Tune In to the Future

ATSC AT THE 2015 NABSHOW EXHIBIT AND CONFERENCE GUIDE

April 11-16 | Las Vegas, Nevada

ATSC Papers and Presentations

Broadcast Engineering Conference Keynote
Sam Matheny | Sun. April 12│ 9:30 AM - 3:00 PM │ S219

UHDTV Roadmap for Ultimate 8k from 4k
Toru Koruda | Sun. April 12│ 9:30 AM - 10:00 AM │ S219

Comparative Field Tests of DVB-2 & ATSC 3.0
Kelly Williams | Sun. April 12│ 10:00 AM – 10:30 AM │ S219

New Phase of Terrestrial UHD Service
Sansung Kim | Sun. April 12│ 10:30 AM – 11:00 AM │ S219

Hardware Implementation & Analysis – LDM System for ATSC 3.0
Sung-Ik Park | Sun. April 12│ 1:00 PM - 1:30 PM │ S219

Planning Urban Mobile & Portable Coverage Using SFNs – ATSC 3.0
Mats Ek | Sun. April 12│ 1:30 PM - 2:00 PM │ S219

Futurecast: NGBT Broadcasting System
Tim Laud | Sun. April 12│ 2:30 PM - 3:00 PM │ S219

ATSC 3.0 Tutorial:
Building the Next Generation Television Service
Sun. April 12│ 3:00 PM - 6:00 PM │ S219

Overview of the ATSC 3.0 Effort
Skip Pizzi | Sun. April 12│ 3:00 PM - 3:15 PM │ S219

Inside ATSC 3.0: What's Happening Where?
Rich Chernock | Sun. April 12│ 3:15 PM - 3:30 PM │ S219

TG3/S32, Specialist Group on Physical Layer
Luke Fay | Sun. April 12│ 3:30 PM - 4:00 PM │ S219

TG3/S33, Specialist Group on Management and Protocols
Youngkwon Lim | Sun. April 12│ 4:00 PM - 4:30 PM │ S219

TG3/S34, Specialist Group on Applications and Presentation
Madeleine Noland | Sun. April 12│ 4:30 PM - 5:00 PM │ S219

TG3/S35, Specialist Group on ATSC 3.0 Ecosystem
S. Merrill Weiss | Sun. April 12│ 5:00 PM - 5:30 PM │ S219

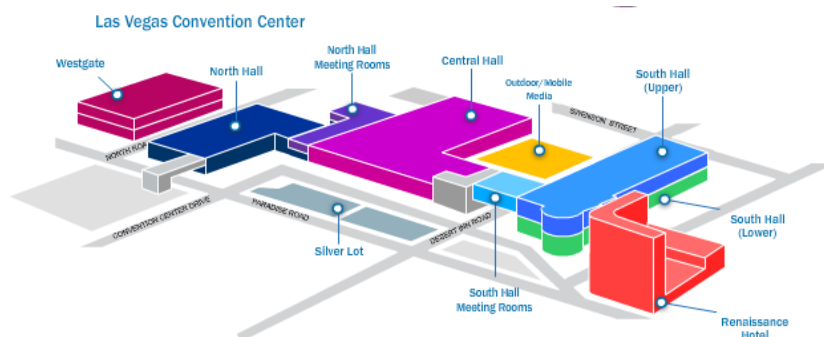**TG3/S36, Specialist Group on ATSC 3.0 Security**
Adam Goldberg | Sun. April 12│ 5:30 PM - 5:45 PM │ S219

Advanced Emergency Alerting System
Jay Adrick| Sun. April 12│ 5:45 PM - 6:00 PM │ S219

ATSC Member Company Exhibits

Las Vegas Convention Center

Advanced Television Systems Committee Technology Pavilion – North Hall

A range of products and services utilizing ATSC Digital TV standards and emerging technologies will be featured in the ATSC Technology Pavilion courtesy member companies ETRI, Korea and the University of the Basque Country, Spain; NERC**,** Shanghai; Triveni Digital, USA; Unisoft, USA; and Verance, USA.

Avateq – Booth #SU8503

Imagine, not worrying about your transmitter performance and signal quality... Avateq offers the solution: AVQ1020ATSC – RF Layer Monitoring Receiver for ATSC. AVQ1020ATSC is a cost-effective, 24/7 remotely accessible solution, designed to out-perform aging competitive units, at a fraction of the cost. Since Avateq introduced this product at NAB2012, hundreds of TV stations have been monitoring their transmitters remotely, saving diagnostic time and travelling expenses. As a member of ATSC, we are working on bringing the monitoring to the next level by expanding a list of measurements to include **ATSC 3.0** specific parameters.

