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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

Dear BTS Members:

In the Spring Newsletter, I talked about membership – and the good news that our BTS membership had grown by 2.7 percent over last year, as of January. But, I warned that this was a good news/bad news situation, since it was based on pre-terminator data. (The terminator is the program that IEEE runs at the end of February to drop members who have not renewed.) So, this time I'll report the rest of the story – the post-terminator numbers which, as expected, are not as good. But, there's more good news ahead, too, so stay with me.

Overall, IEEE terminations were higher this year than last – 30.1 percent of IEEE members who were billed for the 2006 renewal year, versus 26.5 percent of members who had been billed for 2005. Society terminations were also higher this year – 21.1 percent versus 17.5 percent. These are people who kept their IEEE membership but dropped a society membership. Of these, BTS lost 19 percent of our members to the terminator, so we fared better than the average society. In total, though, counting those who dropped both IEEE and BTS as well as those who dropped only BTS, we lost 29 percent of our 2005 membership. This equals the average for all societies. In raw numbers, 542 of the 1,881 members we counted last August, before the bills were sent

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From the Editor

The status of BTS membership continues to be featured with some good news and some bad news as you will see from reading our president's column. I have discussed my take on this issue in the past and will not dwell on it here. I do ask, as Tom has, that you, our current members, voice your opinion as to what you believe would help us to grow the membership. We would especially like to hear from you if you are thinking about not continuing to be a part of the BTS.

On a more positive note, the first BTS sponsored **IEEE International Symposium on Broadband Multimedia Systems and Broadcasting 2006** was held April 6th and 7th, 2006 in Las Vegas, NV appears to have been a big success. I hear we may have even made a few dollars on the event. That is really great for a symposium that was put together rather quickly. It also lends credibility

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Inside

IEEE

From the President continued

out, did not renew. We added 130 new members by the end of January, for a total of 2,011, which was the 2.7-percent gain from January 2005 that we reported last time.

Some of you procrastinated, and did not renew until after February. In March, the IEEE Member Services Department conducted an e-mail and telemarketing outreach, resulting in the recovery of nearly ten percent of the lost IEEE and society members. By the end of March, our BTS membership had exceeded its level at the same time last year. We've added 203 new members in the first five months of this year. As of the end of May, we're just 26 members short of our benchmark August 2005 level. So, we're well on our way to our second straight year of net membership growth. But, obviously, a major membership concern, for IEEE and for BTS, is "churn" – the replacement of lost members with new members needed each year just to stay even.

We're delighted to welcome our new members this year – you'll see a list of your names in this Newsletter. But, we'd be even more delighted to have retained more of last year's members. Having reviewed the past six years of termination data, of which this year is also typical, we can expect that about 29 percent of you who are now receiving this Newsletter as BTS members will not be with us next year. But, we hope it won't come to that again – we'd like to do something about it. Some of you will be hearing from us directly as we survey your concerns. But, don't wait for our e-mail or call – please let us know what you like and don't like about BTS and IEEE, and what we can do to add value to your membership. We want to save you from the cruel clutches of the terminator, and ensure that you'll be back!

Tom Gurley
President
IEEE Broadcast Technology Society
tgurley@ieee.org

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
Fall, 2006	July 20, 2006
Winter, 2006	October 20, 2006
Spring, 2007	January 20, 2007
Summer, 2007	April 20, 2007

From the Editor continued

to the idea that this is an area where the BTS can expand its base and broaden our scope of interest. As our industry is changing, many, including myself, believe that the BTS needs to expand its activities in areas such as this, so I am encouraged by the success of the new symposium. Buoyed by that success, plans are already underway for next year's symposium that will be held March 28-29, 2007 in Orlando, FL. We will give you more details in future issues as those plans develop. One final note, congratulations and thanks to all who helped make the symposium a success.

Not to be out done, chairman Guy Bouchard and his committee are also hard at work on putting together our **56th Annual Broadcast Symposium** that will be held once a again at the Hotel Washington in Washington, DC. There is a lot going on in our industry and this is where you will hear about it from those in the know and on the front lines. Make your plans to attend now as it promises to be a very informative three days. As usual it is also a great place to see old friends, network and make some new friends while getting the latest on what's happening in broadcasting technology. Please take note that our fall Symposium this year will be a bit earlier than in recent years. It is scheduled for **September 27–29, 2006**.

