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IEEE

Broadcast Technology Society Newsletter

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

From the President

Greetings everyone! This will be my first opportunity to communicate with many of you as the new president of the Broadcast Technology Society. As of this writing the BTS AdCom has just finished our first meeting of 2007 and the committee left DC with a list of things to accomplish in the coming year that we believe will be beneficial to the existing BTS membership and will offer us opportunities to reach out to engineers that are not member of the BTS that should be.

One thing that I am most excited about is the rebirth of the BTS Educational Committee with Ralph Hogan as the chairman. I have known Ralph for a number of years since we both are engineering directors for PBS stations and we are both members of the PBS Enterprise Technology Advisory Committee. Education is an area where I believe that the BTS can really grow our relevance to our current membership and the industries that we represent.

BTS has a long history of education. On October 31st – November 2nd, 2007 we will hold the 57th Annual BTS Broadcast Symposium at the Hotel Washington, in Washington, DC. Guy Bouchard of Radio-Canada will once again be chairing the program and the call for papers is already out. On April 14th, 2007 at the NAB in Las Vegas BTS will be conducting a tutorial with Dave Bancroft serving as moderator for the panel of presenters. BTS has submitted a tutorial on IPTV for the 2007 IBC in Amsterdam (September 6th – 11th) that will be chaired by Yiyan Wu of the CRC. Finally, by the time this newsletter has reached you BTS will have completed our second

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From the Editor

Broadcasting is alive and well and the BTS is on the move. Over the past few years there has been great concern about the future of the BTS in that we have been viewed as being tied to old media (aka traditional radio and television broadcasting) and in particular the RF segment of that business. It has been said that it was a mature industry and mature industries do not necessarily need or support a society such as the BTS. It is true that some aspects of the industry have matured and the BTS was in a comfort zone with that maturity. The reality is that the broadcast industry is in the early stages of the most significant period of change in its history.

There had been much talk of how over-the-air broadcasting was to become a thing of the past and was no longer needed now that most homes received their traditional programming via cable. Looking back however, this argument really did not make any sense. The world was going wireless and mobile and people were rapidly adopting new tech-

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From the Editor continued

nologies that allowed them to take their entertainment and communications with them. Potable audio devices and telephones had become common place and with the advent of DVD's you could watch a movie on your laptop at 30,000 feet while on your way to Las Vegas to attend the NAB. Could portable live video be far behind?

I believe most of the talk about the death of broadcasting, in particular television broadcasting, was from those who coveted the broadcast spectrum that they wanted to use for new technologies. But what were these new technologies that required that spectrum – Well as it turns out what they really wanted to do was **BROADCASTING**. If there are any doubts about this look inside this issue and read **Video-on-the-Go Gains Momentum** by James O'Neal. This article talks about how new entrants in the BROADCASTING business view its bright future and the use of new transmission technologies such as Qualcomm's MediaFLO and DVB-H. I have also been told that the mobile demonstration of A-VSB at the recent CES show was quite impressive and that there may be an even better mobile VSB technology on the way. Such advances will allow the traditional broadcasters in the United States to use part of their digital bit stream to provide mobile video.

Along with all this comes a huge number of other related new technologies all connected to getting video and audio to the end user. Broadcasting is not dying but instead, as Bill Hayes notes in his president's column, it is evolving and I would add that this evolution is moving at a rapid pace and the BTS can be, and I believe will be, a force in guiding and assisting this evolution. One of the missions of the BTS is education and I, like our president, am very excited to have Ralph Hogan as the new chair of our education committee since education is one of the keys to a successful future and a smooth evolution. In future issues we hope to announce some new BTS ventures in education for the benefit of our members as well as the entire industry.

The upcoming BTS sponsored **International Symposium on Broadband Multimedia Systems and Broadcasting** in Orlando, FL and the **BTS Tutorial on Video Display Technology** at NAB 2007 as well as a proposed tutorial on IPTV for the 2007 IBC are all evidence that the society is heading in a new direction and looking to embrace the new technologies of our industry and provide educational leadership in this area.

With all this talk about education please see the call for papers for the **57th Annual BTS Broadcast Symposium** that will be held October 31st and November 1st and 2nd, 2007 once again at the Hotel Washington in Washington, DC. Also be sure and make plans to attend the Symposium as it is always an excellent educational opportunity in addition to being a great venue for renewing old acquaintances and meeting some new friends. Hope to see you there.

On a sad note, at least for the BTS, April Monroe our long time society administrator has turned in her resignation and plans to be a stay-at-home mom. Although she will no longer be our administrator she has said that she might be able to do some part time work for us from home from time-to-time. Thanks April for all you help and we hope you continue to be a part of the BTS family if only on a part time basis.

And one final thought on education, I again urge you to share your knowledge with our membership and submit an article for publication in the BTS Newsletter. It does not need to be the in depth scholarly type of material that you find in our Transactions but something more hands on that our members can use in their day-to-day work or even a bit of history that would be of interest.

Bill Meintel
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Newsletter Deadlines

The BTS Newsletter welcomes contributions from every member. Please forward materials you would like included to the editor at wmeintel@computer.org. Here are our deadlines for upcoming issues:

Issue	Due Date
Summer, 2007	April 20, 2007
Fall, 2007	July 20, 2007
Winter, 2007	October 20, 2007
Spring, 2008	January 20, 2008

From the President continued

annual International Symposium on Broadband Multimedia Systems and Broadcasting at CTIA Wireless 2007 in Orlando with Tom Gurley and Brett Jenkins as co-chairs. Clearly we have a long history and growing future in education but we need to do more. The above mentioned events continue to be successful but they only reach a small percentage of the people that could benefit from them.

The wireless delivery of content to consumers, wherever they are, may be new and revolutionary technology in the minds of people who have always had television delivered to their homes via cable, but not to those who have been involved in broadcasting for more than the last twenty years. The technology of the antenna and receiver has indeed changed in order to make the devices more portable

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but it is more about evolution than revolution. There are many opportunities to educate the current "broadcast" engineer and the future "wireless" engineer and BTS is still the organization best equipped to assume that role.

And that role is expanding as we see more and more opportunities for impressing the relevance of our experience and knowledge in other areas. As facilities continue to embrace more digital technology and the need for speed increases, the cabling between machines, racks and rooms is less wire and more transmission line. The "studio" engineer must now learn the skills needed to deal with the new more critical requirements associated with digital signals. The content itself is also changing. Not only has it become digital information, but it may be traditional video and audio, virtually any information from phone calls to bank statements to interactive gaming. It all is being delivered to consumers on a plethora of different devices. Even the most seasoned engineer who fully understands the science of broadcast technology, must continue to grow in his/her knowledge to understand the entire delivery system. I can think of no other organization that has as much experience and knowledge at managing signals on transmission lines as BTS.

As chair of the Educational Committee, Ralph Hogan, has already started working on an initial training program that we believe will offer great value to the BTS membership, potential members and industry. The program itself is in the very early stages of development and I know that Ralph will have much more to report on it in the coming months. Education is the first area that I have asked my team in BTS to tackle. Our goal is continue our commitment to our academic membership and tradition while adding more practical and hands-on education and training for engineers working in the industry. We are a society of very intelligent engineers with a wealth of knowledge and experience and we need to focus on showing the practical application of that knowledge.

I hope that as you see the steps and efforts being taken to increase the relevance and value of the BTS, you'll look for opportunities to get involved. As a working engineer, I have found that I learn more by doing than from reading a journal or an article. As an engineer who has had the opportunity to teach as well, I have found that I have to have a much fuller understanding of material in order to teach it effectively, but there is nothing more satisfying and rewarding than helping someone have that "aha" moment when the light goes on and they get it.

Thank you for taking a few minutes to read this brief message. I am looking forward to my first term at BTS president. With the team that we have assembled I know that we'll make some tremendous strides over the next three years. If you have questions, comments, concerns or want to get involved, please contact me or any member of the BTS AdCom.

Bill Hayes
Hayes@IPTV.ORG

Dr. Kazumasa Enami of the IEEE Broadcast Technology Society Elected to IEEE Fellow

Recognizing the achievements of its members is an important part of the mission of the IEEE. Each year, following a rigorous evaluation procedure, the IEEE Fellow Committee recommends a select group of recipients for one of the Institute's most prestigious honors, election to IEEE Fellow.