Baron – Booth #C7408

BIM – Booth #N7639

Cisco – Booth #N802

Comark – Booth # SU3021

ONE Media, Comark and TeamCast demonstrate **ATSC 3.0** technology developed by ONE Media live at the NAB Show 2015. The ATSC3.0 end-to-end demonstration is using a Next Gen media server provided by ONE Media feeding a Comark transmitter on the transmission side, and a Next Gen demodulator and home gateway provided by ONE Media on the receiver side. The Comark transmitter integrates VORTEX, the very latest generation of high-end modulator/exciter designed by TeamCast. The demonstration illustrates the capabilities of what an **ATSC 3.0** standard could be, by showing a live transmission of MPEG-H HEVC Ultra HD video and MPEG-H 3D audio content.

DekTec – Booth #SU7102

Digital Alert Systems - Booth #N4812

Digital Alert Systems will showcase its new Audio Management System (AMS), designed
to facilitate compliance with television's 21st Century Communications and Video Accessibility Act
(CVAA), and the company's range of next-generation emergency alert system (EAS) and common
alerting protocol (CAP) technologies spanning all aspects of EAS and CAP requirements. Highlights will
include the new DAS-Audio Message Controller (AMC) combined with the award-winning MultiPlayer™
audio player and program switcher, as well as the DASDEC™ series of integrated EAS/CAP devices, which
have been upgraded with a number of new features including the new OmniLingual™ multiple language
support module. Fully integrated EAS/CAP models start at just $1,995, offering broadcasters the benefits
of proven performance and support from a proven manufacturer and innovator.

Dolby – Booth #SU1702

Dolby changes the way we experience entertainment by delivering next-generation content encoding,
distribution, and playback innovations for audio and video. Building on decades of innovation, industry
know-how, and extensive industry partnerships, we are partnering with broadcasters, pay-TV operators,
and OTT service providers to ensure that consumers can become immersed in stories like never before.
At the 2015 NAB Show®, Dolby will showcase Dolby Audio™, Dolby Atmos®, and Dolby Vision™, marking
the beginning of a revolution in broadcasting. The Dolby Audio system provides practical, scalable and
flexible tools built upon state-of-the-art technology and proven know-how. It enables the most efficient
production, distribution and delivery of broadcast experiences for all audiences today and in the future.
At the heart of the Dolby Audio system is Dolby AC-4, the next-generation emission codec. At NAB Dolby
will be demonstrating real-time encoding and decoding of advanced audio content with the Dolby AC-4
codec, with a focus on advanced accessibility solutions and highly efficient delivery of multi-lingual
content. Dolby Vision delivers a dramatically different visual experience that brings entertainment to
life. Dolby Vision gives creative teams the freedom to use the full gamut of colors, peak highlights,
brightness, and contrast, with the confidence they will be reproduced faithfully on televisions that
feature Dolby Vision technology.

DTS – Booth #SU4414

DTV Innovations – Booth #SU10104

DVEO – Booth #SU6605

DVEO is a rapidly growing worldwide provider of content distribution products--including solutions for
SMPTE310M, IP Streaming, ASI, SMPTE259M, SMPTE292M, and Mobile DTV. Our NAB lineup includes:

- Next Generation Professional 8VSB Receiver with Built-in LCD Monitor, Decodes to SDI/HD-SDI
  and Outputs IP+ASI. The Allview 8VSB/HD-SDI+IP features 8VSB, IP unicast or multicast (with
  Pro-MPEG FEC), and DVB-ASI inputs. Outputs are IP, SDI/HD-SDI with embedded audio, DVB-
  ASI, analog, or MPEG or AC-3 audio. The unit can automatically switch between RF and IP
  inputs. It includes audio speakers and signal data measurement overlay, plus ASI RF failover and
  optional second audio outputs (SAP) for more audio choices.