In addition to our usual content of chapter reports and other BTS news, this issue also contains some interesting and informative articles. The IEEE Technical Activities Board (TAB) Newsletters Committee asked IEEE

Societies to publish an article about the 2007 IEEE President-Elect candidates. This lead article, in the form of ten questions and answers, is intended to help you know the candidates and their platforms. Jerry Whitaker has provided an article on the ATSC Advanced Common Application Platform (ACAP) standard for interactive television. We have an interesting piece on the potential application of grid computing in broadcasting from the BBC. There are also articles on the 50th anniversary of the invention of the video tape recorder and one on the ARRL Hello campaign celebrating the first voice broadcast on radio that occurred 100 years ago on December 24, 1906.

And finally I must apologize that this issue is getting to you later than it should have. I hope to get back on track with the next issue and as always I would like to hear from you.

Bill Meintel
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Answers to 10 Questions by the two Candidates for 2007 IEEE President-Elect

19 March 2006
From Your IEEE TAB Newsletters Committee Chair: Jacek Zurada

IEEE Board of Directors selected Lew Terman and John Vig to be the two candidates for 2007 IEEE Pres-Elect. In an effort to better present their platforms and in connection with the upcoming elections, Lew and John, assisted by the TAB Newsletters Committee have prepared for the readers the following "Answers to 10 Questions by the two Candidates for 2007 IEEE President-Elect".

Lew Terman (www.terman.org) can be contacted at l.terman@ieee.org, and John Vig (www.JohnVig.org) can be contacted at j.vig@ieee.org.

QUESTION: What are IEEE's strengths?

Lew Terman: The volunteers are perhaps the most important strength; it is their enthusiasm, expertise, and time which is key to the success of the Institute.

Another major strength is the IEEE's generation and dispersion of high quality Intellectual Property, including archival publications, conferences/meetings, and standards. It is this IP which produces the revenue streams that financially enables the IEEE and create the information flow which is so valuable to the technical community. The IEEE publishes over 30% of the published material in IEEE's fields of interest, and its conferences/meetings around the world enable rapid dispersal of new results, as well as networking and face-to-face discussions.

A third major IEEE strength is globalization: RAB's structure of geographical based entities extends around the world in over 150 countries, allowing networking and the interchange of technical information at the local level.

Fourth, the IEEE has recovered from the recent downturn to a strong overall financial position. Reserves are at an all-time high, though some problems remain for specific O/Us. The financial performance of the Societies and Councils has been very important.

Finally, the IEEE has an excellent staff supporting the volunteers and working with them for the Institute and its goals.

John Vig: The IEEE's main strengths include:

1) That we are a non-profit membership organization; we have ~50,000 volunteers who contribute to the IEEE's >350 conferences, >100 journals, >300 sections, >900 standards, >40 societies and councils, etc.
2) The breadth and quality of products & services: publications, conferences, workshops, standards, educational products and services, sections, chapters…
3) Our diversity – i.e., that we have ~360K members, in 150 countries. The membership includes not only engineers but also computer/IT professionals, scientists…; men and women; members of all cultures..., and that our activities transcend national borders.

QUESTION: What are the major challenges facing the IEEE?

Lew Terman: Membership has been essentially flat in recent years, and the number of higher grader members has been decreasing. A major problem has been the retention of new graduates, now below 25% three years after graduation. Society membership continues to decline, and the fraction of IEEE members without society membership is now over 43%. Much of this can be attributed to a perceived lack of value of IEEE membership relative to its cost. Increased support of member career development is important. IEEE membership will be 50% in Regions 7-10 within 10 years with current trends; the implications (and opportunities) need to be thoroughly examined. The long-term impact of IEL on membership could become significant.

Open Access is the major long-term question for publications - if all publications are available for free on the web, the IEEE publication business could collapse. Publication timeliness has been a problem, new publications are launched too slowly, and there is a strong need for practical publications to engage the practitioners/"bench-top engineers". Finally, there is the impact of going to full electronic publishing and on what schedule it might occur.

While the overall IEEE financial position is good, there are specific units with problems; further reduction of the infamous Infrastructure Charge is needed through continual evaluation of the efficiency of our operations. With the continuing growth of reserves, long term financial plans/goals for the reserves and their use must be developed.

Finally, the IEEE needs to react to new technologies faster to claim leadership positions in these technologies as they emerge. We must continue our search for effective and fair governance.