The IEEE Grade of Fellow is conferred by the Board of Directors upon a person of outstanding and extraordinary qualifications and experience in IEEE fields of electrical and electronics engineering, and who has made important individual contributions to one or more of these fields. The total number of Fellows selected in any one year does not exceed one-tenth percent of the total voting Institute membership.

We are pleased to announce that the IEEE Board of Directors, at its meeting on 19 November 2006, elected **Dr. Kazumasa Enami of the IEEE Broadcast Technology Society to IEEE Fellow, effective 1 January 2007, with the following citation:**

"For contributions to content production technology in broadcasting"

Dr. Kazumasa Enami is currently the Executive Director of the Universal Media Research Center, National Institute of Information and Communications Technologies (NICT), Tokyo, Japan. At the NICT, he is conducting research on ultra-realistic communications technologies, including 3D image and sound.

Until June 2006, he was the Director-General of NHK Science and Technical Research Laboratories, Tokyo, Japan.

He is recognized as one of the world's leading scientists in the field of content production technology for broadcasting through his outstanding contributions to the development of a programmable video signal processor and content production system, and significant activities in standardization of broadcasting technology.

Dr. Enami invented a notable multiprocessing architecture that is suited for video signal processing and developed multiprocessor systems. The developed systems called Picot and HD-Picot have been used for video content production at NHK. He demonstrated the first computer software system in the world that could

process HDTV signals in real time in the broadcast field.

He also contributed to content production technology. In fact, he developed an integrated production environment called DTPP (Desktop Program Production), which supports efficient content production processes from planning through coverage, shooting, editing and broadcasting, to archiving and reuse of content. By using DTPP, metadata related to content is linked to audio and video and then accumulated. This arrangement easily facilitates reuse of content. The practical version of DTPP called BEATUS has been used for content production at NHK on a daily basis. By using BEATUS, TV-Anytime services, in which metadata is important, will be easily introduced. Dr. Enami also led research on a virtual studio system, visualization by image analysis and computer graphics, video synthesis, a video contribution system used for the Barcelona Olympics broadcast, and a terrestrial digital HDTV broadcasting system for ADTV.

He has participated in standardization activity on broadcasting in ARIB (Association of Radio Industries and Businesses) and the governmental council in Japan and ITU-R since 1993. Through these activities he also contributed to advances in broadcasting technology, especially content production and digital broadcasting.

Dr. Enami served as a co-editor of the special issue "Very Low Bit-Rate Video Coding I", IEEE Journal on Selected Areas in Communications, Vol. 15, No. 9 (Dec. 1997). He has also contributed to IEEE-Tokyo by making many presentations at conferences cosponsored by IEEE-Tokyo-BT and the Institute of Image Information and Television Engineers of Japan.

We are proud that Dr. Enami is a member of the IEEE Broadcast Technology Society and extend our heartiest congratulations to him for his outstanding accomplishments.

Message from Dr. Kazumasa Enami

It is great privilege for me to be elected to IEEE Fellow. I think that this honor was given not only for my personal achievements but also for many people who contributed to the progress of broadcasting technologies, especially researchers working for NHK. I deeply appreciate those people.

I was the Director-General of NHK Science and Technical Research Laboratories (STRL) from 2004 till 2006. NHK has promoted research and development related the advancement of entire field of broadcasting technology, including research on HDTV, satellite broadcasting, flat-screen TVs, and digital broadcasting.

In the rapidly changing environment surrounding broadcasting and because of the ever-diversifying demands of our viewers, we must consider the form that broadcasting technology should take. In 2005, we established our new research vision titled "NHK STRL Vision NEXT". This vision statement describes the research we intend to pursue for future broadcasting.

The basic concept of the Vision NEXT is the realization of "human-centered" broadcasting systems, because broadcasting is fundamentally composed of highly human intellectual activities, on both the sender and recipient sides.

The vision consists of three main research goals:

(1) Ultimate broadcasting systems conveying a strong sensation of reality to the viewer.

This work involves research on wide and ultra high definition images, 3D-TV, and high presence audio.

(2) Advanced content production and agile news-reporting systems.

Research will be performed on content production technology that enables the use of equipment and content to be distributed on a network in order to give producers greater expressive powers. The technology to support new expression and production techniques will incorporate the knowledge, skills, and content production specialists. Research will also be performed on broadcasting systems where the various equipment and program materials are connected by a network in order to improve the mobility, speed and precision of field reports.

(3) Ubiquitous universal services

Research will be conducted on ubiquitous technology which enable users to receive services anytime and anywhere. This technology will also permit receivers to serve as information lifelines during disasters. This research will include work on a universal broadcasting service that everyone can easily use regardless of handicap, age, language, or region, along with security technology to protect privacy and content. This capability will be a service that adapts to the viewer's intention and situation.

The most-focused research on the ultimate broadcasting systems is for the Super Hi-Vision (Ultra HDTV) system. With scanning lines of 4,320, the Super Hi-Vision contains 16 times more information capacity than the current HDTV system, and a 22.2 channel surround sound system. The high quality and wide image and super surround sound can convey a heightened sense of reality.

NHK began a research project in 1995 to put the Super Hi-Vision into practical use. In 2002, development was completed for the camera, key device, as well as a VTR and display device. The year 2005 saw the world's first successful live transmission of uncompressed Super Hi-Vision signal via fiber optics. Promotion of technical development and research, in the areas of compression, transmission, display and sound equipment, must still continue however in order to introduce the Super Hi-Vision broadcasting service to general households by approximately 2025.

A Super Hi-Vision system was exhibited at EXPO 2005 in Aichi, Japan, attracting 1.56 million visitors. The NAB show held in Las Vegas in April, 2006 also presented a Super Hi-Vision system, generating favorable comments.

NHK gave the very first demonstration of HDTV in February 1981 at the SMPTE (Society of Motion Picture and Television Engineers) Convention in San Francisco. Twenty-six years have passed since then, and forty-three years since NHK first began the development of HDTV in 1964. Since then, HDTV has grown to an extent where it is now used worldwide for international application at Olympic Games as well as FIFA World Cup soccer. Furthermore, Hollywood films are produced in HDTV, signifying that HDTV is now an essential image medium accepted by the film industry.

In addition to the Super Hi-Vision, I consider one of our primary tasks is to create a new business model by converging with, or collaborating closely with, the communications media during the evolving digital era. Starting with the first HDTV demonstration twenty six years ago and then followed by collaboration among broadcasters worldwide, HDTV is now prevailing as a global and essential media vehicle. With the Super Hi-Vision demonstration serving as a catalyst, I hope to see increasing cooperation among broadcasters working together on new digital technology developments and standardization which is evolving during this era of broadcasting and communications convergence.

After retiring from NHK in 2006, I accepted a position at the National Institute of Information and Communications Technologies (NICT). At NICT, I am conducting research on "ultra-realistic sensory communication technologies," including 3D image and sound. Our goal is to construct an advanced information system that can offer an interesting and engaging environment by creating a natural and realistic sensation of being in a completely different and distant location, through the use of communications and broadcasting technologies.

My research organization consists of two groups: The "3D Spatial Image and Sound Group," which conducts studies on 3D imaging and sound technologies associated mainly with electro-holography; and the "Multimodal Communication Group," which conducts studies to optimize the sense of realism among people by analyzing human mechanisms of cognition.

We must overcome a great number of difficult problems, such as the development of image-capture and display devices with ultra-high resolution and ultra-high pixel numbers and the measurement and analysis of unresolved brain functions. However, we plan to take advantage of our role as a public research institute, conducting research that can only be undertaken—and should be undertaken—by such an institute, as we steadily move forward with long-range perspectives.

I sincerely hope to heighten the role of broadcast researchers worldwide by further invigorating our cooperation and to create new broadcasting services by gathering together the engineering wisdom of all of the IEEE members.

United States Digital Television System – The Challenges that Remain

by Bill Meintel
BTS Vice President and Editor BTS Newsletter

This is the second in a series of articles documenting the transition to an all digital television system in the United States.

In the last issue I took you from the beginnings of the transition to an all digital television (DTV) system in the United States in February 1987 to October 2006. At that point stations had elected or been assigned their post transition digital channel and the Federal Communications Commission (FCC) had issued a Notice of Proposed Rule Making (NPRM) wherein they listed the channel allotment table and requested comments from the public.