Echostar – Booth #SU4724

EnenSys Technologies – Booth #SU6824

Envivio – Booth #SU3602

Ericsson – Booth #SU721

ETRI – Booth #N5837, Booth #N9025

In the ATSC Technology Pavilion, ETRI will partner with the University of the Basque Country to showcase Layered Division Multiplexing (LDM) technology. LDM uses spectrum overlay techniques and signal cancellation to transmit two independent signals using a single 6 MHz TV channel. The demo will display a live LDM transmission and reception with various working modes that represent different application scenarios for **ATSC 3.0**, which will become the first standard worldwide to take advantage of the increased spectrum usage flexibility and performance in delivering UHDTV and HDTV services to portable, mobile and fixed receivers.

In the NAB Labs Futures Park, ETRI presents demonstrations of an advanced multimedia system designed to cover a wide range of **ATSC 3.0** service environment needs from RF transmission to platform and applications, including Layer Division Multiplexing (LDM) transmission, Advanced Digital Signage and Fixed + Mobile UHD Hybrid 3DTV.

Fraunhofer USA – Booth #SU3714

At NAB 2015, visitors to the Fraunhofer IIS booth SU3714 will be able to experience in an exciting new demo the progress being made in building the next-generation audio system for future TV standards based on the recently completed open MPEG-H Audio standard.

To make MPEG-H Audio a reality, the three industry leaders Fraunhofer IIS, Qualcomm Technologies and Technicolor have formed the MPEG-H Audio Alliance. Each one contributes key technical elements as well as long-standing expertise within their market segments. The combined experience and broad-market presence represented by these three companies has not only been critical in developing MPEG-H, but also provides the foundation for successfully bringing exciting new audio features to market.

The system includes object-based audio that allows viewers to adjust the sound mix to their preferences, boosting hard-to-understand dialogue or creating a "home team"-mix of sports broadcasts. Immersive sound may be carried using a traditional channel-based approach or using Higher-Order Ambisonics technology. Fraunhofer IIS will feature a real-time hardware prototype with the ability to encode audio for live broadcasts from stereo up to 3D sound in 7.1+4 H format with additional tracks for interactive objects including commentary in several languages, ambient sound or sound effects. Fraunhofer's real-time system is comprised of:

- a real-time encoder for contribution from outside broadcasts to the studio, where a professional decoder recovers the uncompressed audio for further editing and mixing;
- a real-time encoder for emission to consumers - over the Internet for new media use or for trials of upcoming over-the-air broadcast systems such as **ATSC 3.0**;
- a professional decoder used to monitor the emission encoder's output.

Another highlight at Fraunhofer's booth is the conceptual prototype of a "3D sound bar", enabling mainstream consumers to experience high quality immersive audio without the complexity of adding additional speakers to their existing setup.

GatesAir – Booth #C3107

Visitors to the GatesAir exhibit will see the latest on the FUTURECAST Universal Terrestrial Broadcasting System, now being promoted as a complete ATSC 3.0 system that features an Applications and Presentation Layer, a Management and Protocol Layer, and a Physical Layer.   FUTURECAST is the result of a collective effort by LG Electronics, its U.S. R&D subsidiary Zenith, and GatesAir to create a complete system. Visitors will be able to simultaneously view 4K Ultra HDTV and high-definition mobile programs along with Advanced Warning and Response Network (AWARN) rich-media emergency alerts. FUTURECAST will also be demonstrating how next-generation technology could be used to trigger targeted advertising at the Triveni display (N5637) in the North Hall ATSC Pavilion.

Gray Television, Inc. – Encore Salon C

Harmonic – Booth #SU1210

Harmonic is making the future of video a reality. Our award-winning innovations allow you to unleash the full potential of your content and deploy more flexible workflows. Maximize the value of your bandwidth with superior video quality and new revenue-generating services. And take advantage of the industry's lowest TCO. Visit us at the show to see exciting demonstrations on:

- *Ultra HD Encoding and Delivery*
  Catch a complete, real-time UHD encoding and streaming workflow powered by our new Harmonic "X" technology and featuring the Harmonic PURE Compression Engine.
- *Virtualized Video Infrastructure*
  Get an up-close look at the incredible video quality and Intelligent Function Integration™ offer by VOS™, our software-defined platform for enabling a completely virtualized media processing architecture.
- *Integrated Master Control Room/Integrated Channel Playout*
  Launching cost-effective new channels and high-efficiency iMCR and ICP workflows has never been easier, thanks to the powerful capabilities of our Spectrum™ media servers and all-new Polaris™ playout management solutions.