John Vig: How to provide sufficient value to justify the membership dues is a major challenge. A growing number of members who work for institutions which provide "free" access to IEEE's publications and conferences are asking, "I get everything I want from IEEE for free, so, why should I be a member?"

About 80% of IEEE members don't read IEEE journals on a regular basis. "The articles are by academics, for academics." Half of IEEE members work in industry. Providing more practical content without diluting the quality of our publications is a major challenge.

Half of IEEE's revenues result from the sale of publications. "Open

access," the worldwide movement to disseminate scholarly research literature online, free of charge, threatens these revenues.

QUESTION: What are the major changes IEEE needs to be making?

Lew Terman: Membership: increase (and actively market) membership benefits around the world, broaden the base of membership such as aggressively moving into software, services, applications and solutions. Follow up the China initiative with similar efforts for India and Eastern Europe.

Publications: establish a faster track for new publications, pilot new publications that are more practically-oriented, and establish a reward system for reducing the submission-to-publication time. Develop the best search capability for technical material, and make it a membership benefit.

Education: the Expert Now program for continuing education is off to an excellent start; aggressively push it and make it available to members.

Financial: drive good financial behavior for Operating Units with reserves by giving them more access to those reserves – as the ratio of the O/U's reserves to expenses increases, allow access to an increased percentage of the reserves. Continue to work on decreasing the Infrastructure Charge and increasing revenues, though not at the cost of making IEEE's prime goal increased surpluses/reserves. Develop a long-term financial plan/goals for the IEEE reserves.

Governance: the current governance structure is not egregiously broken; continue to work towards streamlining operations and governmental efficiency.

Finally, work across the IEEE major Boards to establish a spirit of working together, understanding each others problems, and working with staff on identifying and solving tactical and strategic problems.

John Vig: To improve the IEEE's agility, e.g., with respect to entering new technologies, I have proposed that we establish an IEEE Venture Capital Fund. Any person could propose an idea, and, if the idea is judged to be worthy, receive up to $100,000 to implement, or show the feasibility of, the idea.

To provide practical content, I have proposed that we create a new category of peer-reviewed publications, "application notes" - which would include "how-to's," and case studies; and that we digitize many of the ~600 IEEE Press books and make them available to members, and members only, for free.

The IEEE should be more willing to take prudent risks, and it should be more willing to terminate unsuccessful activities.

To explore new ideas, the IEEE should experiment more – with new membership models, dues structures, publication models (e.g., new forms of peer review), etc.

The IEEE needs to improve its communications with members. The Institute should become a real newspaper, i.e., it should report both the good and the bad, and it should publish controversial views, even when such views may displease the leadership.

The IEEE should join with other engineering and scientific organizations to establish a public relations campaign to improve the image of engineering and science.

QUESTION: What are some of the important challenges facing IEEE as a publisher in service to its membership?

Lew Terman: Issues raised by Open Access will need to be anticipated and managed. A major implication is to at least maintain the revenue stream which our publications generate. IEEE needs to help members navigate the mass of data available from IEEE, other technical publications, and on the web. Practical publications need to be developed with the collaboration of RAB and TAB. Goals for article publication timeliness must be set, and rewards established for publications to meet or exceed the goals. Establish a fast approval track for new publications. Maintain the importance of peer review. Keep monitoring the possibility of going to all electronic publishing, and establish when or if it should occur well before any critical point occurs.

John Vig: Open access, the worldwide movement to disseminate scientific and scholarly research literature online, free of charge is a serious challenge because half of IEEE's revenues result from the sale of publications. Google, at www.scholar.google.com and similar services, now make it easier to find the free copies of publications. Papers can be read without having to pay the publishers.

Delayed open access, e.g., making publications open access two years after publication, would not be as damaging. It would allow the IEEE to maintain most of its publication revenues while fulfilling its mission of being "for the benefit of humanity and the profession."

A frequently heard criticism of IEEE publications is that they are primarily "by academics, for academics;" they are not useful for practitioners. About half of our membership is from industry. If our publications are not useful for the majority of our members, then we have a serious problem.

I have proposed three solutions to this problem. One is to ask authors to provide, voluntarily, a "practical impact statement" with their papers. The second is to create a new class of peer reviewed publications, "application notes," and the third is to digitize IEEE Press books and make them available to the membership.

