63RD ANNUAL NAB BROADCAST ENGINEERING CONFERENCE
April 18 – 23, 2009
Las Vegas Convention Center
Las Vegas, Nevada

SUMMARY OF PRESENTATIONS

This booklet contains summaries of the presentations at the 63rd NAB Broadcast Engineering Conference held at the Las Vegas Convention Center, April 18 – 23, 2009 in association with 2009 NAB Show. The 63rd annual NAB Broadcast Engineering Conference will address the most recent developments in broadcast technology and focus on the opportunities and challenges that face broadcast engineering professionals around the world. The highly technical conference features presenters delivering papers in all the varied fields that make up broadcasting today. We want to thank our conference partner, the Society of Broadcast Engineers, for its assistance in developing this year's sessions and especially for creating a special SBE Ennes Workshop for 2009. Additionally we want to thank the IEEE Broadcast Technology Society for presenting its BTS Tutorial. Finally, we wish to thank the PBS and NPR engineering communities for supporting the conference.

Technical papers associations with many of these presentations are contained in the NAB publication, the 63rd Annual NAB Broadcast Engineering Conference Proceedings. This book and accompanying CD-ROM (or just the CD-ROM) are available at the convention in the Central Lobby store or can be ordered online at www.nabstore.com after the convention.

Saturday, April 18, 2009
8 a.m. - 5 p.m.

SBE Ennes Workshop - Continuing the Digital Transition
Las Vegas Convention Center - Room S219
Chairperson: Frederick Baumgartner, PBE, Qualcomm MediaFLO, Inc. - MOPER, Elizabeth, Colo.

8 a.m.
Digital Transmission 101 Part 1
Donald Vanderweit, Agilent Technologies, Inc., Manhattan Beach, Calif.
From Morse code to 8-VSB, QAM, and IBOC, digital radio has progressed within a generation from low-speed specialized applications to become the dominate means of transmitting information via radio communications. Each year, the Ennes sessions begin with an early-bird tutorial, and this year we are grateful to present Donald Vanderweit of Agilent as our guest educator. The tutorial will cover methods of digital modulation, measurements and impairments, and reinforces and expands what you already might know of this now essential part of broadcast engineering

9 a.m.
Opening Remarks
John Poray, Society of Broadcast Engineers, Indianapolis, Ind.

9:10 a.m.
Digital Transmission 101 Part 2
Donald Vanderweit, Agilent Technologies, Inc., Manhattan Beach, Calif.

9:55 a.m.
IBOC Performance: The 1% or 10% Solution
Mike Starling, National Public Radio, Washington, DC
Improved HD Radio coverage and new features in the HD Radio system are hot topics in today's terrestrial

radio industry. Both iBiquity Digital and NPR Labs have conducted additional technical analysis which will be discussed. This presentation will provide essential information and perspective on the industry's work towards a consensus recommendation for FCC action on a managed HD Radio power increase authorization. Mike Starling of NPR Labs and Steve Densmore of iBiquity Digital discuss latest developments and highlight important new features of the HD Radio system.

10:30 a.m.
IBOC's Opportunities
Steve Densmore, iBiquity, Columbia, Md.

11 a.m.
Five Good Reasons to use a Tube for High Power FM+HD Radio
Geoffrey Mendenhall, Harris Corporation, Mason, Ohio
Adding HD to FM transmission presents many challenges to the transmission system, and there are rarely perfect solutions. It would seem that the role of tubes in new transmitter designs would continue to diminish, but in the case of FM+HD, efficiency and cost of operation might best be met with a novel use of power tubes.

11:30 a.m.
DTV Transmission Status
William Meintel, Meintel, Sgrignoli & Wallace, Warrenton, Va.
Previously Bill Meintel has discussed a number of issues that could have come together to create the "perfect storm" leading to a DTV transition catastrophe. Bill will offer his perspective on the current state of the transition. Will the transition come to a successful conclusion or is there still more work to be done. Finally, what comes next? For example, despite the recent fanfare over the end of full power analog television transmission, many low power television stations and translators will continue to transmit analog signals for the foreseeable future.

1:15 p.m.
Implementing Mobile/Handheld
Wayne Bretl, Zenith Electronics, Lincolnshire, IL
Jay Adrick, Harris Corporation, Mason, Ohio
This presentation will provide an overview of the ATSC M/H system and describe what it will mean for those stations that choose to broadcast the service. It will cover a description of the service, the types of consumer devices that the service will reach, the business models that broadcasters might develop and the technical considerations for deployment of the service. An in-depth look will be made at the M/H Physical Layer, the equipment necessary to broadcast ATSC M/H and the possible changes that the system will require for the transmission plant in order to optimize mobile service.

The current status of the ATSC Candidate Standard will be reviewed along with a view of what lies ahead as the technology rolls towards a commercial launch.

1:15 - 1:25 Overview of ATSC M/H as a system and a business - Jay Adrick
1:25 - 1:50 Primer on ATSC M/H Physical Layer - Wayne Bretl
1:50 - 2:30 Integrating ATSC M/H into the digital television station - Jay Adrick

2:45 p.m.
Improving DTV and Mobile TV Coverage through On-Channel and Translator Technologies
Richard Schwartz, Axcera, Lawrence, Pa.
Current DTV coverage areas were allocated based on a single-transmitter architecture, which is predicted to provide minimum specified field strength to 50% of the locations within each coverage area, 90% of the time. Terrain features can produce shadowed areas, or coverage gaps, where signal strength is lower than required for reliable reception. Both the analog sunset and the desire to employ ATSC M/H mobile services have highlighted the extent of coverage gaps for many broadcasters.

Networks of additional DTV emitters can be deployed to mitigate these gaps in coverage. These networks can range from groups of simple on-channel boosters and DTV translators that relay the primary transmitter signal, to complex networks of synchronized DTV transmitters deployed in a "cellular" arrangement that fundamentally replaces the single-transmitter architecture. The optimum choice of DTV coverage network technology is driven by the locations of terrain features and population distribution. Multi-emitter on-channel networks must be carefully designed to avoid significant harmful interference in overlapping coverage areas.

This paper will describe how an on-channel DTV network functions, define the associated terminology, provide guidance in determining when this type of deployment is applicable and give an overview of the systems engineering necessary to design such networks.

3:30 p.m.
DTV Maximization: The Value of the Power
Dennis Wallace, Meintel, Sgrignoli & Wallace, Waldorf, Md.
With the end of analog television transmission, television broadcasters will be much more reliant upon their digital transmission systems to reach the viewer. In this presentation, Dennis Wallace will discuss the findings of field and laboratory tests regarding DTV reception and in particular planning factors for indoor DTV reception. The "Value of Power" for DTV broadcasters will be discussed as well as important considerations for the post-transition DTV transmission facility.

Dennis will provide an in-depth discussion of indoor planning factors for DTV reception as well as how those factors might be applied to the new M/H (mobile/handheld) DTV transmission system. This discussion will include presentation of data regarding the measured performance of indoor antennas and pre-amplifiers as well as building penetration losses and other factors, such as taboo interference, needed to create an indoor DTV reception model.

Mr. Wallace will also provide an overview of the various ways for broadcasters to maximize their coverage and service areas for DTV and will conclude with some suggestions for improving the coverage of DTV stations.

4:15 p.m.
Antenna Choices for Digital Systems
Kerry Cozad, Dielectric Communications, Raymond, Maine
The importance of reliable wireless transmission/reception of data for video reception has been growing for the past few years. What choices do the data provider (broadcaster) and the data user (viewer) have when it comes to optimizing the performance of the antenna systems? Kerry Cozad will offer a discussion of what is available now and trends for the near future in antenna designs. He will review antennas for full power DTV transmitter installations and antenna considerations for mobile/handheld, single frequency networks and translators.

Saturday, April 18, 2009

9 a.m. – 12 p.m.

IEEE-BTS Technology Tutorial: The ATSC Mobile/Handheld Candidate Standard
Las Vegas Convention Center - Room S226
Chairperson: Tom Gurley, IEEE Broadcast Technology Society, Washington, Dc.

9 a.m. Introduction and Session Overview
Jerry Whitaker, ATSC, Morgan Hill, Calif.
Tom Gurley, IEEE, Washington, D.C.

9:15 a.m. Mobile/Handheld Digital Television System
This part of the tutorial includes an overall system description, covers system configuration signaling and ties the other parts together.

9:35 a.m. RF/Transmission System Characteristics
Kevin Shelby, Coherent Logix
This part covers the Physical Layer of the system and includes the data structure, pre-processing, post-processing, and final processing and modulation.

9:55 a.m. Service Multiplex and Transport Subsystem
Rich Chernock, Triveni Digital, Princeton Junction, N.J.
This presentation covers the management sub-layers of the system, including transport, signaling, file delivery, and streaming delivery.

10:25 AM Announcement
Rich Chernock, Triveni Digital, Princeton Junction, N.J.
This presentation covers the Service Guide, which delivers information about the services on the broadcast channel. The ATSC M/H Service Guide is adapted from the Service Guide of the Open Mobile Alliance BCAST specification.

10:40 a.m. Application Framework
Alan Moskowitz, MobiTV, Emeryville, Calif.
This part of the tutorial explains the need for an application framework – which provides a rich JavaScript based environment for audio, video, graphics and interactivity – and describes how it will be implemented iATSC M/H.

10:55 a.m. Service Protection
Alan Moskowitz, MobiTV, Emeryville, Calif.
This part of the system protects the service stream using the broadcast data path and, optionally, a return channel. It is based on the Digital Rights Management (DRM) profile of the Open Mobile Alliance (OMA) BCAST specification for protection of files.

11:15 a.m. Video System Characteristics
Brett Jenkins, Ion Media
This presentation includes the ATSC requirements for video coding, overviews of MPEG-AVC (H.264 Advanced Video Coding) and MPEG-SVC (Scalable Video Coding), ATSC M/H AVC and SVC coding specifications, and RTP (Real-time Transport Protocol) transport and signaling.

11:35 a.m. Audio System Characteristics
Brett Jenkins, Ion Media
This part covers the HE AAC v2 (High Efficiency Advanced Audio Coding) audio system. It describes the constraints on HE AAC v2 audio and defines the elementary stream packetization.

11:55 a.m. Wrap - Up

Sunday, April 19, 2009
9 - 9:30 a.m.

NAB Broadcast Engineering Conference Opening
Las Vegas Convention Center - Room S219

Chairperson: Lynn Claudy, NAB, Washington, D.C.
Keynote: Gary Arlen, Arlen Communications, Bethesda, Md.

2020 Why I Can't Wait
Gary Arlen, Arlen Communications, Bethesda, MD

Our business and personal lives are going through a period of accelerated change, fueled by technology and economic factors that often seem beyond our control. Broadcasting has been in the center of these changes and will continue to be affected by breakthroughs and new developments in diverse technologies. That puts greater demands on TV and radio engineers to be ready for the next opportunities. For broadcasters, confirming our role in the media mix depends on creative, innovative use of the new palette of technologies and especially their applications.

Sunday, April 19, 2009

9:30 -11:30 a.m.
HD Radio Implementations and Improvements Part I
Las Vegas Convention Center - Room S226
Chairperson: Dom Bordonaro, Cox Radio, Inc., Milford, Conn.

9:30 a.m.
On-Channel Repeater Implementation for HD Radio Coverage Improvement
Richard Redmond, Harris Corporation, Mason, Ohio
This paper will discuss of the key considerations one needs to evaluate when developing implementation plans for enhanced HD Radio coverage using on-channel repeaters or gap fillers. We will examine the implications, challenges and limitations of receiving an HD Radio signal off the air and repeating the digital-only portion on the same channel. There will be a review of the antenna isolation required, practical power levels, the benefits and limitations of adaptive echo cancellation, and the impact on receiver performance. This presentation will also explore space planning, power levels and the ongoing costs. This discussion is based on the real-world experience gained through similar projects and networks Harris has been involved with around the world.

10 a.m.
Report from the Brazilian Association of Broadcasting about the Tests Results in AM and FM Stations that use the IBOC Standard

Ronald Barbosa, ABERT (Brazilian Association of Broadcasting), Brasilia, Brazil

In view of the large number of companies that implemented the IBOC standard in their stations, the ABERT - The Brazilian Association of Broadcasting, with the goal of bringing together a set of results representative of all that were obtained by individual broadcasters, decided to hold a number of tests and measurements that would allow a comprehensive assessment of all relevant aspects of the deployment of the IBOC standard.

The tests are limited to the hybrid solution in order to assess the introduction of digital technology into operation simultaneously with the analogue transmission, its impact and its coexistence with the stations in operation. The report presents findings on assessment of the performance of the IBOC system of digital radio.

10:30 a.m.
High-Power, Common Amplification of FM+HD Radio Transmissions with Elevated Sideband Levels
Geoffrey Mendenhall, Harris Corporation, Mason, Ohio
The proposed 10dB increase in HD Radio sideband levels presents a linearity challenge to common amplification of FM and HD Radio signals through a single transmitter. Common amplification linearity must be improved by 20dB to accommodate a 10dB increase in HD Radio sidebands, while still meeting the original NRSC-5B RF emission mask.

This paper explains the application of new, high-power, RF amplifier and power supply technologies to elevated HD Radio sideband transmission. The ability to change operating modes from FM+HD to HD-only or FM-only on-the-fly is also explored as a transmitter back-up strategy.

11 a.m.
FM+IBOC Broadcast Systems Architecture Considerations for Single Frequency Networks
Philipp Schmid, Nautel, Hackett's Cove, Canada
As FM HD Radio continues to be deployed, there is increased interest in boosters and true SFN operation. Two main challenges exist in single frequency operation: time and state synchronization. Very tight time synchronization in the overlapping coverage zone of adjacent transmitters is required in order to avoid IBOC symbol energy from bleeding into adjacent symbols causing inter-symbol interference. State synchronization is required to ensure that the input at each transmitter produces precisely the same time domain signal output, which applies to any accumulators used in direct digital frequency synthesis, interpolation filters, and convolution encoders used in forward error correction.

While possible solutions adequately address these challenges for IBOC on-channel boosters to fill in the shortfall in HD coverage, this paper takes a more comprehensive look at single frequency networks by also considering traditional FM single frequency networks. A superior broadcast system architecture is presented that effectively addresses state synchronization by centralizing all modulation processes rather than relying on a multitude of synchronized modulators. This provides the broadcaster with the flexibility of fielding FM boosters, IBOC boosters and FM+IBOC boosters in any combination as required. Innovative approaches of time synchronization without the need of additional GPS receivers are also discussed providing the broadcaster with an effective single frequency network solution.

Sunday, April 19, 2009

9:30 a.m. - 12 p.m.
Mobile Television Technology Part I
Las Vegas Convention Center - Room S219
Chairperson: Glenn Reitmeier, NBC Universal, New York, N.Y.

9:30 AM

Building the Mobile/Handheld Digital Television Infrastructure
James Kutzner, Public Broadcasting Service, Alexandria, Va.
Modern society is increasingly on the go and mobile digital television offers the opportunity to provide needed services to those who choose to be mobile. Many members of the broadcast industry are quickly developing the means to transmit and receive mobile and handheld (M/H) digital television. What remains to be done is development of the upstream infrastructure that will be needed to create, manage, and deliver the content to fill those broadcasts. Unlike "legacy DTV" the M/H broadcast will very likely be a mixture of real-time and non-real-time delivery. The simplest starting point for an operational model could be to re-broadcast the main DTV program over the M/H signal. However, M/H is a different medium than "legacy DTV" and soon after the M/H launch M/H viewers will be looking for content prepared and packaged to suit the needs of a mobile service. PBS has begun to examine the entire infrastructure of an M/H service. New methods of content development and management and new workflows will need to be developed. How do we develop a new M/H infrastructure and then layer it on top of our existing systems? How do we accomplish this at minimal increases in operational cost? This paper will discuss the starting issues and propose staged infrastructure changes to accomplish the development of the end-to-end M/H broadcast system.

10:00 AM
Adding ATSC M/H to a DTV Station Metatdata Flows
Richard Chernock, Triveni Digital, Princeton Junction, NJ
The new ATSC Mobile/Handheld system has defined a set of metadata for signaling and announcement. While in many ways, this metadata is similar to that for PSIP, there are considerable differences in content and encapsulation. It is likely that the sources for the scheduling information that is used to create the signaling and announcement data will be the same for M/H as for current DTV broadcasting. The task of managing the M/H metadata, especially with consideration of changes during the broadcast cycle is again similar to the current processing of PSIP information.

This paper briefly discusses the signaling and announcement metadata for M/H (comparing and contrasting to existing PSIP). It then outlines mechanisms for adding M/H metadata flows to existing digital television stations, making minimal changes or disruptions to existing flows. A major assertion is that an extension of the stations existing PSIP generator would be an ideal way to integrate M/H metadata capability into digital television stations.

10:30 a.m.
Integrating ATSC M/H into a Broadcast Transmission System; Options and Choices - What You Need to Know
Richard Schwartz, Axcera, Lawrence, Pa.
ATSC M/H (mobile/handheld) is set to become a final standard very soon, and broadcasters are understandably enthusiastic about the new business opportunities that it will provide to them. To ensure that they are able to take full advantage of this important new technology, it is essential that they have a clear understanding of the options and choices to convert their transmission facilities to incorporate M/H. This paper will seek to provide that understanding, covering such areas as exciter conversion, multiplexing, single frequency networks (SFNs), power level and coverage considerations for mobile vs. fixed reception, and all aspects of the transmission chain that are affected. While it is anticipated that most broadcasters will initially convert their existing single transmitter for dual service (fixed and M/H), the different coverage considerations for mobility and reception by a portable receiver may soon encourage the development of a network with multiple transmitters, possibly at different power levels. The paper will discuss this migration, and concepts to implement initially, while planning ahead for a multi-transmitter network. Overall, the paper will cover the major technical issues to consider now and in the future for ATSC M/H conversion.