IEEE Broadcast Technology Society – Booth #L29

Imagine Communications – Booths #MR5, N2702

IneoQuest – Booth #SU6102

Jampro Antennas, Inc. – Booth #C1055

Junger Audio – Booth #C2333

Linear Acoustic - Booth #C549

Linear Acoustic will demonstrate audio-related technologies that support **ATSC 3.0**, alongside Telos Alliance.

NAB – Booth #N6822

NAB Labs Futures Park – Booth #N8527

NAB Labs Hybrid TV Demonstration - This NAB Labs demonstration shows three capabilities enabled by Hybrid TV systems, which could become part of an **ATSC 3.0** broadcaster's service:

- · Targeted advertising
- · "Tell me more"/Second-screen Interactivity
- · Enhanced emergency alerting

Hybrid TV involves the television receiver's ability to combine over-the-air reception with broadband connectivity and interactive applications, providing a richer consumer experience. In this demonstration's examples, different TV sets provide different viewer experiences based on the unique user data stored in each receiver. Data collected could include personal demographic information such as zip code, age, gender, income bracket and the like, contributed on an opt-in basis by the user.

Also in the NAB Labs Futures Park, **ETRI** presents demonstrations of an advanced multimedia system designed to cover a wide range of ATSC 3.0 service environment needs from RF transmission to platform and applications, including Layer Division Multiplexing (LDM) transmission, Advanced Digital Signage and Fixed + Mobile UHD Hybrid 3DTV.

NAGRA – Booth #SU8517

NERC - Booth #N5838

The technology demonstrated in our booth is a full-chain UHDTV system, which includes UHDTV Presentation System, UHDTV Encoding, Broadcasting, Receiving and Decoding. Typically the UHDTV Encoding using UHDTV real-time H.265 Encoder-ZenHEVC, whose compression performance is improved nearly doubled than H.264. UHDTV Broadcasting & Receiving is an upgrade of DTMB, with key technologies of **ATSC 3.0** partially, such as LDPC, BICM etc. The transmission rate is 50Mbps.

Nevion – Booth #SU2615

NHK – Booth #N8933

NHK is presenting 8K, including 22.2-multichannel 3D sound in a 350 inch-theater. Other demos: 8K camcorder and P2 recorder, 8K displays for home use, MMT, 8K/120Hz production system, and loudness meter for 22.2 ch. NHK is pleased to present advanced hybrid services of MMT-based broadcasting system. MPEG Media Transport (MMT) is specified as an element of the management and protocol layer of **ATSC 3.0**. At the NHK booth, visitors may be attracted by use cases of hybrid services, i.e., a broadcast program enhanced with additional content delivered through broadband networks and advertisement of TV program insertion targeting to specific audience in collaboration with broadband. All visitors can also understand how MMT works in the broadcasting system and it would open the door to the future of the broadcast industry.

OneMedia, LLC - Booth #SU3021

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Panasonic – Booth #C3607

Qualcomm – Booth #S201LMR

Live capture, interactivity, flexible rendering in an end-to-end real time Broadcasting workflow with Scene Based Audio (HOA). The demo will show how various benefits of Scene Based Audio also known as HOA can be fit into current TV broadcasting practices. Advantages of HOA include live capture, flexible/adaptive rendering and various interactive features that can be made available to consumers. Come to the demo to see how truly immersive sound can be captured (live), and transported/distributed through only 7 SDI channels (one more than current 5.1 channel delivery) to be rendered to any number of loudspeakers. We will show every stage of production from live capture, through transport through a TV plant (NoC to Affiliate) and finally through an emission encoder (MPEG-H) to consumers.

SBE – Booth #L30

Sencore – Booths #S216LMR, SU1916

SMPTE – Booth #L28

Sony – Booth # C11001

Sorenson Media – Wynn Salon B

Strategy & Technology – Booth #N1122

The key focus of our demonstrations will be the development of interactive applications and their delivery in a broadcast environment. We will be demonstrating HbbTV applications and our application development solution "OnScreen Publisher" which enables the rapid deployment of applications to HbbTV, Smart TV, iOS and Android devices. OnScreen publisher is designed to enable content to be published across multiple HTML platforms including Smart TV's, Tablets (iOS and Android), HbbTV, **ATSC2.0/3.0** and RDK. Connecting to content management systems, OnScreen Publisher enables a create once, publish everywhere approach dealing with the technical differences between each platforms including touch screen an large screen remote control interfaces and delivers apps optimized for each device.