The period for initial comments has now passed; although, the public still had an opportunity until February 26, 2007 to file reply comments (comments on the initial comments) with the FCC. Approximately 160 comments were filed ranging from requests for minor corrections of station parameters to proposals for changing some of the allotted channels

At this time it is anticipated that relatively few changes will be made to the proposed allotment table. This assumption is based on the FCC's desire to not jeopardize meeting the February 17, 2009 statutory deadline for turning off all analog facilities. Due to the limited amount of television broadcast spectrum available in many areas of the United States, changing a single allotment can cause a ripple effect that would dictate many other changes.

Therefore, the finalized table is expected to have approximately 120 stations that will be moving to a completely new channel (neither their current analog or digital channel) for DTV operation in February 2009 and about 500 stations that will be moving their DTV operation to their current analog channel. The remaining stations will give up their analog channel and continue operation on their currently allotted DTV channel.

So what are the challenges facing the U. S. broadcast industry in meeting the 2009 deadline. As noted above there are approximately 620 stations that will need to either modify their existing equipment or purchase new equipment, have it installed, tested and ready to go on the air in February

of 2009 or risk being off the air. Of these, the 500 stations that will transition to their analog channel will need to make a decision as to whether to install new equipment or terminate their analog operation early to allow time for needed equipment modifications. In addition, many of these stations have older antenna systems that likely do not have a sufficiently flat pass band for digital operation. There are also the questions of having adequate space in existing transmitter buildings or on towers to accommodate any needed new equipment before the abandoned equipment can be removed.

It is now clear that a large number of facilities will be required to be constructed and/or modified in the relatively short time frame of now less than two years. Since the industry has not faced such a situation in the past, another obstacle will likely be availability of equipment and even more importantly a lack of skilled personnel to perform the required modifications and installations. In addition, there are areas where work can only be performed during a short window of time during the year due to weather conditions. It is noted that the use of personnel that are not adequately trained would of course slow down the work but in certain areas such as tower work can actually be dangerous and could lead to catastrophic or deadly results.

In addition to all of these difficulties there is also the desire on the part of many of the stations that will remain on their current DTV channel to make improvements to their facilities. For example many DTV stations were implemented with antennas side mounted below the analog antenna and these stations would like to improve their service by moving the antenna into the position now occupied by the analog antenna.

There are also some additional regulatory issues that are not yet resolved that will impact the speed of the final buildouts. Each of the stations that will not be remaining on their current DTV channel is required to obtain a construction permit for the new facility from the FCC. Not only has this process not yet been started, but the FCC has also not yet made known the specific criteria for these applications. The facility associated with each of the stations moving to a new channel or to their analog channel is based on service contour replication of the current DTV facility. In many cases these facilities have unrealistic antenna patterns due to the methodology used to produce the replicated patterns. Therefore, the FCC will need to provide an interference protection criterion that will be used to analyze the construction permit applications that will contain realistic antenna patterns.

Besides these equipment and personnel issues there are also times during the year when viewership is measured for major sporting or other events are taking place when a service disruption could cause a significant economic impact on a station or stations as well as being unacceptable to the public.

An analysis of the approximately 120 stations scheduled to move to an entirely new channel indicates that almost none of them would be able to begin operation prior to the transition deadline without causing and/or receiving significant amounts of interference to or from currently authorized analog and digital facilities. Likewise, it is anticipated that some of the 500 stations returning to their current analog channel for post transition DTV operation would cause new interference to existing stations if they make the move before the deadline. The reason for this latter concern is that the allotted post transition facilities were based on service replication of current DTV facilities that in some cases exceed the station's analog service.

With all of these obstacles it seems unlikely that the complete transition can be accomplished by the mandated deadline. However, the February 2009 deadline only requires that analog facilities be turned off and the out of core spectrum (channels 52 to 69) be vacated. Therefore, it may be possible that some of the changes could possibly be delayed until after the deadline.

One possible solution to the transition problem would be to terminate all analog operation in February 2009 as required and have all stations with an in core DTV channel that are scheduled to move to a different channel remain temporarily on their current channel. This would reduce the size of the problem to approximately 150 stations with an out of core DTV assignment. A preliminary analysis seems to indicate that most of those stations could actually move to their in-core channel as assigned in the post transition allotment table without causing any significant new interference. This analysis further indicates that only on the order of 20 stations could not be accommodated in this scenario. Based on that, it is very likely that the necessary equipment changes could be accomplished to deal with accommodating this handful of remaining stations and thereby meet the mandated requirement.

This is not the ideal scenario and there may be other solutions that would allow for many of the stations to actually begin operation in February 2009 with their desired post transition facility. By the next installment of this continuing series it is anticipated that more guidance will have been provided by the FCC and further work will have been performed by the industry. So stay tuned for further updates.

Your comments on this topic are most welcome. Please contact me directly at wmeintel@computer.org.

ATSC Brief: Work Underway to Define New Field Communications System

By Jerry Whitaker, VP of Standards Development,
Advanced Television Systems Committee, Inc.

The ATSC Specialist Group on Digital Electronic News Gathering (TSG/S3) is developing a specification designed to enable efficient private communications for television remote production and news gathering operations. This work is being led by Dane Ericksen of Hammett & Edison Consulting Engineers, who chairs TSG/S3 and represents the Society of Broadcast Engineers on this project.

About the TSG/S3 Work

Broadcasters have a need for private communications between their DTV station facilities and remote crews engaged in various production activities, including—but not limited to—electronic news gathering (ENG), sports production, and field production. These crews may be equipped with ground-based and/or aerial microwave systems intended to return program video and audio to the DTV station. The specification under development is designed to provide the necessary mechanism for meeting these private communications needs.

It is important to emphasize that the applications for the planned Field Communications Systems (FCS) extend beyond strictly news events. Related and complimentary applications include coverage of sporting events (e.g., golf tournaments and motor races) and remote field production (e.g., parades and political conventions).

To the extent possible, the FCS specification is being designed for interoperability with the Data Return Link (DRL) system described in the ATSC Candidate Standard "Automatic Transmitter Power Control Data Return Link" (document number CS/TSG-696, available on the ATSC Web site at http://www.atsc.org/standards/cs_documents/CS-TSG-696r1.pdf). Communications from the remote location to the DTV station are not addressed in the FCS specification.

System Requirements

In a field production situation, multiple channels of *interruptible fold back* (IFB) audio are typically required, targeted to different crews or talent, and simultaneously available. These channels may carry mix-minus feeds to allow inter-talent communications during live operations. It may be desirable to send one program channel and a number of interrupt channels that override the program by switching at the remote end of the link.

The fundamental requirements of the FCS described in the current version of the specification are as follows:

1) Voice-grade service for IFB and related applications with a nominal bandwidth of 300 Hz to 3 kHz.
2) Maximum round trip (total system) latency of less than one-quarter-second to permit natural conversation among on-air talent.
3) System configuration that allows for expansion based on the needs of the application.
4) Private and not available to the general public.
5) Private data available on an as-needed basis.

For a variety of reasons, it is advantageous to use a well-established, high efficiency audio codec in the system. TSG/S3 has focused on the ITU G.729 vocoder[1] because it provides good-quality speech with relatively low processing requirements and delay times. The G.729 vocoder compresses 8k samples-per-second linear audio signals (16 bit) and encodes them for transmission at 8 kbps, resulting in a compression ratio of 16:1. The vocoder is used for a wide variety of applications, including Voice over Internet Protocol (VoIP).

The requirement for low system-wide latency is the driving element of the basic design. With an allocated bit rate of approximately 60 kbps, up to seven audio channels of IFB using G.729 are practical. While seven IFB channels seems quite sufficient for most applications, it is conceivable that a station could require more channels, particularly in the event of a major remote production, such as a televised football or baseball game. In the case of an event such as a political convention, the need for wireless IFP services would increase dramatically.

To address the requirement for flexibility, the packet insertion rate may be increased in fixed increments. With the addressing scheme planned for the system, a maximum of 16 groups can be inserted, permitting 112 possible audio channels. At this maximum rate, the bit stream requirements would be on the order of 930 kbps.

While the primary purpose of this system is voice communications, having data transfer capabilities is attractive for applications such as file transfers of edited pieces back to the truck or remote location. As such, the ability to increase the allocated bit rate as needed to address the application is attractive to some stations.