The mean time between an author's submission and the date of publication of an article is too long for some of our journals; the delay for five of our journals has been >120 weeks. This must not be allowed to continue, and it need not continue, as evidenced by the fact that the mean is <50 weeks for 31 of our journals.

QUESTION: Do you see IEEE in future years as an organization based on its strong membership base, or do you foresee other models?

Lew Terman: IEEE should remain a membership-based organization. Membership is critical – it is the members through whom we serve our technical communities, and who provide the volunteers that are critical to the success of IEEE. Members also provide a means of measuring how relevant we are to the technical world, and provide the mechanism for engaging emerging technical and geographic areas.

John Vig: I see the IEEE continuing to be a membership-based organization - with its tens of thousands of volunteers and its membership diversity as its pillars of strength.

I do, however, see a need to experiment with membership and dues models. Some members, for example, may be willing to receive Spectrum and The Institute electronically if the dues were lowered by the costs of producing the paper copy of those publications. We have >$160M in reserves. Therefore, we can afford to experiment.

The success of our IEEE Electronic Library (IEL) is hurting membership recruitment and retention. (IEL subscribing institutions, which include many of the largest universities and corporations, provide "free" access to IEEE publications.) I hear more and more "I get everything I want from IEEE for free, so, why should I be a member?" Therefore, another experiment I would propose is to offer reduced dues to those working or studying at a few IEL organizations and measure the effects on membership numbers.

QUESTION: What changes in IEEE would you advocate in response to quick industrialization and potential IEEE presence in large Asian countries?

Lew Terman: The two major Asian countries of interest are quite different in technical environment and social structure. I believe the current China initiative is appropriate; we need to understand the environment and the current approach seems a good first step. We need a deeper understanding of the specific needs and opportunities and how to involve that community to effectively stimulate IEEE membership and volunteerism.

India is also a key growth area in the 21st century, and currently has more IEEE members than any country outside the US. We need to understand why they join, and focus on the appropriate member and technical services to support their interest. India has a strong university structure with which we should be working.

John Vig: IEEE's presence in large Asian countries is actual, not just "potential." For example, in 2005, we held 59 conferences in China, and a total of 129 in China, India, Japan and Korea. Our publication sales, in China alone, amounted to ~$5M in 2005. Total sales to the four countries was ~$20M. In 2005, our combined membership in these four countries was ~45K.

Although the IEEE has made inroads in China and India, it is a long way from realizing the potential presence in these and other countries. Membership is too expensive for many in Asia, Latin America, Eastern Europe... We need a membership strategy for potential members who can't afford our dues, not just in Asia, but, throughout the world.

QUESTION: What do you see as the power of the IEEE President and how would you exercise this power?

Lew Terman: The IEEE President has three major responsibilities/opportunities:

a) Running the Board and ExCom meetings effectively, including setting up the meetings. This is important as the members of the governing bodies of the IEEE meet for only a short time, and it is important the meetings be efficient for the most effective interaction.

b) Providing leadership to the Institute: setting directions, establishing committees and study groups to get information and sift through alternatives, work with the staff, work with the IEEE Boards and governance levels. It is in this area that the President can have the most effect. I would focus on bringing the various groups in IEEE together, and on listening to their input, getting an open airing of issues and suggested solutions, and generating and following through on new ideas.

c) "Showing the flag" around the world, to both IEEE geographies/groups and non-IEEE entities - geographical, technical and political. The interactions with IEEE groups are very important to generate mutual understanding, and the interaction with non-IEEE entities is important to present the IEEE and the technical community it represents, and to understand their needs, views, and to understand possible opportunities.

John Vig: The president's duties are to: chair the meetings of the IEEE Board of Directors, Executive Committee and Assembly; perform ceremonial functions such as meeting with dignitaries, presentation of awards, opening remarks at conferences, etc.; promote the objectives of the IEEE; and be "the Chief Executive Officer of the IEEE."

I would make maximum use of the presidency to advocate the IEEE's agenda, both within and outside the IEEE.

I would set at least one lofty (man-on-the-moon-like) goal for the IEEE, aimed at inspiring and mobilizing the volunteers and staff.

The Board of Directors has been too inward-focused. I would propose the establishment of a council of advisors – consisting of prominent, mostly outside experts and leaders – to advise the IEEE leadership.

QUESTION: In the 2005 IEEE elections, only 14% of the membership voted. What, if anything, would you do to increase members' participation in IEEE elections?