11 a.m.

Transmission Systems for Mobile TV
Myron Fanton, Electronics Research, Inc., Chandler, IN
Orthogonal polarizations in RF transmissions from a broadcast antenna provide increased channel capacity and improved channel performance. In the same channel frequency band, two independent signals may be transmitted and received with isolation provided by dual-linear or dual-circular polarizations. This technique has wide application in communications: satellite communications, terrestrial microwave, cellular phone networks, and broadcasting.

Transmitting antennas that provide polarization isolation for channel combining are analyzed and found to be successful and efficient in applications such as the IBOC FM scheme and DTV simulcast applications. However, the UHF and VHF broadcast propagation channel may not preserve the polarization sense and purity of the transmitted signal, in some cases degrading reception. The possibility of overcoming these problems and application of the multiple-input multiple-output (MIMO) channel is discussed.

The use of orthogonal polarizations to increase channel capacity for VHF and UHF broadcasting is analyzed. Dual-polarized receive antennas have been found to dramatically increase mobile signal reception and virtually eliminate disconnects from the base station, and the application to broadcast DTV and IBOC transmission is made. The application of dual-polarized channels in Distributed Transmission networks and low power broadcast repeater networks is also described.

11:30 a.m.
Rethinking Mobile TV: 5 Fundamentals for Successful Content Discovery and Delivery
Neville Meijers, Qualcomm MediaFLO Technologies, San Diego, Calif.
As the telecommunications and entertainment industries converge, industry stakeholders are fighting over fragmented audiences. Content owners and multichannel operators recognize that they must develop and implement strategies that extend their brands and services onto mobile devices and into subscribers' pockets. Mobile TV offers the potential to meet this need and as consumer desire for more choice and convenience in accessing mobile content increases, mass adoption is on the horizon, representing a multi-billion dollar growth opportunity.

This presentation will provide an overview of existing approaches to mobile TV services and discuss the merits and key lessons that the audience can draw from them, while highlighting the fundamental changes required to the industry's approach to mobile TV, including:

- Ubiquity of Access: The need for constant connectivity to allow users to access services from any location.
- Broad Content Availability: Compelling content that entices users to try and ultimately, subscribe to services.
- Value Proposition and Differentiation: Mobile TV platforms must allow operators to distinguish services through exclusive content, devices and pricing plans to drive revenues.
- Multiple Device Types: Multiple form factors must be developed to pique subscribers' interest and cater to varying tastes. The device ecosystem must be global in scope so all parties benefit from economies of scale.

Sunday, April 19, 2009

1 -3 p.m.

Mobile Television Technology Part II
Las Vegas Convention Center - Room S219
Chairperson: Glen Reitmeier, NBC Universal, New York, N.Y.

1 p.m.
Signals Repetition in Ayrton Senna II Tunnel
Carolina Novaes, Globo Comunications e Participation SA, Sao Paulo, Brazil
With the beginning of digital television transmission in Brazil, a new resource that allows television signal reception in mobile environments becomes available, both with portable devices, or receivers installed in vehicles. In the face of this new scenario, it is necessary to guarantee that the signal coverage will be presented everywhere, delivering to the audience a high quality signal, whether inside a bus, car, malls or even passing through a tunnel. The latter was the fundamental principle of our research, considering that once inside a tunnel, the signal that reaches the receptor is exposed to several degradations, such as: strong attenuation of external signal, presence of many multipaths and Doppler Effect. This work presents the results of digital signal retransmission tests inside the Ayrton Senna II tunnel, the longest tunnel of Sao Paulo city with 1.950 meters, aiming at guaranteeing that LDTV (one-seg) and HDTV (full-seg) services be received by a car at an average speed of 70 Km/h without perceiving any significant difference in signal quality, all through the tunnel extension.

1:30 p.m.
Receiver Considerations for ATSC M/H Broadcasters
Michael Bergman, Kenwood, Princeton Junction, N.J.
This talk will highlight expected receiver features and implementation details which should be of interest to broadcasters deploying ATSC-M/H A/153. A/153 is the the mobile/handheld Candidate Standard for delivery of terrestrial DTV to mobile phones, portable devices, and cars. Discussion will be wide-ranging, to include many of the various elements of the A/153 stack.

2 p.m.
ATSC M/H: Transport and Signaling Characteristics
Gomer Thomas, LG Electronics, Piscataway, N.J.
Among the core components of the new ATSC M/H (Mobile/Handheld) digital TV broadcast system are the transport and signaling subsystems, which transform the raw data delivered in the M/H broadcast stream into a usable format and provide the necessary metadata (signaling) to make the data truly usable.

To enhance interoperability with other mobile broadcast systems and to facilitate future extensibility, the M/H transport subsystem is IP (Internet Protocol) based, without any underlying MPEG-2 transport layer. The signaling subsystem supports not only basic discovery and acquisition of services (virtual channels), but also supports capabilities unique to a mobile environment, such as time slicing and roaming across broadcast area boundaries. Other key signaling design goals included low signaling bandwidth, support for rapid channel change, and a high degree of extensibility.

This paper examines the details of the M/H transport and signaling subsystems, with emphasis on why things are as they are and how the system works.

2:30 p.m.
ATSC M/H Content Delivery
Richard Chernock, Triveni Digital, Princeton Junction, N.J.
For reasons of interoperability with other mobile/fixed infrastructures and future extensibility, the technologies selected for the M/H system are, in many cases, quite different from the technologies familiar for main stream DTV. As one key example, IP has been chosen as the transport encapsulation instead of utilizing MPEG-2 Transport Streams.

M/H utilizes two different types of content: file and streaming, both delivered via IP encapsulation. Files are delivered utilizing FLUTE and streaming content (video and audio) delivered via RTP. Most broadcasters have become familiar with how streaming over MPEG-2 transport works. These basic concepts transfer over to RTP transport, but with changes in details. In particular, the ATSC M/H standard has created a timing and buffer model for RTP, which allows delivery of broadcast quality television.

This paper discusses the underlying technologies for content delivery, illustrates how they work, how they fit into the M/H system and discusses practical implications for M/H system design and deployment.

Sunday, April 19, 2009

1 - 4:30 p.m.

HD Radio Implementations and Improvements Part II
Las Vegas Convention Center - Room S226
Moderator: Dom Bordonaro, Cox Radio, Inc., Milford, Conn.

1 p.m.
HD Radio Broadcasting in Romania
George Pletea, 2M Prima Telecom SRL, Baia Mare, Romania
As many nations today are grappling with the issues of digital radio and television conversion, so is the Eastern European country of Romania. We recognize that to remain relevant, radio in Romania must join the digital evolution.

We will discuss the differences between regulatory matters in countries such as Romania versus the U.S, the challenges presented both technical and legal, plus report on the results of HD Radio testing as required by our regulatory authorities (ANC, "Authority of National Communications"). A full body of tests are required to determine HD Radio coverage versus analogue, as well at the potential for interference to host as well as adjacent frequency stations. Romania feels it requires some of these tests to be conducted within country due to specific allocation and geographic issues which may vary from other tests performed in the past. Thus, this paper will include technical, legal and regulatory information which is more applicable to Eastern Europe in contrast to other regions.

1:30 p.m.
FM Radio Reception in the DC Market for Various IBOC Power Levels
Sid Shumate, BIA Financial Network, Chantilly, Va.
BIA Financial Network (BIAfn) will present a Comprehensive FM Reception Report analyzing the current FM analog and IBOC reception in the Washington, DC radio Market, and predicting, using deterministic-based methodology, the effect that various levels and scenarios of IBOC sideband power level increases would have on analog and IBOC FM reception in this market. This is the first issue by BIAfn of a long-anticipated Comprehensive FM Reception Report, and utilizes the new Givens & Bell ITWOM position-accurate Longley-Rice implementation.

2:00 p.m.
Optimizing Analog + HD Radio Transport Over an Existing 950 MHz STL Channel
Bob Band, Harris Corporation, Mason, Ohio
Keyur Parikh, Harris Corporation, Mason, Ohio
This paper will address the challenges involved in adding HD Radio transport over an existing 950 MHz STL path. Beyond simply adding an IP stream alongside the analog FM, we'll look at what can be done if we re-examine the whole concept from the ground up with joint FM/HD transport in mind. What would the next

generation of 950 MHz STL look like?

The issues to be covered include: How much traffic can a 950 STL support? Can a 950 transport the I2E signal or only the E2X? What sorts of traffic might it carry beyond the analog FM and HD signals? What backhaul alternatives might be used to enable TCP traffic without a full 950 MHz return path, and how can this provide network-based remote management for monitoring and control? What techniques allow us to carry other Ethernet (LAN) traffic alongside the HD stream without interference between them? What are the tradeoffs between modulation waveforms, data payload, and required channel bandwidth? Equally importantly, we'll look at ways to make this all work on existing licensed spectrum, using existing cables and antennas.

2:30 p.m.
IBOC Combining Schemes for 10dB Injection
Myron Fanton, Electronics Research, Inc., Chandler, Ind.
The 10dB IBOC injection levels for HD Radio has rendered some combining schemes impractical. Lossy systems are too inefficient for the power increase and several new options will be discussed, including channel combiners and filters. Increased IM Products or Spectral Regrowth must be managed to meet the NRSC emissions mask and new solutions are presented that suppress these spurious emissions.

3 p.m.
Field Reconfigurable HD Radio Combiner Provides a Path Forward
Peter Matthews, Mega Industries LLC, Gorham, Maine
Henry Downs, Mega Industries LLC, Gorham, Maine
The road to HD radio has met and conquered many challenges along the way. The most recent "speed bump" stems from the original digital sideband power level and its inadequacy in some situations. While testing and discussions are ongoing to update these power levels, it appears clear that no universal hardware solution currently exists to meet the needs of every group involved. This paper proposes a novel solution that not only offers a possible solution to solve these issues for early adopters, but also creates a best-in-class solution for those in the initial planning stages. The discussion will offer a path to accommodate multiple sideband power levels while also addressing the critical space requirements faced in many transmitter facilities. This adaptability, both electrical and mechanical, will be examined in this paper in order to demonstrate that this current challenge may be conquered, just as others have before it.

3:30 p.m.
Content Management and Control of HD Radio Networks via HD Protocol
Tim Anderson, Harris Corporation, Mason, Ohio
A significant shift has taken place in the HD Radio broadcast system architecture with the introduction of the embedded exporter platform and the latest HD Radio software. In order to meet the needs of today's diverse broadcast system topologies, a new architecture has been developed that defines a content management framework and a common communications protocol between the various HD Radio components, as well as station administration equipment.

HD Protocol, or HDP, is now the standard protocol used throughout the HD Radio Broadcast System and supports content creation, distribution, command and control of the entire HD Radio system from local, centralized and remote locations over unidirectional and bidirectional IP networks of varied mediums. This new protocol also provides options for improvements in the robustness and security of the HD Radio data streams

In this presentation, the author discusses the form and structure of the content management framework and the HDP protocol. He discusses the current implementations that are available for system-wide content

management, and command and control, as well as pending future developments and the network architecture that will be needed to facilitate centralized and geographically distributed content creation, management and insertion within the HD Radio data stream.

4 p.m.
FM Digital Radio Power Increase - an Update
Jeff Detweiler, iBiquity Digital Corporation, Columbia, Md.
This presentation will describe a study of digital performance on an FM radio station employing iBiquity's HD Radio™ technology, with power level of the digital sidebands increased by 10dB. The objective of this study is to increase the coverage of the digital portion of a hybrid FM radio signal while maintaining analog coverage within the protected contours. An update on the latest test and regulatory efforts will be provided.

Sunday, April 19, 2009

3 - 6 p.m.
The Consumer Experience
Las Vegas Convention Center - Room S219
Chairperson: Dave Wilson, Consumer Electronics Association, Arlington, Va.

3 p.m.
Distributing Entertainment to the Whole Home and Beyond
Derek Turner, Microsoft Connected TV, Mountain View, Calif.
The speaker will describe trends in IPTV and related digital-lifestyle technologies that provide consumers with entertainment and information throughout the home, at the office, and as they travel. He will discuss business models for service providers and content developers in the delivery of connected entertainment and information services across consumer devices, enabling unprecedented mobility and portability of content. He will explain why IP-based networks are a key facilitator in the evolution of distributed entertainment, notably in the delivery of TV content in the networked home. He will describe how IPTV addresses consumer demands for a feature-rich, viewer-centric experience including, picture-in-picture technology (PIP), electronic program guide (EPG), instant channel change, connected services, applications, devices, and content.

Attendees will learn:
- Accommodating the multi-TV home reality, meeting the multi-headed STB
-How IPTV is transforming the TV set into the central link of the next-generation networked home
- IPTV's impact on music, TV and movies, games, education, productivity, and communication
- From chips to content - partnering to build the networked home ecosystem
- How service providers can scale initial service offerings to their market size and grow with the market
- System-on-a-chip (SOC) trends and their impact on IPTV deployment

3:30 p.m.
Universal TV Receiver for Portable Computers
Ramon Cazares, CrestaTech Corporation, Santa Clara, Calif.
Interest in adding a TV receiver to portable devices is high but remains plagued by a myriad of technology and ability problems: The plethora of incompatible standards increases cost and complexity poor or no reception when using typical stick antennas slow channel scans unacceptable in portable models.
it is not practical to develop a truly universal TV receiver including tuner and demodulator - using conventional IC design techniques. A new approach is needed. Consider a repartitioning of the traditional TV receiver IC functions into a fully programmable radio frequency (RF) IC and software-based signal processing algorithms. Such a solution dynamically balances quality, speed and power dissipation based on the broadcast environment and processing resources available. Additionally, special diversity modes may be

considered with such an architecture as well as techniques to reduce channel scan times from 20 or 30 minutes to just few seconds.

CrestaTech is doing work in this area and currently showing a universal TV receiver based on its software-defined wireless technology. The CTC-200 IC is a single chip TV receiver with tuner and demodulator capable of supporting any analog or digital TV standard including ATSC, DVBT, DVBH, QAM, NTSC, PAL, ISDBT plus emerging standards such as CMMB, DMBTH and ATSC mobile.

4 p.m.
Game Changers: New Home Networking Technology
Manuel Trujillo, Motorola, Inc, Horsham, Pa.
Networking technologies are presenting new advances, as well as challenges, to in-home service for consumers. Technologies accommodating the high speeds necessary for multiple high-definition streams are currently being deployed using Multimedia Over Coax (MOCA) and HPNA A/V. While both transmission tools strive to make use of existing in-home wiring rather than retro-fitting there can still be considerable re-wiring to rooms where MOCA is not available, or where the current wiring is old and in poor condition. Under this umbrella, companies and standards groups have been working for some time to effectively launch two additional technologies: extensions of the wireless 802.11 standard and broadband over power line. While obstacles have stalled widespread deployment, recent improvements forecast general availability for these advancements within the next two years.

This presentation will cover the technical details, barriers and installation considerations of these sophisticated wireless and power line technologies: 802.11n and Homeplug A/V. Motorola Product Management Director Manuel Trujillo will discuss the implications of successful launches, and what the results could mean for the content delivery industry. As this technology is incorporated into IP set tops, home gateways and other home digital entertainment devices, benefits will include a reduction in time for initial home network installation and the elimination of extended truck rolls, this as the home networks and digital entertainment devices expand.

4:30 PM
Search, Navigation and Discovery in Online Video
Tom Des Jardins, Affine Systems, Washington, DC
As broadcasters release increasingly large amounts of content online, consumers face challenges in exploring and discovering this content. Consumers fall into two categories, those who are looking for a single clip, and those who are looking to discover additional content within programming or network brands. This presentation examines the challenges in meeting the needs of the second group, and discusses ways beyond the traditional menu driven or EPG grid approaches. Automatically segmenting by a wide variety of techniques including actors, brands and objects or logos is examined, as well as the impact of scene analysis and object recognition technology such as Affine Systems is examined. Specific examples of problems and solutions are demonstrated. A/B comparisons of different techniques and their impacts on audiences will be discussed, and real world examples will be demonstrated. The impact of deep linking on video and scene segmentation's connection to it will be shown, as well as the ability of sites such as IMDB to provide additional information that can be used to aid navigation.

5 p.m.
Instant Gratification in a World of Infinite Content - The Future In-home TV Experience?
Chris Porthouse, ARM, Cambridge, England
The home video experience is rapidly changing. Limited pre-scheduled content, broadcast to your TV or provided to your cable set top box will transform into a world of almost infinite content available on demand, delivered by your TV operator or from the Internet, personalized for your viewing tastes and targeted at

multiple devices around the home.

This evolution poses major challenges to TV broadcasters, network operators, and CE manufacturers, as well as the hardware and software suppliers to both. This presentation will focus on the major role of what has been, until recently, a largely overlooked part of the home visual experience the Graphical User Interface (GUI).

From personalization and organization of content to driving new revenue opportunities, we will look at why the Graphical User Interface is central to delivering the next generation home video experience and what is really required to bring the digital home to life in 2009 and beyond.

5:30 p.m.
Improving Navigation and Content Discovery
Dan Simpkins, Hillcrest Labs, Rockville, Md.
Broadcasters and other content creators are faced with a conundrum. As television and over-the-top devices deliver more entertainment choices to consumers, finding and navigating content becomes more problematic for the end user. This presentation will discuss alternative means of finding and navigating content beyond the conventional 50 button remote and grid based guide. New methods including PC-like point and click interfaces, and motion-control technology will be explored. These technologies are already being embraced by leading CE companies in new and upcoming products, and could fundamentally alter the definition of "interactive TV" and how TV is consumed in the home.

Monday, April 20, 2009

10:30 a.m. - 12 p.m.
Radio Engineering Forum Part I

Las Vegas Convention Center - Room S226

Chairperson: Michael Cooney, Beasley Broadcast Group, Inc., Naples, Fla.