Voice-Related Applications

The primary applications envisioned for the FCS technology include the following:

IFB and VoIP – IFB communications are used to provide program sound and cueing instructions back to talent and crew. IFB applications may be low bandwidth (telephone quality), but need to minimize system latency. Low latency is required to minimize the response time between a question asked in the studio and the response from the talent. Due to the fact that the video transmission is already com-

[1] ITU: "G.729, Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP)," March 1996.

pressed, there is an inherent delay in the remote signal. Implementation of a VoIP duplex intercom capability replicating the 4-wire or duplex circuit for push-to-talk intercom functionality is highly desired. It is also helpful to provide a VoIP gateway to provide similar functionality to off-premises phone(s) in the ENG truck so the production staff can contact personnel at the station.

Cueing – Cueing information may be either voice-grade or data. Voice communications can be used for countdown purposes, but this is essentially the same as IFB. In such an application, low- or moderate-latency is required. So long as the latency is predictable, it can be somewhat longer because production personnel can compensate by "pre-rolling" their instructions. Data can be used to carry out-cues in text form for display to talent, to trigger a countdown, and for similar purposes. Out-cues provided to talent require that the talent be able to hear a feed of the program without significant latency from the production timeline in order to start on cue.

Crew instructions – Crew instructions can be either in data or voice form. As data, they may consist of assignment information (story, location, schedule, etc.), routing instructions, personnel scheduling information, and the like. For this type of data, long latencies are acceptable; even opportunistic data might be usable in some situations. As voice communications, crew instructions comprise an extension of the studio "PL" that allows the producer/director/TD to speak to the production crew. If used for this purpose, voice communications require—at most—moderate latency so that control of operations can be effectively maintained.

Participate in the Work

The draft Field Communications System specification is being written now within the TSG/S3 specialist group. Interested persons and organizations are encouraged to participate in this work. The TSG/S3 effort, as all other standards development work at ATSC, is open to those with a direct and material interest. Most of the document development and revision is done via email reflectors and scheduled conference calls, so participation in the work does not require attending face-to-face meetings, which can often be a travel burden. If you are interested in contributing to this work, or offering suggestions on operational issues, please contact the author or Mr. Ericksen.

Detailed information on current work within ATSC is available from the ATSC Web site http://www.atsc.org.

Digital Watermarking Technology

by Andy Nobbs, President of Teletrax, New York, New York

Digital watermarking is a process in which specific data is included within multimedia content, providing its own unique identity. The watermarking process is based on the addition of slight modifications to the video signal using special software. As the modifications have very low energy and continuously adapts to the content, the watermark is indiscernible and can only be detected and decoded using special hardware or software. Watermarks are imperceptible to the human eye, and it is virtually impossible to detect the presence of the watermark without proprietary decoding equipment. Any attempt to destroy or remove the watermark will ruin the quality of the material in which it is embedded.

Digital watermarking enables the identification, management and tracking of digital images. It can be used for a variety of different applications, including broadcast verification, digital rights management, image copyright protection, identification security, forensic tracking and mobile commerce. Inserted watermarks can be used for several purposes, including identifying the content itself, identifying the party receiving the content, or triggering an action such as linking to other information.

This paper will focus on the broadcast verification application of watermarking technology.

The Digital Watermarking Process

The following terminology is commonly used when discussing watermarking technology:

- Watermark – The identifier, which has been inserted into the multimedia content
- Watermark Embedder –The process that adds the identifier to the audio visual content
- Watermark Detector – The process that reads the identifier from the audio visual content

During the digital watermarking process, a watermark embedder inserts a watermark by slightly modifying the statistics of the multimedia content. The specific modifications depend on a 'secret key' and the information to be embedded. Only a specialized watermark detector using the same 'secret key' as the embedder can read this information again even if the content has been severely degraded in quality between the moment of embedding and detection.

During watermark embedding, which is processed by using a 'secret key,' the format and size of the original signal remains unchanged. It also has a high degree of built-in redundancy, which means it can survive repeated recording on standard consumer VHS and DVD recorders.

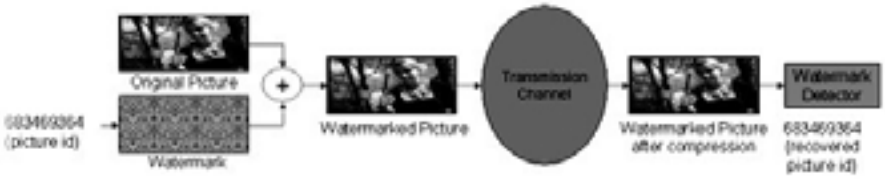

Figure 1: Watermarking Scheme

No additional bandwidth is required and the vertical and horizontal blanking intervals are not used. The extra data is added by applying very small modifications to the pixel intensities in the active video part. However, this is done in such a way that the changes are imperceptible to the eye so the end-user notices no change in picture quality.

Using sophisticated digital signal processing algorithms, the additional data can be recovered by the watermark detector, even after extensive signal processing operations. The watermark detector needs the 'secret key' of the watermark embedder to make detection possible. For this reason, it is practically impossible for anyone who does not have access to this key to remove the watermark without causing severe picture quality degradation.

Digital Watermarking & Broadcast Verification

Digital watermarking is an innovative solution that is highly valuable to content owners, producers, post-production houses and broadcasters throughout the world. Digital watermarks are imperceptible codes inserted into broadcast video and audio that can be detected through the use of specialized hardware or software. They enable the accurate tracking of content when it is distributed and broadcast.

In the broadcast verification application of digital watermarking technology, a watermark is imperceptibly embedded into video content at the time of production or broadcasting, enabling content owners the ability to identify copies of their material as well as the source of these copies, determining whether or not they are legal. Digitally watermarked content is then tracked through a broadcast verification service that utilizes special hardware and software housed in monitoring stations in a variety of locations across the world.

Watermarking allows the precise tracking of broadcast content which serves as a management tool, providing valuable information to content owners, producers, post-production houses and broadcasters. The use of digital watermarks enable content rights-holders to know where, when, and for how long their content airs, and can be reported with additional information such as identification of the content producer, time and date of production.

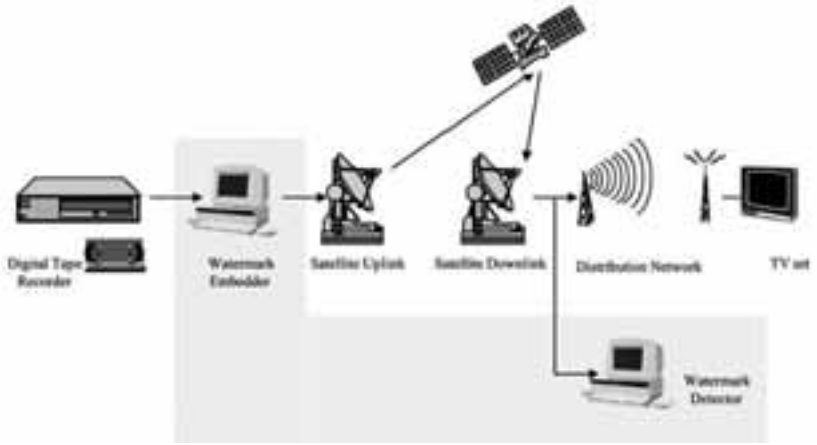

Figure 2: Video watermarking system in a simple broadcast chain

Watermarking Technology & Broadcast Verification Services

Content owners use broadcast verification services to exercise control over creative assets, manage and protect content, manage decision-making and for campaign planning processes. They have a need for their content to be accurately tracked in order to gain a precise understanding of how their creative material performs in the broadcast marketplace.

Watermarking technology is used in conjunction with broadcast monitoring services, for a number of different reasons, by a variety of different industries.

Programming Industry

Programmers use broadcast monitoring services to ensure contractual accountability, determining if specific programming aired in its entirety and according to schedule; as a promotional analysis tool to track television, movie and radio promotions; and for asset protection, providing undisputed legal verification of ownership.

News Industry

News organizations use broadcast monitoring services for inventory control and asset management. Broadcast monitoring can be used as a management decision tool enabling news producers, stations and networks to determine which items to feed to affiliate stations, and as a proof of performance tool determining which clients air specific news segments.

Advertising Industry

Broadcast monitoring services are used by advertisers to confirm ads aired according to contract and in their entirety, allowing advertisers the ability to calculate campaign effectiveness and return on investment and perform campaign analysis in order to maximize promotional impact.

Motion Picture Industry

Broadcast monitoring services can be used in the motion picture industry to

protect theatrical movie releases from content piracy, and to compute royalties owed to actors.