Lew Terman: I think what we are doing this year is pretty good – talking to the Regions and other entities which invite us (with Q&A sessions where time permits), sending these 10 questions to the Newsletters, participating in the Philadelphia debate and making available recordings of the debate and presentations of the candidate platforms on the IEEE web site, and making additional information available on our personal web sites.

John Vig: In 1975-77, when a controversial candidate, Irwin Feerst, ran for IEEE president, 36% voted. In those days, the membership was more involved in IEEE issues than they are today.

Today, the membership is rarely informed of controversial issues. For example, last year, I received reports of meetings where readings from the Koran and Christian prayers were parts of the program. Why not report such events and ask the membership whether or not such religious expressions should be allowed as parts of IEEE events?

"THE INSTITUTE is the newspaper of the IEEE" claims The Institute's website but, The Institute is more a "house organ" than a newspaper. As president, I would propose to the Board of Directors, and The Institute's Editorial Board, that The Institute become a real newspaper of the IEEE.

The office holders in IEEE, especially the President and the other members of the Board of Directors, make decisions about matters that are important to the membership and the future of IEEE. Voting in the annual IEEE election is the chance members have to choose the decision makers. With only 14% voting, 7+% of the members can decide the fate of IEEE.

QUESTION: What have been your three most important contributions to IEEE?

Lew Terman: In the late 1990's, I was instrumental in the conversion of the Solid-State Circuits Council to the Solid-State Circuits Society. This was very successful; the SSCS is now the 5th largest Society in the IEEE, and the Journal of Solid-State Circuits records the highest number of hits in IEL. I served as the first SSCS president elected by the Society.

In the mid 90's, IEEE and TAB were going through financial difficulties. I was appointed TAB treasure, stabilized the situation and improved the communication with TAB, and served a second term as Treasurer.

In 2001, I was on the Board as the bottom fell out of the IEEE financial situation. As part of a team effort, we were able to put in place a number of changes which arrested the slide.

John Vig: My three most important contributions are:

The IEEE Sensors Council, i.e., I proposed it, shepherded it through the approval processes, and was elected its founding president, in 1999. In 2005, the Council's journal published 1500 pages, and its conference had >500 registered participants.

Between 1999 and 2002, the IEEE's reserves declined >$50M (>40%), due, in large part, to the decline in the value of IEEE's investments. Up to this point, the IEEE had no formal investment policy. I wrote the first draft of the Investment Operations Manual (IOM), then worked with investment professionals, volunteers and staff to finalize it and get it passed by the Board. Contained in the IOM is an investment policy which has reduced the risks and increased the transparency of IEEE's investments.

I brought what is now the IEEE Int'l Frequency Control Symposium into the IEEE. I negotiated the takeover of this conference by an IEEE society (UFFC). This conference is now the premier international conference in its field.

QUESTION: What would be your single and most recognized contribution that will distinguish your IEEE Presidency from those of others?

Lew Terman: I would like my presidency to result in the elimination of any silos between IEEE operating units, and attacking IEEE problems with coordinated efforts across IEEE.

John Vig: The president under whose leadership innovation flourished in IEEE.

Biographies

Lewis Terman received a Ph.D. in EE from Stanford in 1961. He recently retired from IBM following a 45 year career in semiconductor devices and technology, digital and analog circuits, and processor and memory design. He received 9 major IBM technical awards including three Corporate Awards, and was involved with a number of product programs. He did two tours of duty on the Research Division Technical Planning Staff. He was elected to the IBM Academy of Technology in 1991 and served as its president 2001-2003. He is an IEEE Fellow, received the IEEE Solid-State Circuits Technical Field Award, and is a member of the US National Academy of Engineering.

He was a member of the IEEE Board of Directors for three years as TAB VP (2001) and Division 1 Director (2004-2005). He has been on TAB almost continuously 1990-2005 as Tab VP, Division 1 Director, president of the IEEE Electron Devices Society and

the IEEE Solid-State Circuits Society, Chair of the Technical Meetings Committee, and two terms as TAB Treasurer; he was off TAB in 2003 serving as PSPB Treasurer. He was editor-in-chief of the IEEE Journal of Solid-State Circuits, and has been chair of numerous conferences, including the ISSCC.

John Vig was born in Hungary. He immigrated to the USA in 1957, and received the B.S. degree from the City College of New York and the Ph.D. from Rutgers - The State University, in 1964 and 1969, respectively. He has spent his professional career performing and leading R&D in government research laboratories - developing high stability quartz crystal resonators, oscillators, and sensors.