TeamCast – Booth #C1730

ONE Media, Comark and TeamCast demonstrate **ATSC 3.0** technology developed by ONE Media live at the NAB Show 2015.The **ATSC 3.0** end-to-end demonstration is using a Next Gen media server provided by ONE Media feeding a Comark transmitter on the transmission side, and a Next Gen demodulator and home gateway provided by ONE Media on the receiver side. The Comark transmitter integrates VORTEX, the very latest generation of high-end modulator/exciter designed by TeamCast. The demonstration illustrates the capabilities of what an **ATSC 3.0** standard could be, by showing a live transmission of MPEG-H HEVC Ultra HD video and MPEG-H 3D audio content.

Technicolor – Ren Exhibitor G, Ren VIP D

Thomson Video Networks – Booth #SU2610

Toshiba – Booth #N7026

Triveni Digital – Booths #SU8802, #N5637, #C3107

An ever-increasing consumer demand for content anywhere, anytime, and on multiple devices is transforming the broadcast industry. As a result, technologies have advanced considerably since the original ATSC standard was developed more than 20 years ago. To help broadcasters and operators address this new era of television, Triveni Digital is actively participating in the development of the next-generation television standard, **ATSC 3.0**, with Dr. Richard Chernock, the company's CSO, leading the charge as chair of ATSC's Technology and Standards Group (TG3). Triveni Digital's emerging products will empower broadcasters to support new revenue-generating services such as:

- · Interactivity and rich media
- · Local ad insertion and addressable content delivery
- · Advanced EPG and service guides
- · Efficient content delivery by utilizing broadcast infrastructure

Unisoft - Booth #N5638

ATSC Interactive Services: UniSoft will be demonstrating a complete end-to-end system for creation and transmission of interactive services. HTML5 applications are delivered from the Station over the air to the home. These enhancements provide the broadcaster with a variety of ways for generation of additional revenues. Examples include sponsored voting and polling, RFI, targeted advertising and political campaigns.

UPV/EHU – Booth #N5737

The University of the Basque Country (UPV/EHU) and the Electronics and Telecommunications Research Institute (ETRI) will demostrate the technology known as Layered Division Multiplexing (LDM) which will be part of the **future ATSC 3.0** standard. **ATSC 3.0** will become the first standard worldwide to take advantage of the increased spectrum usage flexibility and performance in delivering UHDTV and HDTV services to portable, mobile and fixed receivers. LDM uses spectrum overlay techniques and signal cancellation to transmit two independent signals using a single 6 MHz TV channel. The signal is composed of two layers, the first one has ultra-robust characteristics for portable or mobile services and the lower one conveys high data rates to enable UHDTV service delivery to fixed receivers. The demo will display a live LDM transmission and reception with various working modes that represent different application scenarios for **ATSC 3.0**. Layered Division Multiplexing is the result of a R&D cooperation project between Communications Research Centre (CRC, Canada), Electronics and Telecommunications Research Institute (ETRI, Korea) and the University of the Basque Country (UPV/EHU, Spain).

Verance – Booth #N5738

Verance Corporation is exhibiting at the ATSC Pavilion where it will demonstrate the VP1 audio watermark. VP1 enables broadcasters to deliver interactive services, including enhanced A/V content, dynamic advertising, interactive applications, and usage measurement to any device through any distribution path including OTA, OTT, and pay TV. VP1 is the industry's first open technology for first-screen ACR and is a candidate for inclusion in the **ATSC 3.0** standard.

Volicon – Booth # SU7916

Zenith/LG – Booth #C3107

Visitors to the GatesAir exhibit will see the latest on the FUTURECAST Universal Terrestrial Broadcasting System, now being promoted as a complete ATSC 3.0 system that features an Applications and Presentation Layer, a Management and Protocol Layer, and a Physical Layer.   FUTURECAST is the result of a collective effort by LG Electronics, its U.S. R&D subsidiary Zenith, and GatesAir to create a complete system. Visitors will be able to simultaneously view 4K Ultra HDTV and high-definition mobile programs along with Advanced Warning and Response Network (AWARN) rich-media emergency alerts. FUTURECAST will also be demonstrating how next-generation technology could be used to trigger targeted advertising at the Triveni display (N5637) in the North Hall ATSC Pavilion.