10:30 a.m.
Internet Protocol without the Internet Deployment of IP Audio without Compromises

Rolf Taylor, APT, Watertown, MA
ISDN and POTS services have been the staple of remotes for many years but, as with STLs and Studio links, IP links are becoming more popular for this type of connection.

Spurred on by ISDN Switch-Off dates set by some telcos, the popularity of IP for remotes is increasing. But is it simply a matter of switching out ISDN and replacing it with IP? This paper will examine the challenges and pitfalls of using IP for remote broadcasts incorporating the following main points:
-Types of IP connections available-ADSL, 3G EV-DO,etc.
-Testing of the network before going live
-Dealing with Network Delay
-Dealing with Network Jitter
-Dealing with Packet Loss
-Coding Algorithm Choices Adaptive versus Fixed

Finally, the paper will make recommendations as to the correct equipment to be used to ensure that the IP remote is just as successful (or more so) as during the hey-day of ISDN.

11 a.m.
Data Transmission Capabilities for FM Radio

Roswell Clark, Cox Radio, Tampa, Fla.
The importance of transmitting data over FM has become increasingly important in the digital age. What is the real world digital data capacity of an FM radio station? Utilizing RDS, SCA, HD individually and in concert can provide interesting and useful opportunities. This presentation analyzes the possibilities and the pitfalls in transmitting data at the same time as the FM stereo signal.

11:30 a.m.
Virtual LAN (VLAN) Segmentation for Radio Stations
Paul Shulins, Greater Media, Boston, Mass.
As Radio Broadcasters, we are moving into an age where more and more of our audio, including mission-critical services, is being transported via IP over the existing house networks. To achieve proper Audio-over-IP convergence care must be taken to not only ensure adequate capacity is available, but also to guarantee that our most precious traffic, the vital audio, is afforded the appropriate prioritization. Careful planning is needed to establish precedence of this real time signal so transmissions will be successful in reaching all of the ultimate destinations intact, with a predictable sequence, in a timely manner and with the least delay or dropped packets. Designing and implementing a network infrastructure to support these goals involves a shift from traditional flat, spanning, IP networks to well organized, segmented and routed IP networks. VLAN segmentation is a core element of today's converged networks and provides a foundation for establishing Quality of Service (QOS). This presentation will explore the case study of Greater Media's Boston five radio station under one roof facility, and will share the experiences and methods used to achieve properly segmented and optimized packetized traffic over a diverse network spanning four locations.

Monday, April 20, 2009
10:30 a.m. - 12 p.m.
New Technologies for Television
Las Vegas Convention Center - Room S228
Chairperson: Ted Teffner, WCAX-TV, Burlington, Vt.

10:30 a.m.
Data Broadcasting - That Was Then, This is Now
Mark O'Brien, SpectraRep, Chantilly, Va.
Mobile, handheld, next generation receivers, smart antennas, bandwidth management and other advances are creating new opportunities for data broadcasting. How will these and other technologies drive new business models? What are the corresponding demands on your bandwidth and other resources? When will they become a reality? Most importantly, will they finally open the door to data broadcasting as a new revenue source? If so, what are the tradeoffs?

This session will explore data broadcasting issues including: who is using it, how much bandwidth does it take and how do you design and deliver a complete application that end users want?

We will also demonstrate live some of the data broadcasting applications currently being delivered over-the-air. File broadcasting, video streaming, content targeting and end user applications will all be demonstrated.

11 a.m.
ATSC Broadcast Networks & Video on Demand
Jacques Le Mancq, Thomson, Boulogne, France
Pioneers of HD, ATSC broadcasters are now successfully delivering high quality video to the home.

However, the lack of a Video On Demand offering makes Digital Terrestrial TV an incomplete service for end users - who can now choose to get video anytime from cable, satellite or through their internet broadband connection.

This paper will explore ways of delivering various types of On Demand content through the ATSC receiver. A focus will be made on different delivery strategies that mix Push and Pull technologies - based on criteria such as content popularity or the type of consumer premises equipment. It will illustrate that On demand Video can be delivered over ATSC Broadcast networks and that it is also possible to deploy value added services such as Personalized TV or Targeted Advertising.

11:30 a.m.
Content Download Applications over the Advanced Satellite Broadcasting System
Shuichi Aoki, Japan Broadcasting Corporation (NHK), Tokyo, Japan
In content download applications using communication networks, customers download selected content to storage devices for viewing at any time. There is concern that the service quality deteriorates because of network congestion when a lot of customers simultaneously download high-quality content.

To avoid such an occurrence, we aim at realizing an application wherein customers download high-quality content using broadcasting channels incorporating communication networks. This application is more convenient and attractive because commonly requested content is provided in a short time by broadcasting channels while various contents are provided individually by communication networks.

Aiming at a launch in 2011, an advanced satellite broadcasting system has been studied in Japan. In this new system, higher transmission capacity is realized by using LDPC codes, pilot symbols, and a small roll-off factor. It has two transport mechanisms. One is MPEG-2 Systems and the other is TLV multiplexing scheme, which is well suited for efficient transmission of IP packets. These transport mechanisms can be used flexibly on a transmission slot basis by a newly developed Transmission and Multiplexing Configuration Control (TMCC) signal.

This paper proposes content download applications over the advanced satellite broadcasting system and describes the harmonization of the applications using communication networks.

Monday, April 20, 2009

1 - 5:30 p.m.
Radio Engineering Forum Part II
Las Vegas Convention Center - Room S226

Chairperson: Jeff Smith, Clear Channel Radio, New York, N.Y.

1 p.m.
Next generation IP-Based Audio
Tag Borland, Logitek Electronic Systems, Inc., Houston, TX
As IP audio becomes more prevalent among broadcasters, interoperability between systems will become an issue for users. Currently, networked audio consoles have a poor record of interoperability, with complex setup and varying parameter choices by manufacturers effectively isolating their brands from those of competitors.

Recently available, standard IP protocols now allow multicasting systems such as digital mixers to automatically find and select the many settings needed for network communication to work. Some user groups have started requiring a minimum set of protocols in the networked equipment they buy and this

growing demand by users will speed the adoption of standards by manufacturers and will make it possible for consoles from a variety of manufacturers to send and receive audio with little or no user involvement anywhere in the world. This paper will describe the protocols now available and their advantages in broadcasting.

1:30 p.m.
CLEANER...Yet Still Loud!
Frank Foti, Omnia Audio, Cleveland, Ohio
Broadcast audio processing for conventional transmission (FM and AM) has reached extreme levels. Most methods available today are capable of creating LOUD competitive signals, usually at the noticeable and perceptible expense of quality. What can be done again to raise the bar?

Through critical listening, extensive research, and evaluation of processing methods, it was determined the single most annoying quotient is due to intermodulation distortion (IMD) induced by the aggressive functions within the processing system. The algorithms themselves are being pushed to the limits, and possibly beyond.

Through discussion, and sonic demonstration, the problem will be illustrated. More importantly, a new method for competitive audio processing will be revealed which eliminates the challenges suffered by current processing methods. Audio demonstrations will be used to provides A/B comparisons of the present and new method.

Additionally, it will be discussed how this method can be used for other processing applications in addition to conventional FM and AM broadcasting.

2 p.m.
20 Things You Should Know before Migrating Your Audio Network to IP
Thomas Knuchel, APT, Watertown, Mass.
As broadcasters work to seize the perceived advantages of IP connectivity for program content transfer, the industry is becoming increasingly aware that an IP network presents a completely different set of challenges to anything that came before and that migration is not something to be undertaken lightly. This paper provides the broadcaster will an overview of all the key considerations and challenges involved in setting up an IP audio network. The 20 points covered are:

1) Why Should I Migrate to IP?
2) What type of link should I use?
3) Can I use the Public Internet?
4) What if I can’t get an IP link to my transmitter site?
5) Unicasting or Multicasting?
6) What Protocols will I need to use?
7) What is SIP and why would I use it?
8) How is an IP Packet constructed?
9) Does (Packet) Size matter?
10) How can I deal with network jitter?
11) What delay can I expect and how can I minimize it?
12) Is Packet Loss inevitable?
13) Do I need Forward Error Correction?
14) How can I ensure my audio traffic is given priority?
15) What should I stipulate in an SLA with my provider?

16) Will I need to back-up my IP Link?
17) How should I test my network before deployment?
18) How can I determine what audio algorithm to use?
19) What key things should I look for when sourcing codec equipment?
20) How should I manage and monitor my audio network?

2:30 p.m.
Next Generation Radio Networks
Frank Peters Sengers, International Datacasting Corporation, Arnhem, The Netherlands
It seems not that long ago the great advances in audio coding technology and lower cost satellite equipment made it feasible for many radio networks around the world to distribute their programming by satellite.

Many of these radio networks uplinked directly from the radio station studios to feed systems directly in order to by pass major shared hub operators. The economics were first driven by APT-X and later by MPEG Layer II audio coding and compression technologies implemented on relatively low cost equipment. Today, many of these distribution networks are still in operation with 10 to 15 year old equipment that has withstood the test of time.

The age and the lack of support for the equipment answers the "Why should I replace the distribution system"question for most station engineers. The more difficult questions in front of many station engineers to-day are How and when to replace their satellite distribution systems and what should the new satellite distribution system architecture be to carry me through the next 10 years?

This session will walk attendees through what elements should be considered when planning for a new distribution system for their stations that not only takes advantage of the latest in technology, but enhances the listener experience at the same time.

3 p.m.
Using Microcasting™ for Custom Programming
Kamy Merithew, Wegener, Duluth, Ga.
Centralized scheduling and automation systems produce ready-for-air radio programming for mass distribution via remote affiliates. However, some remote affiliate stations want highly customized content playout, referred to as microcasting. This includes live, variable length, format insertions, or deliberate exclusion of various songs or artists, all of which makes using a common linear feed impossible. Prior solutions involved massive content distribution (i.e. CDs delivered via the mail) coupled with expensive local scheduling and automation systems.

New file-based broadcasting solutions provide a unique environment to develop microcasting architectures. This architecture will allow the benefits of a centralized automation system to be projected to the local level, yielding uniquely customized playout without duplicating the scheduling and automation system at each affiliate site. Reliance on mail and even satellite can be avoided by use of the Internet for all content and schedule distribution. The end result is a low-cost solution for new affiliates to launch a station-in-a-box with custom playlists and local insertion controls.

3:30 p.m.
Send a High Quality Audio Feed from Anywhere
Harry Scott, Radio Free Asia, Washington, D.C.
Andrew Janitschek, Radio Free Asia, Washington, D.C.

Distribution of audio from the field to the studio has changed dramatically over the year. There was a time when live audio was only available over a POTS line or it was hand-carried back on tape for playback. Yes, time have changed, and many of us that have been in engineering for over 20 years can attest to the changes as we were there 'making them happen' with each new technology. While a review of technologies evolution is not the aim of this paper, to a certain extent, it cannot be helped as technology used decades ago is still in use today and continues to help us accomplish our mission. This paper is a real-life case study of how we send and receive audio from our affiliates around the globe and how you can do the same, sometimes cheaply or free. With limited budgets and smaller engineering staffs, we hope you will find some nuggets of value here and hope the next time we meet that you will have more advice for us as we all continue to learn from each other at conventions like the NAB.

4 p.m.
Understanding and Using PPM Technology
Dwight Douglas, RCS and Media Monitors, White Plains, N.Y.
There are many skeptics about whether this new technology is good for radio. The idea of a non-recall methodology has been hailed as a major step forward, but some doubters claim that when the PPM picks up stations that a listener may hear, but haven't personally selected, nullifies consumer-product bonding. A discussion on these issues is paramount.

Arbitron and Media Monitors have entered into an exclusive agreement that permits the analysis of the data with a new service called AUDIENCE REACTION. This new technology is available to all PPM and Media Monitors subscribers and both companies need a forum to introduce these services to the radio programmers attending the convention.

Being able to see how the audience reacted to a specific programming feature, and with the click of a button, be able to hear what was on the air at the moment, creates a unique opportunity for the radio programmer. A two-way discussion about how this impacts the consumer is the goal. The technology of PPM is the advanced method to measure listening. Broadcasters must be made aware of the methodologies and be schooled in what actions should be taken to serve their audiences better.

4:30 p.m.
Practical Strategies for Effective Remote PPM Monitoring
Stephen Dinkel, Burk Technology, Littleton, Mass.
As the PPM rollout continues, more engineers are considering the problem of remote encoder monitoring. If the PPM decoder detects a failure, who will find out? What corrective action can be taken? And will stations be able to accurately report the duration of any encoding failures? This paper discusses advantages and disadvantages to the most common approaches for monitoring PPM encoding. It outlines industry best practices for monitoring encoders, preempting failure, and notifying response personnel of all activity. Engineers, managers and program directors can use this knowledge to not only avoid encoding loss, but also to minimize both the upfront and hidden costs of implementing a remote monitoring plan.

Highlights of the paper include key considerations when integrating encoder monitoring with traditional transmitter remote control. It is critical that each stakeholder has a defined role in the monitoring plan, and that overlap between transmitter responsibilities and PPM responsibilities is properly considered. If a separate monitoring and notification system is installed for PPM, stations should consider how well the solution is suited for their particular environment and whether it offers flexibility for a variety of primary/backup configurations.

5 p.m.

Tests of Digital Radio Broadcasting Potential to Cover a Large Area (Alaska) with Shortwave Signals

Donald Messer, Consultant, Washington, D.C.

The FCC gave a 2 year experimental authorization license last summer to Digital Aurora Radio Technologies (DART) to provide test data and evaluation related to the potential of a single HF transmitting station to cover Alaska (~ 500,000 square miles) using digital modulation. As of March 2009, the test plan has been defined, some of the construction, particularly of the antenna field, is complete, and the test and evaluation method has been defined. Tests will begin soon after the cold weather ends, and should go on for at least a year. Reception of the signals at various locations in the State and in nearby Canada will provide the data for evaluation under various power levels and at frequencies near the lower end.

Monday, April 20, 2009
1 p.m. - 4 p.m.
Quality Control for Television
Las Vegas Convention Center - Room S228
Chairperson: Joe Snelson, Meredith Broadcast Group, Henderson, Nev.

1 p.m.

Care and Feeding of LCD Evaluation Monitors

Gary Mandle, Sony Electronics Inc., Park Ridge, N.J.

It's easy to assume that an LCD evaluation monitor should be adjusted according to our past experience with CRT displays. But this is not entirely correct. Professional practices that have developed over many decades—practices that now seem universal—are actually quite specific to the characteristics and limitations of CRTs. Because LCDs are so fundamentally different from CRTs, LCD evaluation monitors require new methods of setup, alignment and measurement. Optimizing LCD quality requires a different approach to the familiar PLUGE color bars. Probes that are perfect for analyzing CRT pictures may be unusable for LCDs, and tools such as the ITU-R BT.815-1 test chart, the IEC 61947 contrast test, the VESA Metrology Specification V2.0, and Motion Picture Response Time (MPRT) testing are proving to be better ways to get a handle on the LCD picture.

1:30 p.m.

DTV Carriage Auditing - What Happened to My Transport Stream?

Ralph Bachofen, Triveni Digital Inc., Princeton Junction, N.J.

Digital terrestrial broadcast signals are often cross-carried into other infrastructures, for example Cable. Often, there are business or contractual agreements on what modifications may be made to the signal, in terms of quality, services and components. However, defining the quality of service and auditing compliance with these agreements in an automated fashion has been quite difficult in the past.

New techniques for carriage auditing will be discussed in this paper which will allow a broadcaster to understand what (if any) modifications have been made to their signal as it is incorporated into another system and to configure functions such as monitoring, logging and trend analysis. In addition, the transformations that are being performed to other broadcasters' signals in the same DMA can similarly be determined.

2 p.m.

What Will Replace the CRT for Professional Video Monitors?

Peter Putman, ROAM Consulting LLC, Doylestown, Pa.

The CRT is going away, and numerous display technologies are vying to replace it for professional monitor applications. The contenders include LCD, plasma, and FEDs for direct-view monitors, and DLP, 3LCD, and LCoS for front and rear projection. This presentation will cover the basic principles of each display technology, how they differ from each other, and who the major manufacturers are for each technology.

The presentation will also include real-world measurements of critical display performance metrics for each technology, including gamma, contrast, dynamic range, color space mapping, and white balance.

Trends in illuminant sources (projection lamps, light-emitting diodes, and lasers) will be covered as well.

2:30 p.m.
Which Compression Strategy and What Bit Rates Should be Used for Broadcast Contribution?
Ian Trow, Harmonic, Sunnyvale, Calif
Broadcasters have a wide variety of options to consider with respect to choosing the correct technical strategy for broadcast contribution. This paper will investigate the issues surrounding the selection of a compression standard and the optimum operational bit rate. MPEG-2, MPEG-4 and JPEG-2000 will be compared and contrasted with examples to highlight their strengths and weaknesses for a variety of contribution applications.

The MPEG-4 standard is evolving to cover professional applications in the same way that MPEG-2 moved up the production chain from initial deployments in DTH distribution to become the backbone of satellite contribution networks. MPEG-4 is also established in the acquisition stage of program production, through the use of high bit rate Intra variants of the H.264 standard. A comparison will be made with the JPEG-2000 standard to understand the bit rate, quality and workflow implications behind adopting JPEG-2000 or the H.264 Intra variant of MPEG-4.

MPEG-4 was initially developed for low bit rate multi-media applications. This made the standard more robust and appropriate for IP based networks when compared with predecessor legacy standards like MPEG-

This advantage is carried through to the application of MPEG-4 in contribution applications and consequently makes bandwidth more plentiful and workflows shorter. The implications of a more IP oriented contribution network along with the relative strengths of compression standards for file based program exchange will also be covered.