Rights Management & Asset Protection
Broadcast monitoring enables content owners to identify the misappropriation of broadcast assets, providing intellectual property protection and undisputed legal verification of ownership

Conclusion

Digital watermarking is a proven technology that is becoming increasingly widespread throughout the media and entertainment industries. Digital watermarks enable content providers such as motion picture and music studios, TV syndicators, news organizations and advertisers to distribute and track content usage while alleviating the issue of security.

Andy Nobbs, Teletrax President and Managing Director, oversees all aspects of Teletrax's day-to-day activities around the world including strategy management, business development, global operations and marketing. Under his stewardship, Teletrax has rapidly expanded its global monitoring network to monitor television broadcasts of 1,300 channels from more than 50 nations, including the top 210 markets in the U.S.

A New Multifunctional Russian Digital System for ENG/EFP

by Dr. Lev Balanin
Department Head of the State Research Institute of Television, St. Petersburg, Russia

A new Russian mobile multifunctional TV system has been developed by the State Research Institute of Television, as part of the Russian national program for development of digital broadcasting. The new system is known as "Kiparis," and is built around MPEG-2/DVB technology. It was designed for on-the-spot electronic newsgathering (ENG) or electronic field production (EFP), and has the ability to provide real-time transmission of actualities either via microwave radio or satellite. The system is also set up for video recording. The design of the system is modular, providing a great deal of flexibility in newsgathering operations.

The "Kiparis" system consists of three independent mobile modules:

- Mobile TV station (MTVS)
- Mobile microwave radio relay station (MRRS)
- Mobile satellite uplink/downlink station (MSS)

Depending on the requirement, the mobile stations can be combined as required, or can be used independently.

Supporting subsystems for supply of electrical power, air conditioning, mains monitoring, and distribution were unitized as much as possible in the design of the overall "Kiparis" system. Operation is possible from either 220 VAC/50 Hz power mains or from a gasoline powered generator.

Central to the "Kiparis" system is the mobile TV station which consists of a program origination and production module based around four television cameras. (Fig.1) This module also provides reception and routing of both analog and digital television signals. SDI video is used for linkage of the various modules. On-board equipment consists of the following:

- Video production switcher
- MPEG-2 encoder
- MPEG-2 decoder
- PAL/SECAM to SDI converter
- Routing switcher
- Sync generation and distribution equipment
- Videotape recorders.

Fig. 1. The exterior of the new "Kiparis" Mobile TV Station (MTVS) vehicle, along with photographs of the video production and cable and equipment storage areas.

The radio relay station mobile microwave radio link is intended for transmission of televised reports within a line-of-sight range of up to 50 km. (Fig. 2). A digital duplex microwave radio relay link manufactured in Russia is used, operating in the 7.15-7.75 GHz band. Digital transmission rates of 34.368 Mbps (E3) are possible and QPSK modulation is

Fig. 2. The Mobile Radio-Relay Station (MRSS) vehicle configured for microwave relay operations. Interior photos show the microwave operations area and a rearview of equipments racks, along with the unit's gasoline-driven generator.

Fig. 3. The Mobile Satellite Station (MSS) vehicle module is configured for Ku-band operations. Interior photos provide views of the satellite/microwave operations area and another view of the rear storage area.

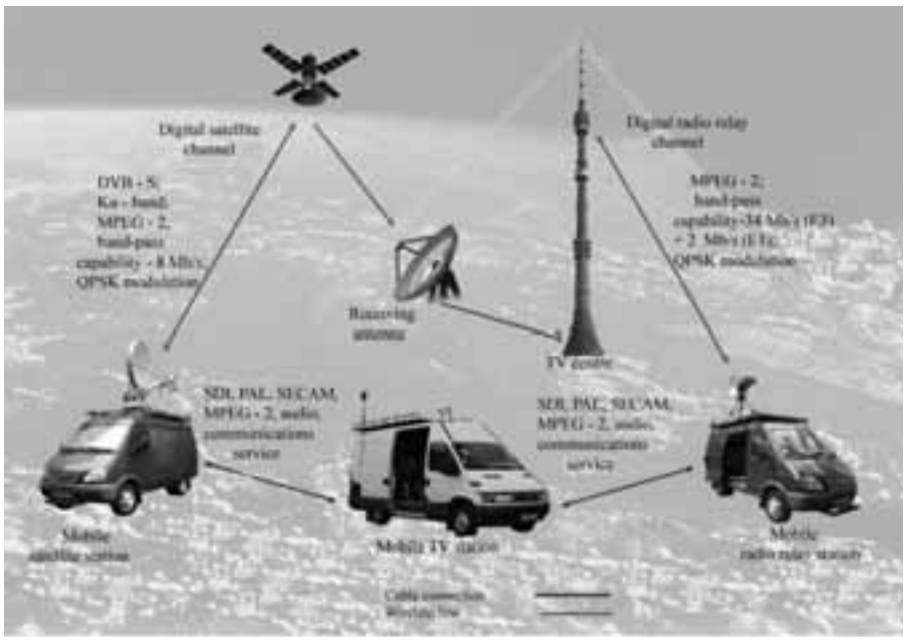

Fig. 4. A functional diagram showing the possible applications and uses of the new "Kiparis" mobile television system for MPEG-2/DVB broadcasting.

used. The link accepts and outputs SDI and MPEG-2 compressed signals, as well as analog PAL and SECAM video.

The mobile satellite station module uses a Patriot Antenna Systems Ku-band antenna, along with Advantech AMT Ku-band DVB-S satellite equipment. (Fig. 3) Bit rates of up to 8 Mbps are possible. The satellite gear is designed to accept and output SDI and MPEG-2 digital signals, as well as PAL and SECAM video. The satellite antenna positioning system can operate both automatically or manually.

Fig. 4 shows possible applications of the "Kiparis" multifunctional mobile television system for capturing and relaying news events from the field.

Distinctive features of the new system are as follows:

- Modular construction
- Mobile (field) operations
- Independent operation of system modules
- Ability to operate with both digital and analog inputs and outputs

Possible system applications may take any of the following forms:

- MTVS operations independent of a communications link – on-board video recording
- MTVS video pickup applications paired with the MRRS microwave radio relay link - transmission of the reports up to a 50 km line-of-site range from a television operations center
- MTVS video pickup along with MSS satellite station connectivity – long distance transmission of news reports to other cities and countries;
- A combination of all three mobile stations (MTVS video pickup along with MRRS microwave and MSS satellite connectivity for on-line reporting of large scale events and for TV bridges between countries.

The "Kiparis" mobile system completed trial operations successfully in 2006 at the Petersburg TV and Radio Company in St. Petersburg, Russia. It has been used for both field production and real-time pickup and transmission of sport events, car racing and concerts in urban stadiums. The trial operations of the "Kiparis" system have demonstrated its high equipment reliability, steady microwave radio communication in varying weather conditions and high quality signals due to the use of digital technologies.

Plans are under way for further development of the "Kiparis" system by integrating new technologies, including transmission of digital video and audio information via OFDM modulation.

The IPTV Focus Group-Third Meeting

by Wei LI
Research Engineer, Communications Research Center Canada

The third meeting of IPTV focus group (FG IPTV) was held by ITU-T in Mountain View, California, USA from January 22 - 26, 2007. More than 200 participants attended the meeting. They came from the world's leading telecom equipment manufacturers (Alcatel-Lucent, Nortel, Ericsson, Siemens, Samsung, Cisco, etc.), tele-

com service providers (Korean Telecom, China Telecom, NTT, etc.), associations (ISMA, ATIS, IEEE/BTS, CEA, etc.) as well as research institutions (ETRI of Korea, CRC of Canada, RNIB of UK, etc.). A total of 169 contributions, and 24 incoming liaison statements were received prior to the meeting. Their distribution to the six-working groups (WG) is as follows:

- WG 1 (Architecture and Requirements): 90
- WG 2 (QoS and Performance Aspects): 50
- WG 3 (Service Security and Contents Protection): 30
- WG 4 (IPTV Network Control): 29
- WG 5 (End Systems and Interoperability Aspects): 29
- WG 6 (Middleware, Application and Content Platforms): 41

Some contributions addressed issues covering more than one working group, thus they were processed simultaneously by relevant working groups. This situation is reflected in the above statistics.

Compared with the last FG meeting, there were significant increases in the number of contributions submitted to WG2 through WG6, with a slight drop with WG1.

Prior to the meeting, IEEE BTS and the CRC submitted two contributions to the FG IPTV.