He has been awarded 55 patents and is the author of more than 100 publications, including nine book chapters.

Since 1997, he has been a technical advisor to program mangers at the US Defense Advanced Research Projects Agency for programs ranging from micro- and nanoresonators to chip-scale atomic clocks. He is an IEEE Fellow, and is the recipient of the IEEE Cady Award and the IEEE Sawyer Award. He has been the Distinguished Lecturer of the IEEE Ultrasonics, Ferroelectrics, and Frequency Control (UFFC) Society, and he has served as the president of this Society.

He founded the IEEE Sensors Council - which now has a successful journal, the IEEE Sensors Journal, and a successful conference. He has served on the IEEE Board of Directors for three years. In 2005, he was IEEE Vice President for Technical Activities.

IEEE Broadcast Technology Society Representation and Tutorial Activities at IBC2006

IEEE BTS Information Booth

The IEEE BTS will be staffing an information booth at the 2006 International Broadcasting Convention (IBC) from 8 through 12 September 2006 at the RAI Exhibition and Congress Centre in Amsterdam, Netherlands. The IEEE BTS booth will be located at IBC Exhibitor Stand Number 8.750b. We will be in the same familiar location in the lobby of exhibit hall 8 however attendees will see the partnership village has a new look this year. You are invited to stop by and meet with the BTS representatives Tom Gurley, President of the BTS, Mike Bennett, BTS AdCom, Yiyan Wu, Editor-in-Chief of the BTS Transactions on Broadcasting and Kathy Colabaugh, BTS Publications Administrator. They will be glad to talk with you and help you with any questions you may have about the IEEE and the BTS.

IEEE BTS Tutorial

In addition, the IEEE BTS will be hosting a tutorial session during the IBC conference. The details are:

Session Title:	Tutorial on Video Display Technology
Session Chairman:	David Bancroft Thomson Digital Media Solutions
Date:	7 September 2006
Time:	10:00 AM to 1:00 PM
Location:	Room L, Amsterdam RAI Exhibition and Congress Centre

Synopsis:
Video display technology has undergone a sea 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 tutorial will be presented by the IEEE Broadcast Technology Society, a co-sponsor of the new 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.

IBC2006

The IBC Conference Sessions run from 7 through 11 September 2006. The IBC Exhibition Halls will be open from 8 through 12 September 2006. For detailed information about IBC2006, please visit its website at www.ibc.org.

Successful Launch for IEEE International Symposium on Broadband Multimedia Systems and Broadcasting

Some 60 presentations and 100 Attendees at April Event in Las Vegas

Opening Plenary

Kamil Grajski of Qualcomm/FLOForum presenting "MediaFLO Technology Overview"

Yoram Solomon of Texas Instruments/Mobile DTV Alliance "Complementary Unicast/Broadcast/Podcast Topologies and Open Standards in Mobile TV"

Keynote Lunch Speakers

Thursday Keynote Speaker: Roger Quayle
Chief Technology Officer: IPO Wireless
"TDtv: Enabling Mobile Operators to Maintain Control and Increase Revenues"

Keynote Speaker: Charles L. Dages
Executive Vice President
Warner Bros. Emerging Technology
"Technology and Entertainment; The Saga Continues..."

Welcome Reception

Borrowing from the fall Broadcast Symposium, an evening "Welcome" reception took place on Thursday evening which allowed attendees to mingle and relax in a comfortable setting.

Speakers Christine Di Lapi (Motorola Inc.) and Roland Schaller (UDcast) smile for a picture.

Speaker Sung-Hoon Kim (ETRI), and Technical Program Chairs Yiyan Wu and Demin Wang (Communications Research Center Canada) after a morning paper session.

Symposium Planners Yiyan Wu, April Monroe, Tom Gurley, Kathy Colabaugh and Demin Wang gather to celebrate a successful symposium.

Session Chairs Pablo Angueira and David Guerra (University of the Basque Country, Spain) enjoy a cup of coffee.

Session Chair and Plenary Speaker John Cosmas (Brunel University) & Speaker Medhi Rezaei (Tampere University)

Society President and Symposium Steering Committee Chair Tom Gurley with Charles Sestock (Texas Instruments), John Cosmas and Amar Aggoun (Brunel University).