3 p.m.
Monitoring Network Video Quality: Don’t Cry Wolf, Focus on Problems that Matters
Matthieu Chamik, Symmetricom, Inc., San Jose, Calif.
Customers have more broadband service choices than ever before, including the delivery of video services (IPTV, VoD) over IP networks. To capture a growing share of this market, service providers must deliver high levels of service availability and perceived quality. Understanding the Quality of Experience (QoE) for end users has become a necessary benchmark. QoE has many aspects that involve the evaluation and optimization of digital video and its related transport systems, making for a highly complex problem. It’s widely understood that applying traditional Quality of Service methods to triple and quadruple play service monitoring simply does not suffice, as they are not adapted to video content, do not provide essential information about video quality, and are prone to false alarms. QoE has emerged as a reliable methodology for video and voice quality assessment, and rightly so as it seeks to measure quality based on the user experience. When it comes to monitoring hundreds of hours/channels of video, successful IPTV and mobile TV deployments must incorporate a QoE solution for objective video quality metrics. This presentation discusses important considerations in video quality degradation and related practices for measuring artifacts in the compression and delivery process. Additionally, this presentation covers what content providers and service providers need to know to deliver high service availability and video quality.

3:30 p.m.

Looks Good Leaving Here, Must Be Your Set
Leigh Whitcomb, Harris Corporation, Mason, Ohio
Paul Briscoe, Harris Corporation, Mason, Ohio
If you ask most consumers, they'll tell you that the average quality of television pictures has gone down in recent years. While some HD content may indeed look pristine in the living room, it's true that the viewer perception of most content is that it's become somehow worse, despite the broad deployment of digital systems and "HDTV". Unhappy viewers may change channels, change service providers or even sue if the quality doesn't meet their expectations. Understanding where the images are being degraded is a first step in solving this problem. It is complicated by the fact that a signal to the home may take different paths and pass through a large amount of processing, to say nothing of what it may face in the viewer's system. This paper examines where and how images become degraded in the signal chain, and how this can be minimized by system design and operational workflow. In addition to image quality degradation, other quality issues such as lip sync and format management (AFD) will be discussed.

Monday, April 20, 2009
4 - 5:30 p.m.
Television Automation for Maximum Efficiency
Las Vegas Convention Center - Room S228
Chairperson: Joe Snelson, Meredith Broadcast Group, Henderson, Nev.

4 p.m.
Designing and Implementing a Centralized Command and Control System for Broadcast
Michel Proulx, Miranda, Montreal, Quebec, Canada
Karl Paulsen, AZCAR, Canonsburg, Pa.
Jeff Johnson, Gannett, Arlington, Va.
Controlling broadcast operations from a centralized location is now a very real capability. This presentation summarizes the methods employed by the owner, vendors and the system integrator; and the concepts utilized in the design, as well as the build out, deployment, and testing of a centralized command and control network for over a dozen broadcast stations in the Gannett Broadcasting group. These stations are configured to operate most of the broadcast day and night with either minimal or no local operators. All system and monitoring is returned to control hubs over low bandwidth data lines. Each hub in turn has the ability to operate all of the remote (spoke) systems collectively or independently. The enabling technologies and the considerations given to these systems will be discussed by Karl Paulsen, Chief Technology Officer at AZCAR Technologies, and Michel Proulx, Chief Technology Officer at Miranda Technologies.

4:30 p.m.
BXF in Your Facility Today, Tomorrow and Beyond
Jamie Meyer, VCI Solutions, Austin, Texas
The complexity of today's broadcast operations has stressed 20-year-old traditional methodologies of communications which have not kept pace with the needs of today's broadcaster, who now demands a more robust methodology that links together business and technical systems to automate the process of getting content on-air.

BXF (Broadcast eXchange Format) standardizes schedule/as-run information, content metadata and content movement instructions, activities that are key for broadcast facilities. By enabling communication and querying processes between the various traffic and automation-oriented systems, BXF allows decisions to be made with the most complete information available. This enhanced communication allows the traffic and automation system to replicate the logic a traffic staff member would use to determine last-minute schedule changes.

Because BXF allows broadcasters to look beyond simple one-way data transmissions, the industry must adapt current procedures to enable these communication protocols and enjoy fully effective system-to-system communication. This paper will outline the current state of the industry and introduce BXF as a new methodology for communications between traffic and automation systems within a broadcast facility. In addition, this paper will ask broadcasters to reexamine their traffic and automation procedures, will discuss additional opportunities afforded to the broadcaster, suggesting that business decisions can increasingly be made where they should be within the automation system. With the options outlined in the paper, substantial improvements can be made to existing operations of broadcast facilities, including improved efficiencies, decreased operating expenses and increased profitability.

5 p.m.
BXF - How's It Working in The Real World?
Chris Lennon, Harris Corporation, Mason, Ohio
Broadcast eXchange Format (SMPTE 2021) has enjoyed much fanfare since its release just over a year ago in April 2008. The standard is quite broad and can mean many things to many people in terms of workflow efficiencies. This session will look at how BXF is being deployed in broadcast facilities, giving broadcasters who have not yet implemented this protocol a glimpse into ways in which their peers are employing it. Specific case studies will be cited, and real-world examples of cost savings and enabling of new revenues will be covered.

Tuesday, April 21, 2009

9 a.m. - 12 p.m.
New Technologies for Radio
Las Vegas Convention Center - Room S226
Chairperson: Milford Smith, Greater Media, Inc., Lawrenceville, N.J.

9 a.m.
Energy Conservation in AM Broadcast Transmitters using Carrier Control Algorithms
Tim Hardy, Nautel, Hackett's Cove, Canada
Electricity prices have risen dramatically in recent years. The cost of electricity for a 50kW AM transmitter is now counted in the ten's of thousands of dollars per year. Efficiency improvement in AM transmitters has helped to control energy costs, however with the latest transmitters now reaching 90% efficiency further improvements in efficiency will be relatively limited. Digital modulation techniques can achieve equivalent service at much reduced power levels, reducing energy costs only if the analog signal is shut down. Unfortunately, many users of AM broadcasts services do not have digital receivers so analog transmissions are still required. However, a large majority of the power transmitted in the Analog AM signal carries no information. Algorithms that dynamically reduce the sideband and/or carrier power for the purpose of reducing energy costs have been in use for more than twenty years by broadcasters primarily outside of North and South America. These algorithms offer very significant reductions in energy consumption of approximately 30 to 50% with the expense of some loss in system performance. These algorithms may be implemented easily and with minimal cost with current DSP based AM exciter technology. A description of several different algorithms is given with description of some of the tradeoffs. Measured data on energy consumption with realistic processed modulation levels will be given.

9:30 a.m.
Got Green? An Engineer's Guide
Nolan Stephany, WXXI Public Broadcasting Council, Rochester, NY
Andrew Janitschek, Radio Free Asia, Washington, D.C.
From global warming to a shortage of landfills, we are all concerned with ensuring a cleaner, greener

environment. Applying ‘greening’ to radio engineering not only takes planning and coordinating, but it also takes real human effort at the transmitter site, the studio, and in the office. This paper presents the methodologies of applying greener processes and tactics to the world of broadcast engineering and include a review of the federal laws and mandates that not only affect, but challenge, our current business workflows. Everything from paper, glass, batteries, plastics, metal, liquids and more, are all resources needed to run a network and local station, they are all reusable too. Recycling and repurposing are not simply options, but an integral part of smarter, greener engineering that contributes to a better environment. Greener solutions will not only help that station’s bottom line, but engage employees in your efforts to go green. We will examine Corporate Social Responsibility (CSR) and its applications to broadcast engineering, then highlight examples of broadcasters embracing ’green’ today and planning for a greener future.

10 a.m.
The Application of Software-Defined Radio Technology to Multi-Standard Waveform Generation for Television and Radio

Kevin Berndsen, Harris Corporation, Mason, Ohio
The ability to select from multiple waveforms for a single radio system involves software and programmable processing. As software now takes a dominant role in the implementation, some of the best architecture ideas from the computing and server domains must be used. A software-defined radio (SDR) platform includes a hardware composition and software framework which meets the requirements for flexibility through software. The design quality of the platform enables the development of robust waveform implementations and features which maximizes the quality of the investment for the end user.

10:30 a.m.
Using the Resource Description Framework (RDF) to Simplify Content Management
David Baden, Radio Free Asia, Washington, D.C.
Ronald Reck, RRecktek LLC, Chantilly, Va.
Broadcasters over the last decade with the migration to a digital platform have discovered the challenges of managing technology that is dynamic and constantly changing. While rapid technological advancement brings many benefits, it also presents many challenges such as an accelerated obsolescence cycle. The complexity of the digital age is compounded for the broadcaster as the explosion of new media types and delivery methodologies presents the constant challenge of enriching, enhancing and repackaging content for ever expanding number of new delivery platforms.

As a result, today’s broadcaster is experiencing the organizational and managerial issues of controlling an ever growing number of segmented systems and distinct networks, databases, and applications that defy unification and exacerbate the struggle to maintain control over an expanding inventory of content.

While an ever growing number of Digital Asset Management System offers one solution for content management these systems usually require the establishment of a master or “über” database to coordinate data from multiple content creation applications. While the authoritative über database model to manage facility wide content is a workable solution it also requires extensive data import/export and synchronization for accuracy. Further, broadcasters must be willing to commit to one locked-in solution.

In looking for an alternative solution for content and technology management one must look to how the world’s largest repository of content, The Internet or World Wide Web, is handling its data synchronization and management issues. The World Wide Web Consortium (W3C) which develops interoperable technologies and standards for the Web has defined one such standard the Resource Description Framework (RDF).

Resource Description Framework (RDF) is a computer language for representing information about data

resources on the World Wide Web. It is particularly intended for representing metadata about resources and its relationship with other data resources. RDF maps the ontology or, the relationship between data resources. This paper will examine the use of RDF and other W3C web standard technologies to create dynamic metadata models for use as a facility wide Content Management System (or Digital Asset Management System).

This paper will outline the use of RDF in a broadcast environment to link through relevant relationship the various existing content creations and scheduling systems to each other. Each of these broadcast resources are allowed to exist in an "as is state" as the data authority for the information that they own. Data no longer needs to be imported or synchronized between systems and the need for an additional master database for content management is eliminated. RDF can support an adaptable system where new content delivery applications and methodologies can be added (or removed) to overall facility operations by simply mapping a new (or eliminating an old) relationship.

11 a.m.
Implications of increasing Man Made Noise Floor levels on Radio Broadcasting
Charles Kelly, Nautel, Hackett's Cove, Canada
In the last decade, noise floor levels have risen due to Broadband over Power Lines (BOPL), fluorescent lighting and vastly increased numbers of microprocessor based products in the home and workplace. This paper will examine available data about current noise levels, both theoretical and anecdotal, and describe possible efforts that broadcasters can make to maintain their coverage area.

11:30 a.m.
Same Basket - Different Eggs
Alex Kosiorek, Cleveland Institute of Music, Cleveland, Ohio
Broadcasting live events is no longer limited to one or two broadcast methods, nor limited to traditional signal paths that have been around for more than a decade. With technologies such as ISDN becoming harder to come by, new means of connectivity and distribution are emerging, becoming ever more necessary. Events must now be produced for legacy formats (i.e. terrestrial radio) and by new means including HD Radio, HDTV, satellite, Internet (streaming & podcasts), Internet 2 (Distance Learning), cell phones and more. While many of the technologies are exciting and present new methods of reaching the consumer, challenges such as the use of multiple/cascaded codecs arise. With more audio channels to manage with surround sound and separate mixes or processing for each delivery method, things can quickly become complex.

Alex Kosiorek, Director of Recording Services for the Cleveland Institute of Music, will present detailed information on the various elements of producing live events for various broadcast delivery methods and cover fundamentals that are seemingly forgotten. A primer that will cover everything from key essentials for each type of broadcast to surround sound production along with do's & don'ts will be presented. Other key points such as how best to communicate between audio, video and IT specialists will be discussed. Attendees shall walk away with a sound foundation to simplify the complexity of delivering productions to multiple technologies while ensuring quality productions.

Tuesday, April 21, 2009
9 a.m. - 12 p.m.
Newsgathering for Television Broadcast
Las Vegas Convention Center - Room S228
Chairperson: David Folsom, Raycom Media, Inc., Montgomery, Ala.

9 a.m.

ENG Truck Safety
Gary Schaut, WIVB-TV, Buffalo, N.Y.
The majority of ENG truck personnel are not engineers and need simple, non-technical explanations of the basic safety rules which will be presented and combined with a few physical examples of basic concepts.

9:30 a.m.
The Impact of Ubiquitous IP Connectivity on Electronic News Gathering and Remote Broadcast Infrastructure
George Maier, Microwave Radio Communications, North Billerica, Mass.
Electronic News Gathering and Outside Broadcast operations have been greatly influenced by the arrival of digital capture, storage, and transmission systems. The next major influence is the growing impact of IP enabled devices moving into the field. In this paper we will discuss the convergence of IP technology within the broadcast infrastructure and the profound impact that has caused permanent changes in every process within the broadcast workflow.

10:00 AM
High Quality Video Calling for Broadcasters
Julian Spittka, Skype, San Jose, Calif.
Increasingly, broadcasters are seeking more convenient and cost-efficient ways to bring talent and guests on-air from remote locations. Thus, many are turning to High Quality video calling technology from companies like Skype to achieve these goals.

Video calling allows broadcasters to put virtually anyone, anywhere in the world, live and on-air quickly and easily, using just an internet connection and standard equipment available at any electronics store.

Whether they're seeking commentary from correspondents on breaking news, seeking viewer participation or need to put an expert on air, yet face travel conflicts, guests can easily join a program remotely via High Quality Video calls.

Julian Spittka, Product Manager and Senior Engineer at Skype, and Don Albert, VP and General Manager of Skype North America, will share how High Quality video calling can seamlessly be integrated into broadcast programs. They will describe the technical aspects of video call integration, share examples of past and current integrations by national and local broadcast outlets and syndicated programmers, as well as discuss the costs of video calling integration relative to satellite for remote feeds.

10:30 AM
Satellite Communications and the Affiliate Broadcaster: KSWO
Hugh Donnan, Stratos, St. John's, Canada
Whenever and wherever a story breaks, reporters need reliable, portable and affordable tools to enable them to capture the news and deliver it back to their bureau ready for broadcast. BGAN from Stratos along with our suite of value added services, The Stratos Advantage, has put a powerful tool in the hands of field journalists. Now they can travel light, setup in mere minutes ahead of SNG-truck users, and return their feed live or store and forward.

For KSWO-TV, an Oklahoma affiliate, this technology has enabled them to break the story like never before. When time is of the essence, and networks are non-existent or damaged, KSWO can be first on the scene with BGAN.

11:00 AM
Software-as-a-Service is Looking Good in Broadcast Applications
Jim Martinolich, Chyron Corporation, Melville, NY
Advances in the Internet, along with new software architectures and more powerful servers, have made it possible and even desirable to provide many software applications as remotely administered services. This paper will describe the many advantages of SaaS, such as lower administration and maintenance costs, and how subscription-based services can be easily scaled to meet the user's needs. For graphics production and in particular for station groups, the additional benefits of centralized asset storage are easier maintenance, archiving and search capabilities that ensure that all stations in a group, large and small, have rapid access to shared content for a consistent and professional look.

11:30 AM
Monetizing Automated News Capture through Context
Fearghal Kelly, ioko, London, United Kingdom
The TV news channel is highly dependent on traditional wires and its own news gathering ability for information. However, the proliferation of digital channels has vastly increased the data analysis workload for journalists and analysts. Broadcast TV news stories are frequently:

- Multilingual
- Spread over global time zones
- Broadcast on competing networks first
- Derived from the chatter of the internet

Whilst it is often possible to get summary facts fairly quickly, the context may be unclear or unverifiable before broadcast. This results in possible audience loss and certainly loss in perceived value. It is also difficult to monetize syndication of news in this format.

In this paper we will present a scenario which enables automatic processing of audio visual material live off air and extracted from relevant news web sites before being merged together. Conceptual weighting dictionaries are created by news analysts to improve the value of the information captured. We will describe the value of the target dictionary, contextual data systems and present a demonstration.

Tuesday, April 21, 2009
1 - 4:30 p.m.
Antenna Solutions and Case Studies for Radio
Las Vegas Convention Center - Room S226
Chairperson: Andy Laird, Journal Broadcast Group, Inc., Milwaukee, Wis.

1 p.m.
HD Radio-Combining – A New Solution to an Old Challenge
Bob Surette, Shively Labs, Bridgton, Maine
Traditionally, there have been limited techniques available for combining HD Radio with FM, and all typically come with a penalty, whether in terms of efficiency, cost (capital and operating), or potential coverage differences. With the possibility, or perhaps the probability, of the digital power levels being increased ten-fold from 1% to 10% of the FM power level, existing approaches to HD/FM combining will either just not be practical, or will be too inefficient to contemplate.

Shively presents here a novel new approach, which offers high efficiency at high power levels, with the only negative being perhaps the additional floor space needed at the transmitter site to accommodate the combining system. The techniques employed have been well proven in digital television transmission for

ten years at this point, and even longer than that elsewhere in the world.

1:30 p.m.
An AM Directional Antenna and HD Radio
Thomas Ray III, Buckley Radio, New York, N.Y.
This paper will describe the directional antenna recently installed at WOR, New York. While a three tower dogleg array may not seem complex, the antenna system contains traps and complex detuning (including detuning skirts) because of the other AM directionals in the immediate vicinity of the WOR array. The paper will discuss the performance of the antenna system, and compromises that had to be made to make the system work both budgetarily and simply because tuning networks would have been ridiculously large.

2 p.m.
The National Radio Systems Committee IBOC RF Mask Measurement Guideline – NRSC G201
David Maxson, Broadcast Signal Lab, Medfield, Mass.
The National Radio Systems Committee has published several guideline documents for broadcast engineers. One that is in the works at the time of this writing is NRSC-G201 "NRSC-5 RF Mask Compliance: Measurement Methods and Practice". David Maxson will present some background on mask compliance measurements and the guideline. If the guideline has been formally adopted by the NRSC by the time of the presentation, David will provide a "tour" of the document.