The first contribution, *the need to clarify the definitions of Quality of Service (QoS) vs. Quality of Experience (QoE) and their relationship*, was assigned number C-0264. It discussed the historical evolutions of these two terms and proposed to draw a clearer line between the definitions of QoS and QoE.

The second contribution, *considerations on monitoring burst loss behavior for IPTV networks*, was assigned number C-0265. It proposed two metrics to monitor burst loss behaviors for IPTV network.

The Monday morning plenary session began with a welcome speech by Mr. Ghassem Koleyni, the FG IPTV Chairman. His talk was followed by opening remarks and presentations by Ms. Susan Miller, ATIS President & CEO and Mr. Dan O'Callaghan (Verizon), ATIS IPTV Interoperability Forum (IIF) Chair

Working reports from the electronic meeting of WG1 held in December 2006 were approved during this plenary session.

Some common issues raised from the contributions were also addressed during the plenary session. Contribution number 397 (C-0397) by Ericsson in the UK suggested a work plan for the FG IPTV in order to better coordinate with the work of the ITU Study Group (SG) 13. The Chairman didn't fully agree with some of the time lines. He asked for more flexible options such as extending the life span of this FG beyond one year. Contribution 0415 by the Republic of Korea proposed open, fair and competitive environments during the standardizations of the FG IPTV. This proposal was accepted by consensus of all the participating parties.

During the five-day meeting, each working group worked separately on their own mandates. Due to the uneven distribution of the contributing documents, the workload of different groups varied. The Architecture and Requirements working group (WG 1) had to work hard to fulfill its mandates. WG 1, with the largest amount of contributions to process, had the largest number of participants. WG1 had to work the entire five days often late into the evening. Other working groups also added evening sessions to meet the tight schedule.

Since the BTS/CRC contributions mainly focused on IPTV QoS/QoE issues, I allocated most of my time with WG2 activities.

The QoS and Performance Aspect working group (WG 2) worked during the first 4 days by approving the agenda, reviewing the assignment of incoming documents and incoming liaison documents, and progressing on existing work items. Apart from general issues to be addressed, there were four existing work items identified and processed during this meeting time, they include:

- QoE requirements for IPTV
- Traffic management for IPTV
- Application layer reliability solutions for IPTV
- Performance monitoring for IPTV

The following items below describe the major activities resulting from processing the general issues and existing work items:

General issues

C-0266 from ITU-T SG13 provided some comments and questions on the IPTV FG working documents. They were mostly related to architecture. In particular, multicast QoS requirements were asked. Up to now, WG2 has not yet identified specific requirements for multicast QoS. Our current consensus is that the QoS requirements are generic and independent of the underlying network architecture.

C-0277 from Nortel Networks proposed to have a single vocabulary document for the focus group. It was agreed that the vocabulary terms need to be coordinated and approved by the six working groups.

C-0426 from ITU-T SG13 provided information about the ongoing multicast work SG13. This information was noted. Specific multicast-related traffic management may be considered in the future under agenda item 7.2 in the Traffic Management issue.

QoE requirements for IPTV

Our first contribution, which was numbered C-0264, asked for clarification of the definition of QoS and QoE. Initially, the focus of both QoS and QoE was on the end-user, although QoE emphasizes the subjective perception. However, over the years QoS has come to be more related to the performance of the underlying transport network, particularly outside of the telecom industry. So, the term QoE is now used to refer to what the end-user perceives. I presented this contribution during the first day's meeting. After some discussion, WG2 recognized the issue as valid. The following are the concluding remarks in

the WG2 output document regarding our contribution: *It was noted that the term QoS may have different definitions in different standard bodies. A clarification will be added to the working document that we consider QoS as related to the network performance. Furthermore text from TR-126, section 4.1 on the relation of QoE and QoS will be included in the working document.*

C-0354 from NTT proposed to include QoE requirements for Electronic Program Guide (EPG), metadata and browser. Some items were argued not belong to QoE (such as data size as from metadata, ...). This was accepted with some modifications.

C-0356 from ISMA introduced methods for fast channel switching. It does not define any specific value for channel switching times. It is not expected that ISMA will define such a value. It was agreed to copy the two statements on channel switching times from the modified requirements document into the working document.

C-0364 from RNIB suggested an addition to the service requirements document for consideration of caption, subtitles and supplementary information in case of trick mode (such as fast forward, fast backward, etc.). This was accepted by WG2.

C-0389 from ETRI discussed QoS/QoE parameter adjustment for Linear TV, especially when changing between SD and HD content. Although this contribution addressed issue of importance, it was regarded as a WG4 issue.

Traffic management for IPTV

Incoming Liaison (IL)-0033 from the DSL Forum provided a document TR-101 "Migration to Ethernet based DSL Aggregation Networks". It includes information on DSL access network QoS and was considered a useful input to the working document. As the participants were not familiar with this document, specific proposals will be contributed to the next meeting. Thus this document was put in the "living list" of documents for future reference.

C-0267 form Siemens Networks proposed to define UDP streaming of MPEG-2 TS instead of using RTP for streaming applications. While WG2 is not defining streaming protocols, it was noted that UDP streaming impacts performance measurements and application layer reliability solutions. Without the RTP time stamps network jitter and delay measurements might be limited. Without the RTP sequence number the AL-FEC and ARQ mechanisms are not possible. This information was provided to WG4 for their consideration of streaming protocols.

C-0317 from Huawei proposed to add text for admission control. It was agreed to use the first part of the proposed text in the drafting session. The second part of the proposed text on specific multicast admission control behavior was not agreed and will be put into the "living list."

C-0409 from ETRI proposed a restructuring of the working document and to add a figure on the architectural framework. This was agreed with the modification that traffic restoration should be removed from the figure.

C-0337 from NEC proposed to add a description of bandwidth allocation function for access network to a WG4 working document. As such functionality is also defined by WG2. A clarification with WG4 is needed on who will define what.

Application layer reliability solutions for IPTV

IL-0031 from the DVB Project provided information on the status of the work on AL-FEC and details on the AL-FEC methods. AL-FEC has been approved by the DVB technical module and is in the final approval process. It will be part of release 1.3 of ETSI TS 102 034, the DVB-IP specification. AL-FEC uses an hybrid code based on the Pro-MPEG and Raptor codes. Some simulation results were presented. The packet loss models are based on DSL access lines. In the discussions, more information on the simulation results and evaluation criteria were suggested. C-0394 from Sumitomo Electrics also presented results of a field test on AL-FEC. In another contribution C-0395 from the same company, AL-FEC solutions used in IPTV deployments in Japan were listed.

C-0405 from Digital Fountain provided an overview on existing FEC solutions and their applicability. It proposed to specify the use of the DVB AL-FEC solution. It was mentioned that the Raptor code has IPR related to it. Clarification on the treatment of IPR in the focus group was requested by some delegates. As the DVB AL-FEC specification is currently not yet available it cannot be accepted for inclusion into the working document. The DVB liaison was included in the living list for future reference and the item shall be reconsidered when the specification is available.

Performance monitoring for IPTV

Our second contribution, which was numbered C-0265, proposed to add network performance parameters based on IETF RFC 3357 plus two additional parameters related to burst loss. This contribution was considered useful to assess specific transmission impairments such as burst loss and was accepted by WG2. It was noted that the working group is currently including a large number of performance parameters into the document. A further definition and classification on what is mandatory, what is optional and where it should be measured are considered necessary.

C-0268 from UTStarcom proposed new parameters for distributing content. The contribution assumed a certain content distribution network architecture. As this architecture has not been defined up to now, it was considered premature to introduce detailed parameters. Thus, this document will be put into the living list.

C-0308 from NEC proposed video quality monitoring using a no-reference approach. This was accepted for drafting with small modifications. The general notion of a back channel for reporting the results of video quality

monitoring to a management system will be put at the beginning of section 8.5 of the output document.

C-0338 from Pixelmetrix proposed a performance monitoring reference diagram for the definition of monitoring points and domains. This was agreed in principle; however the diagram in the contribution was considered as too detailed. A more generic diagram and text were suggested to generate more concise network domains and related measurement points.

C-0410 from Telchemy introduced the ongoing work by IETF AVT on RTCP video metrics. This activity was considered as an input for the working document. WG2 agreed to establish a liaison with IETF AVT. C-0411 from Telchemy proposed a lost measurement metrics also based on the IETF AVT work mentioned above. Some of these metrics are already included in our document, however different measurement methods might be considered. It was agreed to put the document in the living list and wait for the feedback from the liaison with IETF AVT.