Report from the IEEE BTS Argentina Chapter

by Valentin Trainotti

During the evenings of 30 and 31 May 2006, the IEEE BTS Argentina Chapter conducted a two-day Seminar on Broadcast Transmitting Antennas. The Seminar was very well received by 21 attendees including attendees from different parts of the country including Posadas in the province of Misiones in the northern part of the country, from Rio Cuarto in the province of Cordoba in the western part of the country and from Bahia Blanca in the province of Buenos Aires in the southern part of Argentina.

Prof. Valentin Trainotti and Dr. Walter Gustavo Fano presented the Seminar in Spanish during a three-hour session each evening of 30 and 31 May 2006.

Prof. Trainotti and Dr. Fano

The first session of the Seminar presented the following topics:

- Medium frequencies transmitting short Monopoles, Monopoles
- Dipoles, and Monopole Arrays for AM and Digital transmissions
- Antenna characteristics
- Artificial and natural ground plane
- Input impedance
- Bandwidth
- Power capacity
- Near and Far Field Strength
- Diurnal and Nocturnal service area.
- Surface and ionospheric wave propagation

The second session of the Seminar continued with the following topics:

- Very and Ultra High frequencies transmitting antennas for FM and TV
- Antenna elements
- Reflector Antenna elements
- Antenna Arrays
- Input impedance.
- Bandwidth
- Power capacity
- Near and Far Field Strength
- Service area
- Spatial Wave Propagation

Each attendee at the Seminar received two textbooks on Electromagnetic Engineering and several IEEE BTS papers authored by the lecturers. Information about the two textbooks can be found at the following web sites: http://www.cuspide.com/detalle_libro.php/9871104103

http://www.cuspide.com/detalle_libro.php/9871104324

Prof. Valentin Trainotti and Dr. Walter Gustavo Fano are available to present this Seminar to other IEEE Sections or Chapters in IEEE Region 9. They can present the Seminar in a single day by scheduling a three-hour session in the morning and a three-hour session in the afternoon. If interested, please contact Prof. Valentin Trainotti by email at vtrainotti@fi.uba.ar.

Report from IEEE BTS Chapter of Beijing Section

THE 2nd INTERNATIONAL FORUM of DIGITAL TV and WIRELESS MULTIMEDIA COMMUNICATIONS (2nd IFTC) in SHANGHAI

by Zhixiang Xu, Chair

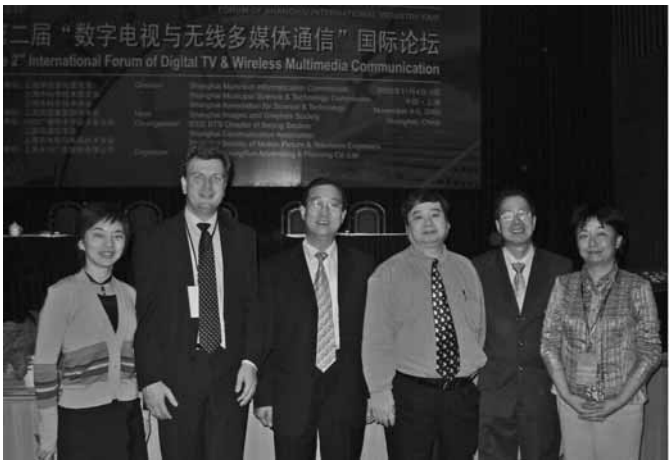
The 2nd International Forum of Digital TV & Wireless Multimedia Communication (IFTC) was held during November, 2005 in Shanghai, China. The IEEE BTS Chapter of the Beijing Section was the one of the sponsors of the 2nd IFTC Forum. The IEEE member Prof. Wenjun Zhang, who is the Vice President of Shanghai Jiao Tong University, was the Chairman of the Forum. Prof. Zhixiang Xu, who is the Chairman of the IEEE BTS Chapter of Beijing Section, served as the Executive Chairman of the

Photograph 1: Chairman and the main speakers. On the far left side of the photograph is Wenjun Zhang, Forum Chairman

Forum. On behalf of the IEEE BTS Dr. Yiyan Wu, who is the principal scientist at CRC Canada, presented the welcome speech to 280 persons attending the Forum. The thematic topics of the 2nd IFTC were Digital TV, IPTV, Mobile Phone TV, Content & Security Management, and New Advances of Broadband Multimedia. Keynote speeches were provided by fourteen scientists and specialists from both domestic and foreign locations. Thirty-two papers were presented at the Forum.

