiwatari, Makiko Azuma, Takuya Handa, Masanori Sano, Yuko

Yamanouchi, *Japan Broadcasting Corporation (NHK), Tokyo, Japan*

Understanding Banding – Perceptual Modeling and Machine Learning Approaches for Banding Detection and Removal

Hojatollah Yeganeh, Kai Zeng, Zhou Wang, *SSIMWAVE Inc., Waterloo, Ontario, Canada*