Four "living lists" corresponding to the above working items were produced for further study.

Six outgoing liaison documents were also created towards the end of the WG2 meeting. These liaison documents are going to be submitted to different entities for further inquiries, collaborations and coordination. These entities include DVB TM-IPI, ITU-T SG12, DSL Forum, ATIS IIF, IETF AVT and IPPM, etc.

In summary, a total of 14 outgoing liaison statements and 12 working documents were produced by relevant working groups.

During the afternoon's plenary session on the last day, six meeting reports were created and approved.

The next meeting of the IPTV FG will be held 7-11 May 2007 in Bled, Slovenia.

Dr. Wei Li is a research engineer at the Communications Research Centre Canada (CRC). His current research interests include broadband wireless system, DTV system, broadband multimedia processing. Dr. Li is a member of IEEE and BTS.

Video-on-the-Go Gains Momentum

Next-generation content delivery: Slow out of the gate, but still in the race

by James E. O'Neal, Technology Editor, TV Technology Magazine

Next-gen TV, the third screen, mobile TV, cell phone TV -- there are a lot of names for this next chapter in broadcast television, and quite a list of players too. NAB2006 identified 21 of them and this is just the tip of that proverbial iceberg.

While the service providers haven't exactly had to hire additional help to take subscription orders just yet, there is some interest for the small screen video service among the estimated 180 million cell phone customers in the United States.

With the rollout of third-generation, or "3G" cell phone network technology, telecom service providers are now able to implement video capability, but consumer acceptance and demand are still in their early stages.

SOUP TO NUTS

Howard Barouxis, Grass Valley senior director of sales for North America, sees a bright future for small screen video.

"I think that the market is great," said Barouxis "We've been involved in a lot of DVB-H trials and we've done a lot of deployments around the world. We're now working with all the major operators in the United States in small city trials."

"We see a huge market and are providing quite a bit of the overall solution--head ends, encoding, IP encapsulation--we're supporting both DVB-H and MediaFLO, and we're offering transmitters and middleware too," Barouxis said. "The only thing we wouldn't offer are handsets."

As for full-scale next-gen service within the United States, Barouxis thinks that it will be here soon.

"What you're seeing in the U.S. this year are small trials," he said. "There will be trials in the larger markets in 2007 and the market will probably open up in 2008."

According to Barouxis, it's a matter of "build it and they will come," and says major operators are working on this.

Vizrt, Harris, Snell & Wilcox, Tandberg Television and others have also been producing and marketing items for what may ultimately prove to be a large market.

Halid Hatic, vice president of business development for Vizrt, says that his company has had its ear to the ground when it comes to the small screen.

"What we realized by listening to our customers, especially in the United States, is that they are looking for ways to monetize their content in new and different ways," Hatic said. "Ipod and cell phone delivery has not gone unnoticed and we've designed a workflow product with which they can repurpose any of their products into a mobile platform."

Hatic sees delivery of video as just part of the equation, with graphics and metadata being value-added items.

"If a person is interested in sports scores, they could have them delivered in the form of a ticker rendered in a local environment with dynamic updating. The ability to deliver hyper-local news to a subscriber base is the 'holy grail.' Vizrt can help stations simultaneously produce content for both local news and the handset subscriber."

Hatic views the small screen business as just getting started.

"Our customers [content producers] are already experiencing demands due to shareholder pressure to increase revenue," Hatic said. "On the other hand, stations are waiting for viewers to start asking for mobile delivery. It was a bit of a shock to the industry when ESPN folded up their mobile strategy [earlier this year]. This part of the industry is still in its early stages, but it was great to see Disney take the first steps."

Most proponents of handset video admit that there are some hurdles to overcome before the public completely embraces the technology. Among these are screen size, battery life and subscription costs (estimated to be $10 to $25 per month in addition to the cost of the cell service itself).

At least three major U.S. cell phone service providers are set up for video delivery: Cingular, Sprint and Verizon.

TOO MANY BITS

Depending on the methodology used for deploying the service, there are other issues too. There is concern that next-gen video delivery could become suicidally successful and drag down traffic throughout a vendor's network. A wideband stream would have to be provided to every customer wanting to view a particular event. Too many viewers could result in system congestion and crashing. The way around this is to provide a more generalized service similar to standard television broadcasting with RF transmission of signals to subscribers.

Jeffrey Nelson, executive director corporate communications at Verizon Wireless, was optimistic that congestion would not really be a problem with Verizon's current VCAST video service.

"When we launched VCAST almost three years ago, we designed the service in such a way as to provide network proper coverage and capacity. This is clearly part of our business model. We're not going to risk our reputation as having the best cellular system by oversubscribing the service."

In breaking away from conventional networked delivery of video, DVB-H and Qualcomm's MediaFLO appear to be the logical choices. MediaFLO supports 320x240 resolution and 30 fps (considerably beyond 3G capabilities) and could offer upwards of 15 live program choices and considerably more when content is limited to short video clips.

FUTURE FOR VCAST

Since Verizon has plans to begin offering MediaFLO service in the first half of 2007, is there a real future for VCAST?

"We really view them as very different services," Nelson said. "On regular TV you can either watch programming where anyone sees the same selection--this is comparable to MediaFLO--or you can opt for on-demand viewing. That's where VCAST is today. It's long form versus short form. We see them as coexisting."

There's also the question of content suitability for the small screen. A wide shot of a football field during a kickoff is not going to play well on a two-inch screen. Content generation for next-gen viewing will have to be carefully considered and cannot be left to simply passing along reformatted video. Editing will no longer amount to decisions as to the best sequence of material and the location of cuts, wipes and dissolves.

It will also have to include "viewability" considerations with regard to wide versus tight shots and the way they are assembled to tell the story. The same goes for graphics. What works nicely on a sports bar 50-inch display may not play at all on a handset screen. Content providers will have to address these issues, just as they have had to do in going from SD to HD and from 4:3 to 16:9 aspect ratios.

SMALL SCREEN ISSUES

Snell & Wilcox is another player in this nascent industry and the company is marketing their Helios product for easy repurposing of content. It not only handles standard, format and aspect ratio conversions, but also provides deinterlacing and scaling, along with a library of compression selections to ensure operability with various cell phone delivery systems, as well as other next-gen delivery methodologies.

Joe Zaller, vice president of strategic marketing at Snell & Wilcox, described some of the challenges associated with small screen television.

"There's a very big need to make pictures look good in the small space," Zaller said. "There are a lot of issues to deal with. Interlacing is one of those. Most deinterlacers start by throwing away half of the information so the displays are progressive. There are problems too with the different sizes and shapes of screens. With 16:9 coverage of sporting events, the director lets the action move through the frame. When you view this on a small screen you may not be able to find the ball. This is really a big issue for mobile TV."

Zaller described other problems that arise when repurposing content for small screen TV.

One of these is compression efficiency. When the camera sees crowds behind a sports player, the system tends to treat the randomness of that crowd as "noise" and wastes a lot of bits. Helios is designed to recognize such situations and defocus the background crowd images in order to reduce the bit count.

"Some 3G operators are streaming at 6 fps; we want to help them deliver a better picture, so our technology saves a significant amount of bandwidth," Zaller said. "We deliver at 15 fps and the viewer gets a better picture and will come back to watch again. Quality is going to be very important.

"People will initially look at it as a novelty. We don't want to keep it at this level."

IEEE BTS New York Chapter Report

On 12 December 2006 Warner Johnston, Chair of the BTS New York Chapter, gave a distance presentation on Closed Captioning, CEA-708B Standard, from New York to an audience of 18 people attending a SMPTE Chapter meeting in Detroit. The Detroit SMPTE meeting was hosted by Louis Johnson IV who is a BTS member, SMPTE Section Manager and a Station Engineer at WXYZ TV. This novel BTS New York distance presentation in Detroit required a computer with a Power Point projector and a desktop type well amplified two way voice conferencing phone. In advance of the meeting Warner Johnston sent Louis Johnson his Closed Captioning Power Point presentation.