2:30 p.m.
Real World Installation of AM HD Radio
Ray Klotz, Sierra Multimedia, Inc., Bella Vista, Ariz.
Installation of HD Radio on the AM band is anything but plug and play. This paper covers the work necessary before installation, during installation and measurements to assure proper operation. Antenna system requirements and corrections, installation adjustments and proof measurements both at the transmitter and in the field are covered. This paper follows the efforts of one station (KFAQ, Tulsa, OK) that did it right from start to finish.

3 p.m.
HD Radio Implementation Case Study: Dual-Polarized Master-Antenna
Myron Fanton, Electronics Research, Inc., Chandler, Ind.
IBOC high-level combining via orthogonal-polarized antenna elements is an efficient and successful technique for simultaneous analog and HD Radio transmission. The combining technique has been used from the early days of broadcasting as well as satellite communications, terrestrial microwave, and cellular phone networks. The master FM antenna and combiner system installed atop the AON building in Chicago is exemplary of the implementation issues involved in dual-polarized IBOC combining. The system provides transmission facilities for two FM radio stations. The system includes a three-layer dual input antenna and constant impedance combiner system. The master antenna is a dual input design that accepts and combines each FM station’s analog and HD Radio FM broadcast signals. The combiner system is also designed with the capability to combine the individual analog and digital signals for each FM radio station. The system also provided a new generation of site monitoring and protection equipment. The details of the system design are discussed, considering the key specification of radiation pattern symmetry, antenna impedance and isolation, and combining system isolation. Spectral re-growth, inter-modulation products, transmission issues, power capacity, and system measurements provide insight for the implementation of a successful HD Radio system. The engineering design of antenna and transmission system components to achieve the level of performance needed for master antenna is quantified, and application is made to single station transmission systems.

3:30 p.m.
Easing the Transition to AM IBOC: Tools and Techniques to Help the Broadcaster
Brian Walker, Nautel, Hackett's Cove, Canada
Despite having been in use for several years, AM IBOC can still be difficult to set up on both new and existing transmitters with a comfortable margin to the spectral mask. This paper will discuss several techniques that can be used to help speed up and ease the commissioning of IBOC at the transmitter site, focusing on reducing spectral emissions and preserving a low-distortion signal. Often the load can be challenging for the transmitter in question, and variations over time can cause any spectral margin to disappear. The ability to measure the load during commissioning and operation is crucial to tracking any changes, and can help the broadcaster keep the antenna cusp in the correct orientation without needing to disconnect the transmitter.

Assuming the load has been adjusted to be as symmetrical and ideal as possible, the transmitter must adjust for its own distortions and any remaining imperfections in the load. Amplitude and phase distortions in the power amplifiers can be characterized and removed by using precorrection. The frequency response of the transmitter when loaded by the antenna can be measured and flattened with adaptive filtering to prevent any mixing distortions. Finally, over-modulation and lost power modules can be handled gracefully, reducing the peaks in the transmitter without clipping the signal. The combination of these techniques can save time in commissioning, and result in a transmitter with far less unwanted spectral emissions.

4 p.m.
High Level IBOC Combining Using Filters
Derek Small, Myat Inc., Mahwah, NJ
The application of Directional Filter Modules used to combine high power digital sidebands to a host FM signal for IBOC transmission is reviewed. A comparison between traditional FM combining techniques and a lossy directional filter approach is examined. Different filter responses are used to adjust the FM and digital path loss response through the system. Transmission efficiency, loss and delay variations are provided for paths with different filter characteristics.

4:30 p.m.
The Inaugural Installation of the First KinStar AM "Green" Antenna
Tom King, Kintronic Labs, Inc., Bluff City, Tenn.
On October 25, 2005 the FCC issued Public Notice DA 05-2741 entitled "Media Bureau Adopts Simplified Application Procedures for AM Nondirectional KinStar Antennas" which officially authorized the use of the low profile KinStar antenna for full time omnidirectional operation in the AM band in the US market. The KinStar antenna was conceived by Star-H Corporation and was jointly developed by Star-H Corporation and Kintronic Labs with the assistance of duTreil, Lundin and Rackley, Inc. into a field-proven marketable broadcast product ultimately resulting in the FCC type-acceptance. This paper will address the application process, design, installation, final commissioning and KinStar versus original series fed tower comparative performance for the first onair KinStar antenna at KCST-AM Radio in Florence, Oregon. This presentation will serve to validate the truly exceptional performance of the KinStar low profile.

Tuesday, April 21, 2009
1 – 5 p.m.
Managing Content and Data for Television
Las Vegas Convention Center - Room S228
Chairperson: William Miller, Miltag Media Technology, New Rochelle, N.Y.

1 p.m.
Quality Video over IP for Production, Challenges & Benefits
Richard Schiller, Consultant, UK
Video over Internet Protocol (VoIP) is growing in importance for distribution of entertainment and information to the home. In television post production the use of Ethernet networking with IP transport of file-based media is well established. It would seem then that we have the elements needed for transporting quality video over IP for live content in the television production environment. However the challenge of transporting Quality Video over IP (QVoIP) is greater than taking these two parts and just blending them together. This paper looks at using Ethernet, and other IP networks to carry high-quality video signals for video production. It analyses the benefits that networked video infrastructure will have over traditional point-to-point connections and the challenges that adopting the technology will bring. From those two elements it then pieces together the target performances and features needed by any Quality Video over IP system to become acceptable to integrators, maintainers and users.

1:30 p.m.
Service Oriented Architecture in Media Systems
John Footen, National TeleConsultants, Lansdowne, Va.
Service Oriented Architecture (SOA) is being applied with greater frequency in media systems. This presentation will provide a review of the basic concepts of SOA. It will also examine the special characteristics of the media industry that must be accounted for when applying SOA technologies. The presentation will provide a comprehensive survey of how SOA has been applied to date in Media. This will include a review of SOA infrastructure products as well as how media specific products are using SOA. Several case studies of real-world projects in media will be examined as well as the SOA-related activities of industry bodies such as the AMWA.

2 p.m.
Automating Workflows: Go Broad or Deep?
John Pallett, Telestream, Inc., Nevada City, Calif.
Whether reducing costs through workflow automation or adding support for new distribution channels, video operations managers are faced with an important choice: to build technology infrastructure optimized around one or two file-based workflows, or build a more flexible technology infrastructure to meet changing workflow requirements. In this paper we examine the pros and cons of different workflow automation approaches, highlighting some common file-based workflow automation strategies and their relevance in different environments.

2:30 p.m.
Maximizing Your Multiplex
Joel Wilhite, Harmonic, Sunnyvale, Calif.
HD television has been a wonderful addition to the television business repertoire and represents the bulk of the bandwidth and engineering cycles being consumed today in DTV the industry. With the addition of mobile and handheld business models more pressure is being added to encoder efficiency and capabilities to provide higher video quality while at the same time utilizing less bandwidth to make room for new services.

While statistical multiplexing HD and SD video in a multiplex has become common practice for maintaining or improving video quality, MPEG-2 compression rates have been eclipsed by MPEG-4 AVC (H.264) encoders that can compress at half the bit rate. On July 29, 2008, the ATSC announced the publication of the A/72 standard and later moved it to published Standard status which opens the door to usher in the next generation of encoding. Now that more tools are available, questions arise, such as how is all this going to work in the

systems currently installed? This paper will explore several unique possibilities applicable in the two prevalent business models. Some of the applications will describe how the current architectures will bridge into systems that add the use AVC encoding while maintaining MPEG 2 programming.

3 p.m.
National Geographic's Mediacore: Challenges and Solutions
Stavros Hilaris, National Geographic, Washington, D.C.
National Geographic's Global Media group recently modernized the technical infrastructure supporting its broad-based media content and distribution business. National Geographic's video systems serve as the core for the television post-production, short form video production, and a successful stock video licensing business.

The MediaCore project allows National Geographic to optimize post-production workflows and realize technology induced benefits in multiple areas. Benefits include the ability to leverage new files based cameras in the field provide for common tape/file based ingest processes and establish centralized storage to more effectively support multiple groups across business areas. In addition, this new infrastructure allows National Geographic to more effectively mine its vast archive of film and video footage from past decades.

The audience will learn the planning and implementation aspects of this project related to media asset management, storage, file distribution, file format considerations, transcoding and metadata management, from this paper. Operational aspects related to training and transitioning to file-based environment will also be addressed.

3:30 p.m.
Managed File Transfers – Beyond WAN Optimization for Digital Media
Tom Ohanian, Signiant, Inc., Burlington, Mass.
The media & entertainment industry has begun its transition to digital acquisition, manipulation, and distribution strategies. An increasing amount of digital files are being generated, packaged and distributed and much of this electronic distribution is occurring using the open Internet. It is important to understand how file transfer methods operate and what functionality to be mindful of in researching methods to move files as you implement a digital media distribution strategy.

In this presentation, FTP, UDP, firewall traversal and relay techniques, TCP window sizing techniques, and TCP retransmission and flow control methods will be examined. Architectural decisions of centrally managed file transfers versus federated sets of transfers will be outlined. Security methodologies for creating a trusted set of servers and security of data payload using standards-based public and private key cryptographic techniques will be outlined. Split policy management for senders and receivers will be described. In addition, compression techniques, such as data specific compression, network traffic compression, host or network acceleration, and protocol prediction will be discussed.

4 p.m.
The Next Generation Asset Management
Eric DuFosse, Thomson, Beaverton, Ore.
Technology has changed dramatically since the genesis of broadcasting. In the last decade deployment of file base systems increases dramatically the need for better administration tools to organize the media and orchestrate movement of content. This is basically the function of modern Media Asset Management but is this enough? Our proposal is to combine an open MAM framework with a workflow engine that can: - Manipulate the media according operational processes and not only technical tasks - Allow a real-time management of resources (human or machine) - Provide a bridge between the business application and the technical infrastructure handling complex sequence of action (work order) via simple commands. This paper will describe in detail the industry needs, the solution vision and the architecture: - Service

oriented architecture framework - Workflow engine dedicated for broadcast industry - Task based user.

4:30 p.m.
Extending SOA for Media Production and Distribution
Paolo Dettori, IBM Research, Hawthorne, N.Y.
Media production and distribution are evolving rapidly by enhancing process automation and management and by coping with the proliferation of new formats, distribution channels and business models. The adoption of web services as building blocks for developing increasingly complex media processes is an important step toward reuse of media processing tools. At the same time, the adoption of a Service Oriented Architecture (SOA) pattern provides a single point of integration for multiple services and provides common features such as service publishing and discovery, reliable message delivery and transformation. In this talk, we present a novel approach to extend the concept of SOA to provide robust support to highly flexible and extensible digital media processes. A key aspect of our approach is the combination of high-level abstract service composition and dynamic composition for dynamic adaptation of the media processes at run-time.

5 p.m.
Mapping Coverage Gain and Loss in the U.S. Transition to Digital Television
Rajat Mathur, P.E., Hammett & Edison, Inc., San Francisco, Calif.
In 1996, the FCC began the process of transitioning traditional analog TV broadcasting to digital. The post-transition digital facilities may not exactly replicate the existing analog coverage, and some viewers who presently receive over-the-air analog television may not be able to receive over-the-air digital transmissions. Conversely, some viewers who presently do not receive over-the-air analog television service may be able to receive new over-the-air digital transmissions. The objective of this project was to determine, by way of predictive models, which viewers will lose coverage and which viewers will gain coverage after the transition both from the perspective of each full-service station and from the perspective of the five major networks. The results were provided in two ways: maps and numerically with spreadsheets. These results are intended to assist the FCC, stations, networks and other interested parties in determining where coverage gain/loss is likely to occur and how over-the-air viewers could be affected.

Wednesday, April 22, 2009
9 a.m. - 12 p.m.
Disaster Preparedness and Public Alerting
Las Vegas Convention Center - Room N102
Chairperson: Clay Freinwald, Entercom, Seattle, Wash.

9 a.m.
Access to Emergency and Non-Emergency Broadcast Information for People with Disabilities
Geoff Freed, Carl and Ruth Shapiro Family National Center for Accessible Media, Boston, MA
Marcia Brooks, Carl and Ruth Shapiro Family National Center for Accessible Media, Boston, MA
In nearly every community, local television broadcasts serve as the primary source of information about the weather, school closings and emergency alerts. The FCC has mandated that emergency and non-emergency on-screen messages and alerts must be presented in accessible formats for people with sensory disabilities, but this requirement is rarely met. Through a three-year project, The Carl and Ruth Shapiro Family National Center for Accessible Media at WGBH (NCAM) has developed prototype solutions that will enable local television stations to send messages, warnings and alerts that meet the communication needs of people with disabilities. This includes the use of text-to-speech solutions that automatically translate on-screen graphics into audio for blind or visually impaired viewers, and automatically relocatable closed captions, which address display conflicts between captions and on-screen graphics. In 2007, NCAM presented the project's goals to NAB, now we can demonstrate effective solutions to the NAB community.

9:30 a.m.
Disaster Planning for Radio Stations
Steve Davis, Clear Channel Radio, Austin, Tx.
This presentation will cover what Clear Channel has learned from preparing for and dealing with the aftermath of various hurricanes and other disasters in recent years. This paper will demonstrate what was needed to create a disaster plan that would assist before, during, and after a disaster/emergency, (natural & or man-made). I have put together action lists for our broadcasters and engineers throughout the U.S. to aid in their preparation. Included are: checking of backup systems, fueling, employees' duties and issues in assigning staff roles and responsibilities, how to contact utilities and get on a priority list, working with Federal, State, and local authorities to get what you need before or after you are off the air, simulcasting and what equipment you can use, and tricks to get back on the air after main transmitters have failed. The plan we have now includes employee participation in testing and running drills with different scenarios in mind (floods, fires, storms, earthquakes, bio threat). The paper will briefly discuss the role of each department and the impact of loss of equipment, personnel, and loss of air time over an extended period.

10 a.m.
National VSAT -Safety Net
Steve Davis, Clear Channel Radio, Tulsa, Okla.
Today's modern radio facilities are interconnected in many ways. This makes for great efficiency, putting critical information and communication in the local market's hands, and facilitating the sharing of great programming and immediate airing of timely breaking news regardless of origination point. However with this increasing reliance on various means of interconnection of separated sites, comes a downside: the consequences of losing those connections! In dealing with disasters we have found that the most common disruptions are: Loss of WAN connectivity (impacts email, database systems, streaming, audio interchange among other things). Loss of Audio to one or more tower sites (typically because a land line, or STL, or both, have failed), and Loss of control of a tower site.

While our engineers have always come up with creative approaches to these challenges, at Clear Channel Radio we decided to build an infrastructure to provide a second layer of connectivity. We have accomplished that by installing a Ku band VSAT IP-based satellite network with built-in audio streaming capability which we affectionately call the SaTL (for Satellite STL). This paper will discuss this implementation, the design criteria, the infrastructure, and how it has been used.

10:30 a.m.
One-Seg Technologies for Emergency Warning Services based on Digital Terrestrial Television Broadcasting --- Emergency Warning Broadcasting and Earthquake Early Warning ---
Kenichi Murayama, NHK, Tokyo, Japan
A mobile, handheld TV service based on ISDB-T (digital terrestrial television broadcasting in Japan), the so-called One-Seg service, has been popular since it started in April 2006. The cumulative shipment of One-Seg receivers exceeded 41 million in August 2008. We have developed two technologies for sending alerts to One-Seg receivers. One is for the Emergency Warning Broadcasting System (EWBS). It enables a signal to be sent that activates One-Seg receivers automatically if a disaster such as a tsunami occurs so, that information broadcast to alert the general public is received and displayed. The other is for the Earthquake Early Warning (EEW), which started to be broadcast in October 2007. An EEW is issued by the Japan Meteorological Agency as soon as an earthquake is detected, even before ground movement occurs. NHK broadcasts the EEW by superimposing it on TV and radio programs. However, there has been no way to know of an EEW broadcast without having a TV or radio turned on. The technology we developed for this system enables a signal to be sent that activates One-Seg receivers automatically so that they display an alert promptly after an EEW is issued.

11 a.m.
Emergency Preparedness: Essential Elements for Business Continuity of Broadcast Video Delivery When Disasters Strike
James Capps, Comcast Media Center, Littleton, Colo.
Whether the causes are natural or man-made, an effective disaster recovery plan is based upon disaster avoidance. Maintaining business continuity despite the worst circumstances depends upon capabilities that allow television networks and broadcast stations to continue their broadcasts despite losing their master control and/or transmission facilities.

This paper will provide NAB members with a checklist that may be used for evaluating their current level of readiness and tips for working with internal and industry resources to address any shortcomings. Topics to be discussed in detail include: geographical considerations for a back-up facility; general capabilities of the back-up facility; operational readiness requirements; active origination requirements; and economic considerations.

11:30 a.m.
Predictable, Certain and Green – Ensuring Reliable Power and Green Systems at TV Facilities and Transmitter Sites
Julian Rachman, DFW Consulting Group, Inc., Austin, Tx.
Gary Rackow, Active Power, Inc., Austin, Tx.
In order to ensure uninterrupted service, it is important to have a solid uninterruptible power protection strategy. In the past, uninterruptible power supply (UPS) systems have been dependent on large banks of lead acid batteries for bridging the interruption to backup generator power. Due to the chemical makeup of batteries, reliability comes into question. This paper discusses two very important topics: first, several approaches broadcast engineers can take to minimize the risk of failures associated with conventional battery based UPS systems and second, sustainable solutions to reduce the operational cost of a broadcast facility.

Approaches discussed within this presentation will include utilizing batteries and battery free alternatives. This paper will illustrate that while the technology behind a new wave of flywheel based UPS products involves relatively simple mechanics, the final products themselves have proven to be highly reliable, extremely efficient and a more environmentally sound alternative to traditional lead acid battery based systems. The paper will also detail how broadcasters are employing products based on this technology.