The Detroit SMPTE Chapter meeting began at 7:30 PM on 12 December 2006. Of the 18 people attending, nine were SMPTE members, one an SBE member, three were both SMPTE and SBE members, one a SMPTE and IEEE BTS member and one person a member of SMPTE, SBE and IEEE BTS. Three engineering guests were also present. After the SMPTE administrative agenda items were completed, Warner Johnston began his distance presentation from New York via the voice conferencing phone. As Warner Johnston proceeded through each item of his presentation, Louis Johnson in Detroit projected the associated Power Point slide on the screen. The complete presentation along with time for introductions and questions lasted 90 minutes. The distance presentation process worked quite well. The attendees were very interested in the subject and followed up with questions.

The IEEE BTS wishes to thank Warner Johnston, BTS New York Chapter Chair, for giving his presentation to the Detroit SMPTE Chapter meeting. The BTS also extends it thanks to Louis Johnson IV in Detroit for setting up this meeting and arranging the equipment for a distance presentation.

Warner Johnston has offered to provide his Closed Captioning from New York to other technical groups via the same distance presentation process. If interested, please contact Warner Johnston directly at Warner.W.Johnston @abc.com.

IEEE BTS Japan Chapter Activity Report

by Keiichi Kubota, Chair BTS Japan Chapter

BTS Japan Chapter held a joint meeting with the Institute of Image Information and Television Engineers (ITE). A technical meeting was held on January 16 to 17, 2007 at Kumamoto University, Kumamoto, Japan. There were 27 technical presentations including 18 presentations by young students on transmission technologies for digital terrestrial broadcasting and general topics for broadcasting technology and one special topic for CG synthesis technology.

The BTS Japan Chapter is planning to conduct six joint future meetings with the Institute of Image Information and Television Engineers (ITE). The scheduled meetings are:

- February 9, 2007 at NHK Hiroshima Station, Hiroshima, Japan.
- February 23-24, 2007 in Kyuka-village Minami-izu, Shizuoka, Japan.
- June, 2007 at Kikai Shinko Kaikan, Tokyo, Japan.
- July, 2007 at Hokkaido University, Sapporo, Japan.
- October, 2007 at NHK Nagoya Station, Nagoya, Japan.
- January, 2008 at NHK Fukuoka Station, Fukuoka, Japan.

As reports of these meetings become available, they will be provided to the BTS Newsletter.

Congratulations to the IEEE BTS Members Recently Elevated to Senior Member Grade

The IEEE Broadcast Technology Society sends its heartiest congratulation to the following BTS members elevated to Senior Member status from November 2006 through January 2007:

David Maxson – Boston Section
Martin Aidam – Germany Section
Dennis Brewer – Region 10 APO
Sergey Makarov – Worcester County Section
Graham Turner – UK & Republic of Ireland Section
Weihua Bing - Boston Section
George Paunovic - Spain Section

IEEE Senior Members are honored members of the IEEE Organization. We hope you will consider joining the ranks of Senior Members. IEEE Bylaw 1-105.3 sets forth the criteria for elevation to Senior Member Grade, as follows:

'….a candidate shall be an engineer, scientist, educator, technical executive or originator in IEEE-designated fields. The candidate shall have been in professional practice for at least ten years and shall have shown significant performance over a period of at least five of those years."

When you become a Senior Member, you will receive a bronze and wood plaques, a letter to your employer (upon request) $25 towards a new Society Membership, the recognition of your peers, and the opportunity to become an executive IEEE volunteer. If you would like to become a Senior Member and need some assistance, please contact your Section Chair or the BTS Administrator Kathy Colabaugh at k.colabaugh@ieee.org.

IEEE Seoul Section Forms New BTS Chapter

The IEEE Broadcast Technology Society is proud to announce that the IEEE officially approved the formation of a new IEEE Seoul Section BTS Chapter on 6 December 2006. The Chapter Chair is Prof. Yong Han Kim.

In November 2006, Dr. Yiyan Wu, BTS Transnational Committee Chair and Editor-in-Chief of the IEEE Transactions on Broadcasting, visited with the IEEE members in Seoul for a seminar/meeting during which plans were finalized in preparation for receiving official IEEE formation of the BTS Chapter in Seoul. A photograph of the founding Chapter members and guests from left to right are: Young Woo Seo, Korean Broadcasting System, Dr. Yiyan Wu, CRC Canada, IEEE BTS representative, Dr. Yong-Tae Lee, Electronics and Telecommunications Research Institute, Prof. Tho Le-Ngoc, McGill Univ. Canada, Prof. Yong Han Kim, University of Seoul, Chair BTS Seoul Korea Chapter, Prof. JungSun Kim, Han Kuk Aviation Univ. (IEEE Seoul Section chair), Jian Xu, Ph.D. Student, Yonsei University, Korea, and Prof. Jong-Soo Seo, Yonsei University, Director of Multimedia Research Lab. The photograph was taken by Prof. SangWoon Lee, Yonsei University.

The IEEE Broadcast Technology Society welcomes the new BTS Seoul Chapter and looks forward to publishing Chapter reports in future issues of the BTS Newsletter.

IEEE BTS Tutorial on Video Display Technology at NAB2007

The IEEE BTS will present a tutorial on Video Display Technology at NAB2007 on April 14, 2007 from 1:00 PM to 5:00 PM. This tutorial will be presented as part of the NAB Engineering Conference in room S226/227 at the Las Vegas Convention Center.

Video display technology has undergone a sea of change over the last decade, as LCD, plasma, and DLP devices have all but supplanted the venerable CRT in consumer applications. Recent developments have improved such parameters as dynamic resolution, viewing angle, contrast, and color gamut – long-held advantages of the CRT – challenging its continued dominance even for critical professional viewing. However, challenges remain in achieving standardization of color gamut, contrast range and other parameters across these new replacement technologies, for content creators to continue to achieve consistent quality control.

This half-day tutorial will be presented by the IEEE Broadcast Technology Society, a co-sponsor of the IEEE/OSA Journal of Display Technology. It will draw upon the technical expertise of leading researchers and developers worldwide to explain these recent developments in the context of both consumer and professional applications. It will also offer a peek at emerging technology still in the laboratory.

Among the issues to be explored are: the impact of today's HDTV and future formats on perceived quality with flat panel displays; broadcasters' requirements for displays in the production environment; measuring display performance in relation to requirements; available technologies and models; and a display manufacturer's perspective and description of the latest flat panel proposal for professional monitoring use.

David Bancroft, Manager Advanced Technology, Thomson Grass Valley, will introduce the topic and the speakers and moderate a panel discussion following their presentations. The presenters are:

- Hans Hoffmann, Senior Engineer, European Broadcasting Union, Grand Saconnex, Switzerland
- Richard Salmon, Senior R & D Engineer, Digital Media Group BBC Research, Tadsworth, United Kingdom
- Paul Boynton, Electronics Engineer, Flat Panel Display Laboratory, National Institute of Standards and Technology (NIST)
- Peter Putman, Editor/Publisher, HDTVexpert.com
- Hugo Gaggioni, Chief Technical Officer, and Senior Vice President, Broadcast and Professional Systems, Sony Broadcast and Production Systems Division

For more information and the latest updates about NAB2007 and the Engineering Conference please visit www.nabshow.com.

The IEEE Broadcast Technology Society

57th ANNUAL BROADCAST SYMPOSIUM

31 October – 2 November 2007
Hotel Washington, Washington, DC USA

CALL FOR PAPERS

Potential topic areas for papers may include:

- Digital radio and television systems: terrestrial, cable, satellite, Internet, wireless
- Streaming, IPTV, VoIP, VoD, Mobile TV, Wireless Multimedia
- Transmission, propagation, reception, re-distribution of broadcast signals
    - AM, FM, and TV transmitter and antenna systems
    - Tests and measurements
    - Cable and satellite technologies:
        - *Interconnections with over-the-air broadcasters • Transport stream issues • Re-purposing of navigational information*
- Advanced technologies and systems for emerging broadcasting applications
    - Reception:
        - *Software-based receivers • DTV and IBOC reception issues • Smart antennas for indoor use • Noise-figure management in a home environment • Compression and modulation for mobile and hand-held sets • Diversity reception under dynamic multipath • Frequency- and time-domain equalization • Wireless home distribution*
    - Transmission:
        - *Dynamic sharing of bandwidth • Spectrum re-packing optimization • New extensions for the ATSC VSB standard*
- Wireless Broadband Networks; e.g., IEEE 802.22 Wireless Regional Area Networks ("WRANs")
- Information Technology for broadcasters

Abstracts are due by 21 May 2007

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For details, visit the NAB2007 web page at http://www.nabshow.com

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