Wednesday, April 22, 2009
9 - 11 a.m.
New AM Technical Rules
Las Vegas Convention Center - Room S226

Moderator: Cris Alexander, Crawford Broadcasting Company, Denver, Colo.

9 a.m.
New AM Technical Rules -- Current Rule Making Status, History and Benefits
Raymond Benedict, CPBE, Society of Broadcast Engineers, Washington, D.C.
In this presentation, Mr. Benedict will provide a brief history of the path that brought us the new AM technical rules as they pertain to AM directional antenna performance verification by modeling and conventional field intensity measurements, as well as an overview of the rules themselves. The benefits of modeling will be explored, as contrasted against traditional field intensity measurements. Finally, Mr. Benedict will discuss what arrays are and are not eligible for the modeling option.

9:30 a.m.
Modeling AM Arrays
Benjamin Dawson, Hatfield and Dawson, Seattle, Wash.
There is much more to properly modeling AM directional array than simply defining geometry points, wires and sources. To obtain a valid model to which an array can be adjusted for the purpose of producing the proper directional pattern, the modeling process involves impedance matrix measurements and adjustment of the model to match real-world impedances. Ben Dawson, P.E. will explain the modeling process for the purpose of providing those considering this option a good idea of what is involved.

10 a.m.
Field Measurements for AM Modeling
Ronald Rackley, du Treil, Lundin and Rackley, Inc., Sarasota, Fla.
The process of modeling an AM directional array begins and ends with a number of field measurements. Ron Rackley, P.E. will detail the proper procedure for making impedance matrix measurements precedent to modeling. He will also discuss calibration of the sample system and deal with detuning of unused array elements. Finally, he will explain what is required to satisfy the requirement of the new rules to recertify the sample system of an array licensed pursuant to the modeling option every two years.

10:30 a.m.
New AM Technical Rules -- Panel Discussion
Panelists answer questions from the audience and provide further insight into the new AM Technical Rules.
Cris Alexander, Crawford Broadcasting Company, Denver, Colo.
Benjamin Dawson, Hatfield and Dawson, Seattle, Wash.
Raymond Benedict, CPBE, Society of Broadcast Engineers, Washington, D.C.
E. Glynn Walden, CBS Radio, New York, N.Y.

Wednesday, April 22, 2009
9 a.m. - 12 p.m.
Video Compression and Coding
Las Vegas Convention Center - Room S228
Chairperson:

9 a.m.
The Role of MPEG-4 within Contribution
David Mitchinson, Tandberg Television, Southampton, UK
Customers are increasingly seeking improved bandwidth efficiencies for all contribution applications. For newsgathering, improving efficiency is key to reducing operational costs and in many cases, enabling the economic migration from SD to HD. This paper examines the potential applications for MPEG-4 in the context of all contribution applications. It examines how fundamental requirements, such as low end-to-end latency, can be met. Having examined how MPEG-4 performs within basic contribution environments the paper progresses to examine the more quality-conscious, higher bit-rate 4:2:2 applications currently dominated by MPEG-2.

The paper provides an insight into the potential benefits of MPEG-4 from delivering efficiency savings through to delivering video quality improvements having provided a technical assessment of the technology, including fidelity extensions such as 10-bit quantization and 1080p, the paper concludes by examining the current marketplace and predicts where MPEG-4 can be expected to have an impact.

9:30 a.m.
Compression and Coding – What is Dirac?

Tim Borer, British Broadcasting Corporation, Tadworth, Surrey, UK
Dirac is a new family of video codecs spanning the applications ranging from mobile to ultra high definition TV and film and video post production. It is a royalty free codec with compression performance is comparable to AVC/H264 for distribution and JPEG2000 for production. Dirac has now reached a degree of maturity and is used in several applications. This presentation will provide an overview of Dirac, what it is and what it can be used for. It will describe the technology uses (wavelets like JPEG2000 and motion compensation and arithmetic coding like H264). The applications and advantages will be also described. The presentation will discuss the the development of Dirac, the business models Dirac supports and how they relate to the broadcast and content creation industries. A key factor in the adoption of Dirac will be standardisation and its royalty free status. This presentation will address the latest news on progress towards standardisation and will discuss patents and IPR issues.

10 a.m.
Using 10-Bit H.264 Encoding with 4:2:2 for Broadcast Contribution
Pierre Larbier, ATEME, Bievres, France
10-bit is the standard for professional video. Sporting events are shot in 10-bit HD, films are scanned at 10 bits, video is edited at 10 bits and television broadcasts are archived in 10-bit. But when it comes to broadcast contribution, encoders and decoders are limited to 8 bits, the same as for consumer video. When transmitting video from one point to another picture information gets lost and quality suffers.

This paper will argue the case for replacing MPEG-2 with 10-bit H.264 encoding with 4:2:2 chroma sub-sampling for broadcast contribution applications. By transmitting in native SDI (4:2:2 10 bit), studios can receive contribution content at the same level of quality that they've come to expect from years of working with professional digital tape. The bandwidth efficiency of H.264 allows for delivering 10-bit video content over IP, a viable alternative to expensive satellite or manual tape-based workflows.

10:30 a.m.
Migration of Contribution Links to AVC
Ian Trow, Harmonic, Sunnyvale, Calif.
Tom Lattie, Harmonic Inc, Sunnyvale, Calif.
Selecting the correct technical strategy for broadcast contribution presents broadcasters with a wide variety of options. While MPEG-4 AVC (H.264) is becoming a more widely adopted codec, moving from IPTV to satellite and broadcast applications, it has yet to become widely deployed for contribution links. At face value, the ability to reduce link capacity (and lower costs) warrants serious consideration be given to AVC. However, to date much of the AVC work has been focused on low bit-rate emission networks like DTH and IPTV, making some of the core development efforts somewhat inconsistent with the higher bit rate and quality goals of contribution links.

AVC's focus on IPTV networks has made it more robust and appropriate for IP-based networks when compared with predecessor legacy standards like MPEG-2. This advantage is carried through to the application of AVC in contribution applications and consequently makes bandwidth more plentiful and workflows shorter. This paper will investigate the issues surrounding the selection of MPEG-2 or AVC and the optimum operational bit rate of each. Both CODECs will be compared and contrasted highlighting their strengths and weaknesses relative to news gathering applications where the adoption of high definition and the increased use of IP-oriented networks are changing long-held practices.

11 a.m.
Impairments for Multi-generation JPEG2000 Compression
Helge Stephansen, T-VIPS AS, Oslo, Norway

A typical television programme is subject to multiple compression and de-compression cycles before its final compression for broadcast emission. Recently, broadcasters have become aware that by increasing the quality level in production, including contribution, postproduction and storage, it is possible to compress the broadcast emission signal to a lower bitrate while maintaining the same visual quality. This translates to increased potential revenue for broadcasters.

One of the well known properties of JPEG2000 is that mathematically lossless encoding can be carried out at a compression ratio around 2:1. With the right codec settings, it is also possible to perform an unlimited number of compression generations with no additional picture quality impairment beyond the first encoding. Therefore, an efficient scheme would be for the first round of encoding to compress each frame of video to a level where artefacts are about to appear and subsequent lossless compression stages will maintain that quality level at the same bit rate. This paper will present the performance of concatenated JPEG2000 compression for television images using optimized combinations of wavelet filters and compression ratio.

11:30 a.m.
It's Not Dead Yet! MPEG-2 Video Coding Efficiency Improvements
Matthew Goldman, Tandberg Television, Bedford, N.H.
Broadcasters are required by federal regulation, and locked into in practice due to the millions of consumer digital televisions (DTVs) purchased, to use the MPEG-2 Video format for free over the-air DTV service to the home. The 19.39 Mbps bandwidth is already a constraint for those broadcasters that offer multiple DTV services in a single 6MHz channel. With the advent of new Mobile/Handheld services being introduced in 2009, the need for more efficient coding is paramount. Improvements in MPEG-2 Video coding efficiency are extremely valuable.

Contrary to widespread belief, MPEG-2 Video has not yet reached its maximum performance. Improvements in integrated circuit speed and intelligence mean that the amount of information that can be processed in real-time enables new approaches to coding MPEG-2 Video that before were not possible. Examples include fully exhaustive motion searches and predictive processing, rate-distortion optimization (RDO) algorithms, and lessons learned from implementing MPEG-4 AVC coding retrospectively applied to MPEG-2 Video to improve the use of the compression algorithms. This paper will explore new approaches to coding MPEG-2 Video efficiently. Wherever possible, simulation results will be used to demonstrate the improvements.

Wednesday, April 22, 2009
11 a.m. - 12 p.m.
Towers and Transmission Systems Part I
Las Vegas Convention Center - Room S226
Chairperson: John Lyons, The Durst Organization, New York, N.Y.

11 a.m.
Guy Anchor Rod Corrosion: Probability, Self Inspection, Detection and Prevention
David Davies, ERI - Electronics Research, Inc, Chandler, Ind.
Tower collapse due to galvanic corrosion and subsequent foundation failure was last year's second leading contributing cause of tower disasters. The effects of galvanic corrosion are unseen and go under-detected when employing the current industry-standard inspection methods resulting in sudden and often catastrophic tower failures. This paper will present, the root causes of galvanic corrosion, why this problem is exponentially increasing, how to self-evaluate the corrosion risk based upon available site data, detection procedures, and prevention methods, along with the advantages and disadvantages pertaining to each method and their relative cost. Also presented is ERI's experimentation and findings concerning a detection method that has proven to be non-intrusive and non-destructive, yet highly accurate and cost-effective.

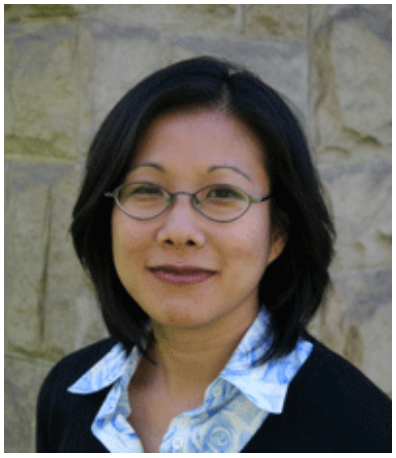
This paper will be of interest to TV and Radio tower owners, tower renters, consulting engineers, tower insurers, and tower maintenance providers.

11:30 a.m.
High Power Radio Frequency Loads and Attenuators for Broadcast Applications
Tim Holt, Bird Electronic Corporation, Solon, Ohio
Radio Frequency Loads and Attenuators are used in many places within the broadcast transmission plant. At the same time, the high crest factors of signals associated with the digital broadcast environment has necessitated the development of new approaches to the design and application of these components. In this paper, we will present the most current approaches to resistive device design, and discuss advantages and limitations of each approach. We will discuss unique failure mechanisms associated with each device type, as well as best operational practices to prevent failure. Finally, we will discuss basic maintenance approaches aimed at extending the operating life of these components.

Wednesday, April 22, 2009

12:00 PM - 1:30 PM
Technology Luncheon
Las Vegas Convention Center – Barron Room
Jack Sellmeyer will receive the engineering achievement award for Radio and Sterling Davis will receive the engineering achievement award for Television. Mimi Ito, renowned digital media research scientist, will deliver the keynote address.

Technology Luncheon Keynote Speaker – Mimi Ito
Renowned digital media research scientist Mimi Ito will keynote the NAB Technology Luncheon, exploring how people use new digital media and mobile technologies in their everyday lives. As a research scientist and cultural anthropologist, Ito primarily focuses on how children and young adults use communications technologies to establish and build relationships. She has studied a wide range of new media practices, from the production, distribution and marketing practices of children's software to the cultural effects of online gaming, social communities and other forms of digital media.



In addition to her studies in the United States, Ito's research group at Keio University studies mobile phone use. She also is researching English-language fandoms surrounding Japanese popular culture, especially anime, Japanese animated film.

Ito has worked on a variety of research projects, including the recently completed study titled Kids' Informal Learning with Digital Media, a three-year project examining how new media and digital technologies change the way children learn, play, socialize and participate in everyday life. She also coordinated 24/7: A DIY (do-it-yourself) Video Summit, an Internet video event that taught amateur video makers about digital and online video production and Internet distribution.

Radio Engineering Achievement Award Winner
Jack Sellmeyer

Jack Sellmeyer is a professional engineer and principal engineer for Sellmeyer Engineering, broadcast engineering consultants. He has spent his 50-year career devoted to the development of radio engineering. He is

the consummate radio broadcast engineer, who began his career working in radio stations then moving to the manufacturing side of the business designing products for the radio industry. He then combined these aspects of his career to become a consulting engineer handling all aspects of radio engineering from FCC applications to transmitter plant design and construction supervision, broadcast studio facilities planning and construction and AM directional antenna design and adjustment and measurements.

Jack began working in broadcasting while in high school and his first position was as a board operator and transmitter operator for radio station KPBM in Carlsbad, New Mexico. He received a Bachelor of Science in Electrical Engineering from Arizona State University in 1965. By that time, he had overseen the construction of an addition to the studio/transmitter building, construction of new studios and the installation of a new 5 kW transmitter for tation KGRT in Las Cruces, New Mexico, and served as Chief Engineer at station KRUX in Glendale, Arizona, among various other pursuits too numerous to mention here.

While at the Gates Radio division of Harris Intertype, Jack was a senior design engineer of FM products. He developed a new Modulator and Automatic Frequency control module for the TE-1 Solid State FM Exciter to correct frequency stability problems. He worked for the Collins Radio Division of Rockwell International as Senior Engineer in FM exciters and on the 5 kW and 1 kW pulse-width modulated transmitters. Jack worked with Forest Cummings to design low-level solid state circuit boards used in the Collins 828E-1 pulse width modulated 5 kW AM transmitter. Collins received three patents on technology used in this transmitter and he was listed as co-inventor on the patent covering automatic modulation sensitivity control.

In November of 1980, when Collins closed its doors after 50 years in the broadcast equipment business, Jack formed Sellmeyer Engineering, where he remains to this day. He has lectured at and helped NAB organize NAB technical seminars and workshops dealing with AM directional antennas and he has published numerous articles. Jack is a member of a number of industry professional societies including AFCCE, IEEE, NSPE, SBE and TSPE.

TV Engineering Achievement Award Winner
Sterling Davis

Sterling Davis is vice president, Engineering for Cox Broadcasting, a veteran with over 40 years of broadcasting experience. He has been involved with every step of TV engineering, from production to distribution, and has

been a prime force in helping to move the television and radio industry into the digital age. He has demonstrated time and again the ability to successfully balance his energy and drive to reach organizational goals, with the necessary diplomacy required to build consensus across a variety of represented businesses and organizations.

Sterling began his broadcasting career as an audio engineer for the ABC network and was then with KTTV in Los Angeles, California for five years. Following 3 years as operations manager for the Vidtronics Company, he returned to Metrotape (KTTV) as chief engineer responsible for operational and production responsibilities for six network sitcoms per week.

In early 1978 Sterling became vice president, operations, for one of the original post-production houses in Hollywood—the Vidtronics Company division of Technicolor. Later in 1978 he joined Telemation Productions in Seattle, where as chief engineer he designed and rebuilt their facility. In 1982 he joined Cox Broadcasting's VU in Oakland as director of operations, managing all aspects of engineering and production including ENG, editing, and traffic. He also began producing and was the executive producer for the MDA and Easter Seal Telethons, Giants' Baseball, and the Chinese New Years Parade. Promoted in 1998 to vice president of engineering for Cox Broadcasting in Atlanta, he assumed responsibility for 15 television and 80 radio stations.

Along with the daily responsibilities of overseeing engineering for Cox, Sterling holds the leadership role of key decision maker in advancing the group towards file-based newsgathering as well as automated news production. He also is responsible for shepherding Cox's transition to digital for both television and radio stations.

Another leadership role for Sterling has been in the advancement of broadcast engineering standards and technologies vital to the evolution of the broadcasting industry. Since its formation in April 2007, he has been chairing the technical activities group of the Open Mobile Video Coalition (OMVC), and is also currently the chair of MSTV's Engineering Committee. For three years, he chaired the ATSC Planning Committee, studying the next stages in the evolution of DTV.

Sterling is an elected member of the ATSC Board of Directors and participates in several technical committees, most notably the ATSC Specialist Group on Mobile/handheld DTV (TSG-S4). He has been active in the in-band/on-channel (IBOC) digital radio standardization efforts of the National Radio Systems Committee (NRSC). He is also a member of IEEE, SMPTE, AES, RTNDA and SBE.

Wednesday, April 22, 2009
2 - 6 p.m.
Towers & Transmission Systems Part II
Las Vegas Convention Center - Room S226
Chairperson: John Lyons, The Durst Organization, New York, N.Y.

2 p.m.
The Application of New LD-MOS Technology to a UHF Multimedia Transmitter Design
Martyn Horspool, Harris Corporation, Mason, Ohio
Over the past 10 years, 32-volt, Lateral Diffused Metal Oxide Silicon (LD-MOS) FET devices have become the technology of choice for high-power linear amplifiers in broadcast RF amplifier applications. Advantages including ruggedness, reliability and linearity have already been well proven. Recently developed, high-power, 50-volt, LD-MOS FET devices have now become available for the UHF television broadcast band (470 860 MHz). This paper addresses the application of these LD-MOS devices in a new transmitter design. Several key operational benefits will be discussed, including the following:
1. Higher power density (more power per RF pallet) compared to existing designs
2. Smaller transmitter footprint
3. Greatly improved AC to RF efficiency
4. Simple, rugged design using fewer components
5. Power levels previously attainable only from tube-based designs

The concept for a new UHF multimedia transmitter platform using the new RF devices will be discussed, including exciter, power supplies, control and cooling systems.

2:30 p.m.
The New FCC Rules for Distributed Transmission Systems (DTS)
S. Merrill Weiss, Merrill Weiss Group LLC, Metuchen, N.J.
In late 2008, the FCC adopted rules for the routine licensing of multiple digital transmitters operating on the same channel and serving an area together. Such transmitters comprise Distributed Transmission System (DTS) networks. The new rules went into effect in January, 2009, with certain application processing aspects following later. DTS networks permit broadcasters to fill in gaps in coverage that are caused by terrain and to extend their service areas through use of added lower power transmitters instead of increasing the power of single transmitters. They do so without the need for additional channels. DTS transmitters can be fed over Studio-to-Transmitter Links (STLs) or over the air, in which case they function as Digital On-Channel Repeaters (DOCRs).

The new FCC rules specify where DTS transmitters can be located, the areas they can serve, the power levels and antenna heights they can use, and the methods for determining interference from and to DTS networks. They also specify the processes for filing applications. The ruling from the FCC opens a brief time window in which it is possible for stations to apply to serve, with DTS, areas that they formerly served with their analog operations but that now are beyond their authorized digital service areas. Given the short time remaining for stations to take advantage of this opportunity, some emphasis will be placed on it.

3 p.m.
Coverage and Interference Analysis of Distributed Transmission Systems
William Meintel, Meintel, Sgrignoli & Wallace, Warrenton, Va.
The FCC is expected to finalize Rules concerning the use of Distributed Transmission Systems (DTS) for Television early in 2009. These systems consist of two or more synchronized transmitters operating on the same television channel in order to improve service over that which can be provided by a single transmitter. This technology takes advantage of the ability of modern DTV receivers to deal effectively with the presence of multi-path even when, as in the case of a DTS system, that multi-path is intentionally generated. The introduction of service to mobile and handheld units by television broadcasters, as well as the need to regain lost analog service, greatly increases the potential need for DTS technology.

Because systems employ multiple transmitters within the same area, a different methodology must be implemented to analyze the potential for interference to other stations operating on the same channel as well on channels adjacent to a DTS system. In addition, for system planning new coverage prediction tools must also be developed to determine the interaction between the transmitters within the system. These tools must take into consideration not only the power, antenna height and antenna pattern of each of the transmitters but the spacing between the transmitters as well as the timing synchronization of each transmitter.

This paper will explain how these systems will be analyzed with respect to causing interference to other stations as well as the tools needed to properly design a DTS system.

3:30 p.m.
Peak Power Ratings for Transmission Line Carrying Multi-Channel OFDM Broadcasts
Daniel Fallon, Electronics Research Inc, Gray, Maine
DVB-T, ISDB-T, FM-IBOC, and their variants all use OFDM modulation. OFDM modulation has a large peak to average power ratio. When several channels are combined together to feed a broadband antenna the transmission line may experience extremely high voltages. The traditional way of calculating peak powers is to find the peak voltage of each channel and then add the voltages. This approach is valid for CW operation but due to the pulsed nature of OFDM peaks it tends to oversize the line for multi-channel OFDM ensembles.

This paper reviews peak power handling calculations, and reviews the process for arc-formation in air. It takes a look at the statistics and duration of OFDM peak events. The similarities and differences with 8-VSB are noted. It then introduces a peak power handling calculation relevant for short pulses. Several specific examples of line size selection for multi-channel broadcasts are presented.

4 p.m.
Improved Lightning Protection for Radio Transmitter Stations
John Pinks, Nautel, Hackett's Cove, Canada
Damage to electronic equipment and loss of on-air time at radio transmitter stations often results from lightning energy induced into the antenna system or the AC line distribution system. This is particularly true at the lower end of the frequency spectrum where tall antenna structures closely resemble traditional lightning protection rods. This technical paper discusses the anatomy of lightning energy and presents a methodology to remediate its harmful effects by careful attention to the physical layout of the site.

Techniques which cause lightning currents to move from destructive to non-destructive paths are discussed in detail. As an additional bonus, the harmful effects that result from the location of the transmitter in the high electromagnetic field of its own antenna are significantly reduced. Implementation of these techniques had proved to provide significant improvement at many problem sites.

4:30 p.m.
New Consensus Standards for Construction Rigging and Protocol
Don Doty, Stainless LLC, North Wales, Pa.
Gordon Lyman, Westower, San Antonio, Tx.
Two nationally recognized organizations, The National Association of Tower Erectors (NATE) and The Telecommunications Industry Association, part of the American National Standards Institute. (ANSI) have collaborated on tower construction and rigging protocol and procedures standard which was recently adopted. The new consensus Standard sets the standard for tower erection, maintenance, modification, antenna replacement and other important protocols.

Broadcasters, consultants, owners, structural engineers and other industry professionals will be able to learn about new safety techniques, engineering review and other processes to make sure that work performed on their tower is done in the safest and most efficient manner.

5:30 p.m.
DVB-T2 Deployment and Impacts
Regis Le Roux, Enensys Technologies, Rennes, France
The European-based consortium DVB defined within only 2 years an extension of the existing standard DVB-T called DVB-T2, for the broadcast transmission of terrestrial DTV. According to the commercial requirements issued in April 2007, the first phase of DVB-T2 will be devoted to providing optimum reception for stationary (fixed) and portable receivers (i.e., units which can be nomadic, but not fully mobile) using existing aerials, whereas the second and third phases will study methods to deliver higher payloads and the mobile reception issue. The novel system should provide a minimum 30% increase in payload, under similar channel condition as used for DVB-T. The expected first region to use the new standard will be Grenada in November 2009. This paper will discuss the following:

When considering global deployment of DVB-T2 standard in a country, some aspects should be carefully evaluated:

-Does DVB-T2 will require a similar SFN network as DVB-T ?

-What are the main challenges for Test & Monitoring solutions to guarantee DVB-T2 validation?

Wednesday, April 22, 2009
2 - 5:30 p.m.
Loudness, Lipsync and AFD for DTV
Las Vegas Convention Center - Room S228
Chairperson: Graham Jones, NAB, Washington, D.C.

2 p.m.
Television Audio 101 to 5.1
David Casey, Neural Audio, Kirkland, Wa.
Television audio has become as complex as its video counterpart. With new transmission methods, channel configurations and loudness standards, producing a great -sounding broadcast requires a strong grasp of each of these technologies. This paper will provide an overview of the major audio technologies and standards in use in television today and will touch on some best practices as well as common misconceptions. This paper should be a great introduction for those who are new to television audio as well as a solid review for those who want to brush up on their audio knowledge.

2:30 p.m.
Lip Sync for IP-Based Mobile Television Service
Michael Dolan, TBT, Inc, Del Mar, Calif.
Lip-sync has haunted digital television services since their first broadcast and remains a technical challenge. As we move into the new environment of mobile television services, the challenges start over again since the technology is IP-based and not MPEG-2. Although Internet delivery of streaming audio/video provides a certain level of sync, it falls short of "broadcast quality". A new level of timing precision is needed to achieve broadcast quality. This paper will address the existing technologies and describe a precision of usage and models needed to achieve broadcast quality behavior and synchronization.

3 p.m.
Loudness Monitoring in a Digital System
John Hartwell, Hartwell Consultants, San Francisco, Calif.
Audio loudness has been an issue with broadcasters almost since the inception of broadcasting, with research dating back to the 1930s. Most of the loudness issues in the early days of audio broadcasting were the result of the technology at the time, which required a limited dynamic range for better signal to noise ratios, and allowed higher audio distortion than achievable today. Both of which contribute to the listeners perception of delivered audio as being loud. With advancements in technology and an improved delivery system, loudness became more of a signature of the broadcaster and a tool for the advertising agency, where signal processing limited the dynamic range even more, yet met the FCC's mandate of transmitted modulation levels. These practices, intending to make the audio seem louder, has infuriated television viewers with an outcry of complaints, culminating with a possibility of loudness legislation and regulations.

This paper explores the use of ITU B.S. 1770 / 1771 as a means to measure loudness, its'effect on Dialogue Normalization as specified in the ATSC A53 digital television standard and common practices in delivering Normalized Dolby
Digital.

3:30 p.m.
Control of Loudness across Broadcast Platforms
Thomas Lund, TC Electronic A/S, Brabrand, Denmark
With the transition to digital, unacceptable inter-program level jumps have become more frequent in

broadcast, for instance between programming and commercials or promos. For years, the author has investigated how to predictably and transparently control loudness, and, at the same time, minimize audio distortion in digital film, music and broadcast. The paper summarizes recent findings, and demonstrates how open standards may be used to easily accomplish these goals not just in DTV, but across all broadcast platforms, and at a minimum of station workload and expenditure.

Procedures that focus solely on HDTV or solely on dialogue are not adequate to encompass even today's requirements. It is reported how broadcasters around the world are therefore adopting novel open standard audio descriptors in delivery specifications, ingest, and transmission, and how the new techniques produce predictable results and high audio quality with equipment of different brands, and with various data reduction codecs.

This paper is targeted to audio production, installation, transmission and management professionals. It provides scientific information based on research and experience from countries around the world, and does not endorse or promote commercially available equipment.

4 p.m.
Metadata Challenges for Today's TV Broadcast Systems
Randy Conrod, Harris Corporation, Mason, Ohio
Utilizing metadata for audio and video essence enhanced processing is one of the key aspects for designing today's systems. This paper is a discussion of what is possible, what works well and what doesn't work so well. Examples of audio metadata for Dolby applications and AFD for aspect ratio signaling will be given.

4:30 p.m.
AFD and Dolby Metadata Implementation: The Telequebec Story
Jean-Claude Krelic, Miranda Technologies Inc., Montreal, Canada
AFD Active format description (SMPTE-2016) and Dolby Metadata (SMPTE-2020) are fairly young new standards. More and more broadcasters are implementing these solutions, including Tele-Quebec - a Montreal Broadcaster - which recently starting broadcasting its new HD channel. In this paper we will cover how they have implemented the use of these new standards, the challenges they had and what benefits they have gained.

This paper also highlights solutions to general audio-related issues associated with transitioning to HD and Digital delivery, including handling a mixture of stereo and 5.1 surround channels, tracking audio meta data, transporting multi-channel audio during distribution using mezzanine coding techniques like Dolby E, Level normalization (to maintain consistent audio levels across a dynamic playout schedule and multiple channels) and audio-to-video delays.

5 p.m.
Designing and Testing AFD-Enabled Systems
Paul Briscoe, Harris Corporation, Mason, Ohio
This paper discusses the use and systemization of AFD, with a focus on testing devices and end-to-end systems. AFD describes the format of the content with which it's associated, but does not itself solve anything without significant user understanding and system planning. Simply 'turning on AFD' is a recipe for disaster. With the need to deliver content in at least two aspect ratios and working with that or more upstream of distribution, today's broadcaster faces difficulty ensuring the screen is always most appropriately filled with content. The paper will help the user understand what AFD can and cannot do for them, what limitations they may face, and what they need to know to effectively manage their content using it. This will include the use of AFD at ingest, throughout the production path, and at time of broadcast, in addition to handling of archives. Practical examples

of success stories and pitfalls as well discussion of the contemporary limitations of the overall path to the home and home equipment will be used to illustrate and reinforce the content. The latest CEA discussions around the last mile will also be discussed.

6 – 8 p.m.
Amateur Operators Radio Reception
Las Vegas Hilton – Room Ballroom B
Always one of the most popular events at the convention, this reception draws hundreds of broadcasting's best and brightest, from company CEOs to shop technicians, for a relaxed evening talking shop, enjoying the fellowship of the radio amateur community and winning fabulous door prizes! Sponsored by Heil Sound Ltd.

Thursday, April 23, 2009

9 -11 a.m.
Alternative Broadcast Platforms
Las Vegas Convention Center - Room S226
Chairperson: James O'Neal, TV Technology, Alexandria, Va.

9 a.m.
Is It Still a TV When It's Connected?

Pat Dunbar, Microsoft, Mountain View, Calif.
Whatever the name, ad dollars will follow the evolution of video to a multiplatform environment, taking advantage of new facilities to reach consumers in innovative ways. A picture will still be worth a thousand words and so the question for marketers is how best to leverage and manage to the capabilities of today's video technologies.

9:30 a.m.
Peering Ahead: The Future of Broadcast over Broadband
William Cooper, informitv, London, UK
Peer networks enable the efficient and economic online distribution of files and streams to potentially millions of users. In a peer network, each node functions as both client and server, sharing data with other users. This helps spread the load to the edge of the network, so that capacity grows with demand. A number of major broadcasters are now using peer-assisted delivery for downloading programmes over broadband networks. New entrants are building broadband platforms to stream on-demand programming and even live radio and television channels.

Delivering live television over a peer network is a major technical challenge. A promising approach involves splitting a stream into multiple stripes, each of which can be shared with other users, without having to relay the whole stream. Techniques such as forward error correction and multilevel encoding can be used to enable efficient distribution while protecting against the effects of delays and packet loss. As with any broadband service, the quality is ultimately limited by the speed of the connection of each end user. Based on recent developments and deployments, this paper looks at the fundamental principles and the disruptive economics of peer-assisted distribution over broadband networks and examines its potential to supplement or even eventually replace conventional broadcast delivery.

10 a.m.
Extending Video Services beyond TV with Real-time Video Content Re-purposing
Adam Tom, RGB Networks, Sunnyvale, Calif.
Video service providers are best positioned to differentiate themselves from their competitors by delivering content to multiple devices, including PCs, TVs, and wireless handhelds. Instead of creating and storing content offline in multiple resolutions and formats and in multiple locations, or creating overlaying video networks,

operators can realize better efficiency with reduced capital and operational costs by re-purposing content in real-time. In addition, time-critical and local content such as late-breaking local news can to be delivered in real-time to many devices simultaneously. This presentation describes a highly scalable and integrated solution that enables real-time video content re-purposing, allowing operators the flexibility to perform format, resolution and other video characteristics conversion to and from multiple video formats to create their service offerings for multiple devices. This solution also provides the opportunity to deliver targeted advertising and other revenue-generating applications to a variety of devices based on a converged video network.

10:30 a.m.
Overview of NHK's Video-on-Demand Services and System for Broadcast/Telecom Convergence

Hiromitsu Miyazaki, NHK (Japan Broadcasting Corporation),Shibuya-ku, Japan

There are about 30 million broadband subscribers in Japan and various VoD services are gradually becoming popular. Each subscriber can receive video streaming services including even HDTV, without much stress at anytime. These broadband circumstances are causing a change of TV viewing style. NHK has started a new pay VoD service called NHK on Demand, which offers catch-up TV services and older popular archive programs, in partnership with some major VoD service providers. We hope that this service will enhance the existing broadcasting service with synergy in broadcast-telecom convergence. We provide this service in various streaming formats (WMV, MPEG2 HD and H.264 HD) through multi-delivery platforms in order to give more viewers the opportunity to enjoy our TV programs independent of viewer's different networks and terminals on such as PC, STB for Cable TV and digital TV set for IPTV.

Especially for these new services to multi-delivery platforms, we developed a new production system which can enable us to perform a series of operations such as ingesting, editing, transcoding, verifications and uploading in a quick and efficient manner. This paper describes the NHK on demand service, the whole system configuration and newly developed production system for this service.

Thursday, April 23, 2009
9 a.m. – 12 p.m.
Television Infrastructure Part I
Las Vegas Convention Center - Room S228
Chairperson: Chuck Phelan, National TeleConsultants, Glendale, Calif.

9 a.m.
How to Define and Build your Next-generation Broadcast System.

SiuYin Loh, Beyond Broadcast LLP, Singapore, Singapore

How do we plan for the future when technological change is upon us everywhere? What does one do to avoid the endless upgradge cycle? Can it be avoided at all? Software engineers have been trying to build software with hardware-like building blocks. Can broadcast engineers planning to build or extend hardware infrastructure gain traction with the agile development method practiced by some software engineers? The two disciplines share certain key challenges: a) Users not knowing exactly what they want - "Show me something else as I know I don't what that". b) Developers/engineers not knowing how to build something that has never been built before -"Our needs are unique and thus we are trying this novel approach, its something we've never done before."

9:30 a.m.
10 Gigabit Networking for Audio and Video Applications

Stephen Lampen, Belden, San Francisco, Calif.

The hottest new thing in data is 10 gig, 10 GbaseT, and it will be sweeping into audio, video and broadcast applications soon. This presentation shows what it is, how it works, and why previous cable designs don't

work. Connectors, patch panels, and patch cords are also critical and are included. This presentation starts with the history of Ethernet and twisted pairs for data.

10 a.m.
H264 Compressed HD Playout - Without Compromising on Quality
Jacques Le Mancq, Thomson, Boulogne, France
The latest H264 video processing technology opens up new possibilities for digital video applications. Having the ability to store transmission-ready video files in a transport stream format is an attractive proposition as it can reduce the size and complexity of digital broadcast systems whilst offering the ability to deliver high quality video at very low bitrates. Despite these obvious benefits, baseband playout servers are still more widely used than compressed video servers. This is mainly due to the fact that compressed video playout servers do not support frame accuracy in the H264 video domain "which means that they cannot work under automation control.

This paper will explore how the gap can be closed between an automation system that requires frame accuracy and a ready-to-broadcast transport stream with 1 or 2I-frames per second. We will illustrate how, by processing in real-time, the compressed video bitstream can perform frame accurate playout. We will then examine the impact of using a compressed playout server rather than a combination of baseband playout server and compression systems, for a medium sized-HD playout center.

10:30 a.m.
Are Fully Digital Workflows A Pipedream?
Chris Lennon, Harris Corporation, Mason, Ohio
Users (broadcasters, program producers/distributors, ad agencies and commercial producers) don't believe that technologists can integrate all their systems, and many technologists don't believe that users know or care enough about metadata. Both are mistaken, of course. This leads to a bit of a "chicken and egg" situation in the realization of fully digital workflows and the efficiencies they promise. A classic example is the slow adoption of new means of content identification, such as ISAN and Ad-ID, and the improved metadata flows that these standards permit. This paper will explore the stumbling blocks, enablers and milestones that users encounter along the way to their ultimate goal of fully digital workflows and will attempt to show users the path of least resistance.

11 a.m.
Advanced Techniques for Re-using Satellite Bandwidth
Sidney Skjei, P.E., Skjei Telecom, Inc., Falls Church, Va.
Two advanced techniques which have been termed Hierarchical Modulation and Layered Modulation are now being used to increase satellite transponder throughput and re-use bandwidth. Both backward compatible (i.e. sharing bandwidth with an existing population of receivers) and non-backward compatible modes are available, and are particularly applicable to digital television and radio broadcast distribution networks. Through put improvements obtainable by using these techniques are in addition to those obtained by use of advanced modulation systems such as DVB-S2, turbo coding, etc. Products such as Paired Carrier Multiple Access (PCMA), DoubleTalk^{TM}, Carrier in Carrier^{tm}, which embody some of these capabilities, are commercially available and in use today. The paper describes these techniques from a system standpoint, discusses potential applications/motivations for use, and provides some considerations regarding use of these techniques.

11:30 a.m.
Delivering Digital and HD Programming to the Market at Breakthrough Speeds
Ken Brady, Turner Studios, Atlanta, Ga.
Turner Studios, the largest all-digital production facility in the southeast U.S., provides turnkey production

services worldwide for the Turner Broadcasting networks, including live and post-produced video and audio production. Two years ago, Turner Studios was struggling to manage an ever increasing volume of media content with its shared Direct Attached Storage (DAS) systems. Editors and clients accessed different systems using different methods from different workstations in order to access key media content. The organization had difficulty keeping up with storage demands. With a rapidly growing business, including the recent addition of NBA TV, an expanding list of broadband projects and the arrival of high definition programming, the company struggled to keep up with escalating storage demands. It quickly became apparent that deploying and expanding multiple shared servers would not ultimately meet the needs of the business.

This paper details how Turner solved its data growth challenge and integrated next-generation scale out storage with Apple Final Cut Pro and other advanced editing applications to create a high-performance digital media pipeline to accelerate project completion times. Today, Turner has compressed five years of encoding work into two, reduced IT cost and complexity and streamlined its operations to deliver more projects, faster, directly impacting Turner's bottom line.

Thursday, April 23, 2009
1 - 3 p.m.
Television Infrastructure Part II
Las Vegas Convention Center - Room S228
Chairperson: Chuck Phelan, National TeleConsultants, Glendale, Calif.

1 p.m.
Synchronization & Timing for the 21st Century
Peter Symes, SMPTE, White Plains, N.Y.
Present-day solutions for synchronization (black burst) and for time labeling (SMPTE 12M timecode) are both more than 30 years old. Although current implementations are still viable, they are inappropriate as long-term answers for the digital world. SMPTE and EBU formed a Joint Task Force to examine user requirements, and to seek proposals from the television industry, and from other industries, on cost-effective solutions for the future. The work of the Task Force will be concluding in early 2009, at which time proposals will be forwarded to SMPTE as input for due-process standardization.

The paper will describe the work of the Task Force, and the proposals in its final report. The intention is to promote a more wide-ranging discussion among potential users to ensure that requirements have indeed been met, and to seek further guidance for the standards process.

1:30 p.m.
Efficient Production Switching in Multiformat Environments
Ankit Patel, Echolab, Inc., Billerica, Mass.
Production companies with the means to apply complex effects and transitions during live sports coverage, music and entertainment shows, and TV programs have a decided advantage in bidding on high-profile projects. As they upgrade to HD, these companies require production systems that support sophisticated switching and effects while taking up a minimum of space and demanding very little setup. This presentation will explore handling both SD and HD sources smoothly, using a switcher's internal conversion and synchronization capabilities, and deploying powerful key layering and special effects tools to simplify complex production tasks in a multiformat environment.

Multiformat switcher technology provides a foundation for creation of a compelling on-air product and complementary tools add simple yet valuable functionality. Integration of an SD/HD-compatible multichannel instant-replay system, for example, can put dozens of channels at the operator's disposal for immediate synchronous playback. In a football or baseball game, this capability helps to draw viewers into the action

through use of multiple perspectives on a single play. The integration of a clip playout system with the switcher further enhances the creative power of the operator, offering convenient graphics this paper discusses the multiple features and tools that are available to enhance production capabilities for SD and HD content. These technologies make HD production more efficient and make quality HD work more affordable.

2 p.m.
Dual-3G SDI for 3D, 4K and 1080p60-RGB Production and Post Production
Nigel Seth-Smith, Gennum Corporation, Ontario, Canada
The new 3Gb/s SDI standard, SMPTE 424M/425M, allows for the transport of video formats up to 1080p60 at 1920 or 2048 samples per line using 4:2:2 coding over a single coaxial cable. It can also carry 1080p formats at lower frame rates, or 1080i formats, using 4:4:4 or 4:4:4:4 coding, with 10 or 12 bit word depths. The 3Gb/s standard is being taken up by the industry, and is becoming the norm for all new infrastructure. There are, however, applications where it is desirable to transport even higher data-rate formats. A combination of higher frame rates with greater bit depths exceeds the capacity of a single 3Gb/s interface. Similarly, higher resolution formats such as 4K are in use, particularly in post-production, as are 3D production formats.

This paper describes a method of coding these higher data-rate formats onto a pair of 3Gb/s links, so that they can be reliably carried via the 3Gb/s infrastructure. It also includes a mapping for 3D.

2:30 p.m.
The Production System and Workflow of the Best Quality TV Drama using HDTV 4:4:4 in NHK
Yutaka Kikawa, Japan Broadcasting Corporation (NHK), Tokyo, Japan
NHK is now producing a major period drama series, "Cloud above the Slope". To record the best quality HD and make more realistic visual effects of old-time Japan, NHK adopted 10-bit RGB 4:4:4 as a recording format for the first time ever in NHK's drama production. It was very important that shooting equipment should be mobile and compact, for the sake of shooting large-scale war scenes. We needed dual-link optical transmission of 4:4:4 format for long-distance transmission. For HD camera output, we developed a new dual-link optical transmission equipment mounted on the camera, since there is no suitable commercial product. This equipment enables the same number of staff to shoot materials as usual for dramas. This paper describes the equipment and other self-produced equipment, such as "HDCAM-SR portable separate adapter", and "Portable image composition system" which can compose rough CG and the camera signal on the spot. In addition, we report an efficient workflow of our drama production using this format with visual effects of old-time Japan and scenes using a live camera.

Thursday, April 23, 2009
1 - 5 p.m.
Storage, Archiving and Asset Management for Television
Las Vegas Convention Center - Room S226
Chairperson: Thomas Edwards, FOX Technology Group, Los Angeles, Calif.

1 p.m.
So You Want to Build a File-Based Production
Joey Faust, National TeleConsultants, Inc., Glendale, Calif.
Transitioning from the hardware-centric, tape-based production models of the last millennium and moving into the world of file-based workflow is no longer a question of preference--it has become a necessity! The good news is that the tools and techniques for successful implementations have been refined and tested over the last few years, and building a file-based facility is now less daunting than it ever has been. There are still a number of facets to consider: systems integration, bandwidth, storage, MAM, editing, archive, security, disaster recovery, vendor management, and staffing. This paper will serve as a primer for those looking to invest in a

file-based facility who may be overwhelmed by the new considerations. It will cover best practices, pain points, and common gotchas in implementing these types of systems. It includes real stories from the trenches, and ways to avoid difficult (and costly!) issues that may arise.

This paper covers file-based workflow from ingest through archive, including the software, hardware, and human infrastructure necessary to support it. New techniques and directions that are becoming more popular in modern media facilities will be discussed.

1:30 p.m.
Automatic Structured Content Archiving Towards Improved Multimedia Search
Sebastien Weitbruch, Deutsche Thomson OHG, Villingen, Germany
Many institutions are responsible for the collection and preservation of multimedia archives with unique and invaluable legacy. To preserve this cultural heritage for future generations, access, semantic linking and visibility of knowledge is as important as its secured and robust archiving. New advanced technologies for content retrieval are emerging based on new multimedia search engines. However, knowing that only in Europe more than 30 millions hours of audiovisual archives are available it is clear that no search engine will be capable to analyze existing archive on the fly but that the archive must be structured, indexed and that appropriate metadata must be available.

This situation lead to the creation inside the THESEUS project funded by the German Federal Ministry of Economy and Technology (BMWi) of a project named CONTENTUS. This project will target the creation of innovative solutions for archiving rich multimedia content providing automatic quality analysis, material restoration, storage optimization, metadata generation and aggregation, semantic linking while supporting future generation of search engines.

2 p.m.
Solving the Asset Management Challenge in an HD World
Robert Caldeira, Focus Enhancements, Inc., Campbell, Calif.
The sheer volume of video and other media assets produced today can represent nothing short of a logistical nightmare for many organizations. While the revolution of file-based tape-less acquisition has streamlined the acquisition workflow and reduced the industry's dependence on videotape-based storage, pinpointing a digital file is no easy task. All too often, organizations fail to take advantage of their existing assets, simply because they don't know what they already have!

Through the introduction of Media Asset Management (MAM) solutions, acquisition, storage and retrieval of digital media assets are drastically streamlined and can save organizations significant time and money. As a result, organizations and individuals are looking closer at MAM solutions where growing interest is created to better understand the key enabling technologies driving these solutions.

Therefore, this paper will look at the components associated with the challenge of asset management of high definition content in today's file-based tape-less workflow.

2:30 p.m.
Storage Virtualization - Disks, Tape and More
Keith Graham, AZCAR, Canonsburg, Pa.
This presentation will explore how the impacts of continued growth in media and related content are driving new dimensions in accessibility and physical storage. Short term, near term and archive of content is forcing the harmonization of spinning disk, solid state memory and digital tape. These solutions in turn

drive choices that include abstracting logical storage from physical storage " otherwise referred to as ˜the virtualization of storage. Virtualization provides the means for many users or applications to access storage without being concerned with where or how that storage is physically located or managed. Security, interaction and storage management requires new systems be deployed.

This presentation will review both current and emerging storage methodologies that must be configured for massive file sizes, collaborative production and geographically diverse distribution. The practical implementation of RAID, SAN and NAS for magnetic, silicon based and linear data storage systems will be reviewed in connection with virtually tape and disk libraries. The standardizations efforts of SMPTE AXF will be highlighted as applied to storage system management.

3 p.m.
Construction and Operation of a Direct Non-linear Server System for the Beijing Olympic Games
Sumi Tokunaga, NHK (Japan Broadcasting Corporation), Tokyo, Japan
We constructed a direct non-linear server system capable of consistently ingesting, editing, playing out, and archiving video contents for the Beijing Olympic Games. The video format was DVCPRO HD. We selected non-compressed 8-channel audio for 5.1 surround sound production. The server accommodates 3700 hours of programs and is connected to 43 client terminals: 10 for ingesting, 25 for editing, 6 for playing out, and 2 for archiving. We achieved a system with high dependability, high throughput, and low cost by using mostly general-purpose high-performance computers and newly developed high-reliable software applications. This paper gives full details and capabilities of the system which achieved efficient and stable operations.

3:30 p.m.
A New Approach to Audiovisual Digital Archiving
Matthew Addis, IT Innovation Centre, Southampton, UK
There are over 100 million hours of audiovisual material in Europe's archives. The data volumes are huge (hundreds of Petabytes in total) and will double within two years with most new material being born digital. This material needs to be kept safety, securely and with high levels of content integrity for 50 years or more. At the same time, digital audiovisual archives are becoming "embedded" as services within wider networked infrastructures and content-centric processes. The business models and processes surrounding the storage, preservation and access to digital assets are evolving fast, access to archive content now takes place across organisational boundaries and there is a nascent but growing market for outsourced archive hosting as a service. This paper presents work in the UK AVATAR-m project on how to specify and govern federated archive services that involve both local and remote storage. Our focus is how to achieve high levels of data safety when multiple storage services are combined. This paper describes the techniques and models being investigated the many factors and the expected results.

4 p.m.
Applying Best-Practice IT to Solve Legacy Issues with File-Based HD Production
Luis Estrada, IBM, Atlanta, Ga.
As broadcasters continue their ad-hoc adoption of file-based production technologies, they often find themselves perpetuating basic inefficiencies in the workflow imposed by limitations within their traditional analog production. The rapid transition to High Definition (HD) production is forcing the issue of finding dramatically lower-cost and faster methods for content and metadata creation, transport, and storage. In particular, distributing HD content over new distribution channels in today's dynamically changing environment presents a major challenge.

This presentation will focus on implementing an optimized digital workflow through an IT-based HD-

capable infrastructure by:

- Managing HD file-based content while keeping the costs in line
- Integrating traditional broadcast transport and encoding standards with IT industry open standards
- Taking advantage of a media-aware Service Oriented Architecture (SOA) for workflow design and tuning
- Providing an enhanced and immersed audience experience by delivering interactive data streams along with video and audio
- Transforming content into the right format for web portals, IPTV, mobile, etc.

Using case studies, this presentation will examine how broadcasters can improve efficiency, responsiveness, and the quality of their content to meet current and future audience demands.

4:30 p.m.
A Service Oriented Approach to Online Digital Audiovisual Archives
Matthew Addis, IT Innovation Centre, Southampton, UK
In many parts of the audiovisual community the boundaries between the environments used for content creation, distribution and archiving are becoming blurred. The transformation in the way that electronic media is created and consumed is being followed by a transformation in the way that this content is archived, repurposed and reused. Traditionally, archives have sat at the tail end of the content lifecycle and provide a place where content tends to 'end-up' for safe keeping. However, today digital audiovisual archives are increasingly 'embedded' as active facilities within wider networked infrastructures and content-centric processes.

The archive becomes an integrated repository of audiovisual assets which are under continuous development and reuse. This paper presents work done in the UK AVATAR-m project on service-oriented approaches to digital permanence and preservation of audiovisual content. In particular, we recognise that the business models and processes surrounding the storage, preservation and access to digital assets are evolving fast and transcend traditional organisational boundaries.

Our approach embraces this new world where archives can be both deployed in-house and as third-party services. Our specific focus is how to specify and then govern federated storage services in a way that ensures the long term safety, security and accessibility of audiovisual assets in a managed and cost effective way.

Thursday, April 23, 2009
3 - 5 p.m.
Television Content Protection
Las Vegas Convention Center - Room S228
Chairperson: Patrick Griffis, Dolby Laboratories, San Francisco, Calif.

3 p.m.
Generating New Revenue Streams
Andy Nobbs, Teletrax, London, UK
These are creative times, people create and consume content, not worrying about consequences, enhanced by the free spirit of internet and technical innovations. People demand universal access to content, anytime, anywhere. But often it is only after content has been experienced, that its true value is appreciated and with it the potential for return.

This evolution needs new rules and technologies for making content digitally available and for unlocking its value. Over the past few years, watermarking and fingerprinting technologies have grown in acceptance as a mean to control and manage content. By providing new measurement data and by controlling their televised

and online inventory, media executives are now able to find and generate new revenue streams.

This will explore (through examples/case studies) how embracing new "content measurement" technologies and services can provide media executives with critical intelligence enabling them to better understand manage their offerings and monetize their assets.

3:30 p.m.
Content Protection in the Digital Age: Protecting Programs, Platforms, People and Profits
Sue Farrell, Red Bee Media, London, UK
For the broadcaster, much of the focus on security to date has been on the prevention of piracy through the use of encryption, conditional access or copy protection of channels or programs, generally safe in the knowledge that their facility is physically secure and their distribution network is private. However, there are other security considerations now that broadcasting operations and delivery platforms are based on information technology networks and systems. IT security will be an increasingly important requirement in managing risk for television operations and distribution through broadband data networks. As television becomes more connected to the Internet, the kind of issues suffered by web sites and personal computers will start to affect the home television experience. Spam, denial of service attacks, viruses, worms, phishing, hacking, grooming, identity theft and privacy issues will be only some of the day-to-day problems that will accompany television services delivered through data networks.

This paper will explain the requirement to secure not only the content at the point of delivery, but the entire television service, and consider the new approaches that should be adopted in the media management operation in the digital age.

4 p.m.
Image and Video Fingerprinting: Forensic Applications
Frederic Lefebvre, Thomson, Cesson-Sevigne, France
Watermarking provides solution to overcome copy piracy. Associated with other technologies, it is very helpful to monitor copyright protection. But, sometimes, contents are not copyrighted, and the identification fails. In identification context, watermarking is not the only one solution. A basic method compares two different bit streams using bit to bit distance. Whenever 1 bit changes, the whole hash code changes. Due to content manipulations (voluntary or natural), such as analog to digital conversion (camcorder capture), compression, frames removing or adding (advertising), this strategy based on comparing the bit to bit comparison or hash code is doomed to fail. The multimedia identification/authentication process has to support natural distortion. Fingerprinting solves this problem. Fingerprinting technique extracts discriminating features, called fingerprints or multimedia DNA, representative and unique for each multimedia content. This paper identifies and explains the several techniques that exist to find these unique features.

4:30 p.m.
Watermarking: What Approach will Hollywood Adopt?
Steve Oetegenn,Verimatrix, San Diego, Calif.
TV and motion picture content is finding numerous ways to the consumer, both illegal and legal. Verification and control of distribution is a challenge for any video that escapes digital rights management (DRM) through the analogue hole. Technologies have grown over the last decade, and are now ready for prime time to monitor and police distribution, and to put bounds on unlimited distribution. Several technologies claim to be able to alleviate the $18 billion problem that Hollywood is facing, such as human readable forensic watermarking, machine readable copyright technology and digital fingerprints. While all technologies are imperceptible during playout, some are used to forensically identify individual copies others are used to stop distribution on

popular video sites like YouTube. They differ in application and popularity. This session will clearly define the approaches of each technology and debate the pros and cons for broadcasters. Discussion will also happen around the applications and integration requirements that need to be understood in order to offer competitive content distribution. This is extremely timely considering the multiple trials that are being undertaken at almost all the major studios and online content sites.