The 3rd IFTC will be held on November 3-4, 2006 in Shanghai. For information about this event please visit its web site at www.siga.com.cn/iftc2006. We welcome IEEE members to come to Shanghai and attend the 3rd IFTC Forum during the golden autumn of this year.

Photograph 2: IEEE BTS representative Dr. Yiyan Wu (right), Principal Scientist at CRC and Prof. Zhixiang Xu, Executive Chairman of the Forum



Photograph 3: Some of the IEEE members attending the Forum.

Report from the IEEE BTS/ComSoc Ottawa Joint Chapter Seminar

by Bahram Zahir, Chair

OTTAWA, Canada – April 18, 2006; David Falconer, Professor Emeritus, Carleton University conducted a seminar on Air Interfaces for Future-Generation Wireless Systems. The seminar was held in SITE, University of Ottawa. About 75 people attended this seminar.

The seminar focused on the requirements of "4th Generation" of wireless systems, including an overview of the organizations involved in the process of research for the 4th generation; flexible spectrum use; user requirements and application scenarios; moderate terminal and base station hardware costs; high spectral efficiency; and scalability of the cost of terminals with respect to their maximum bit rate capabilities. Also, it discussed the benefits of OFDM/single carrier and frequency division/time division. The next generation of wireless systems is intended to intuitively adapt to the needs of the user as they evolve from Personal Area Network to Cellular Network.

Dr. David Falconer gives a talk to members of the IEEE in Ottawa on 'future generation wireless systems.

We thank EION Wireless (www.eionwireless.com) as the sponsor of this event. As well, we would like to thank the School of Information Technology and Engineering (SITE) - University of Ottawa, (www.site.uottawa.ca/index.shtml), for providing the venue for this event.

ACAP Demonstration Project Gets Underway

by Jerry Whitaker, VP of Standards Development, ATSC, Washington, D.C.

The ATSC Advanced Common Application Platform (ACAP) is a comprehensive standard for interactive television. Developed as the result of a landmark harmonization effort between the ATSC DTV Application Software Environment (DASE) and CableLabs' Open Cable Application Platform (OCAP) specifications, ACAP provides consumers with advanced interactive services while providing content providers, broadcasters, cable and satellite operators, and consumer electronics manufacturers with the technical details necessary to develop interoperable services and products.

The ATSC Planning Committee (PC) has undertaken a major demonstration project of the capabilities of ACAP, the goal being to illustrate how ACAP can be used to enhance the viewing experience.

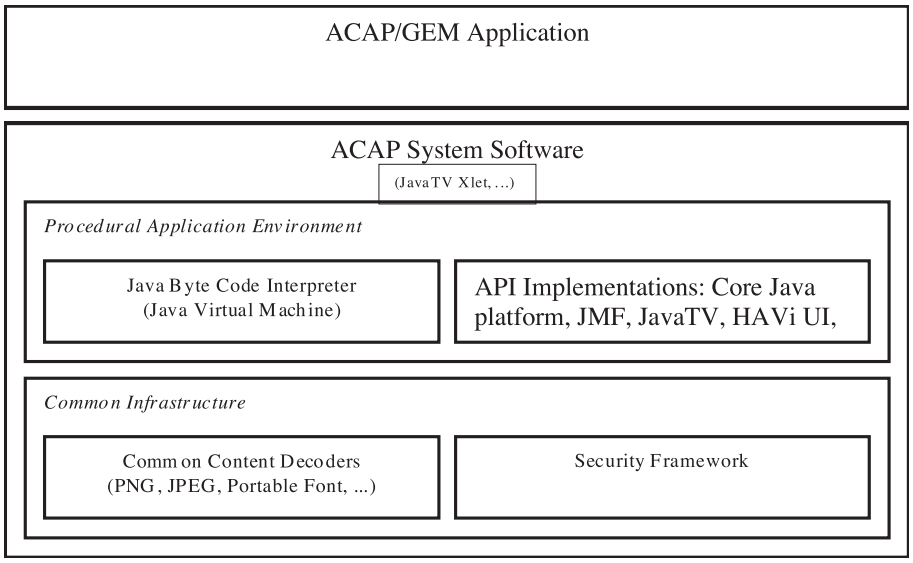


Figure 1 ACAP-J system architecture.

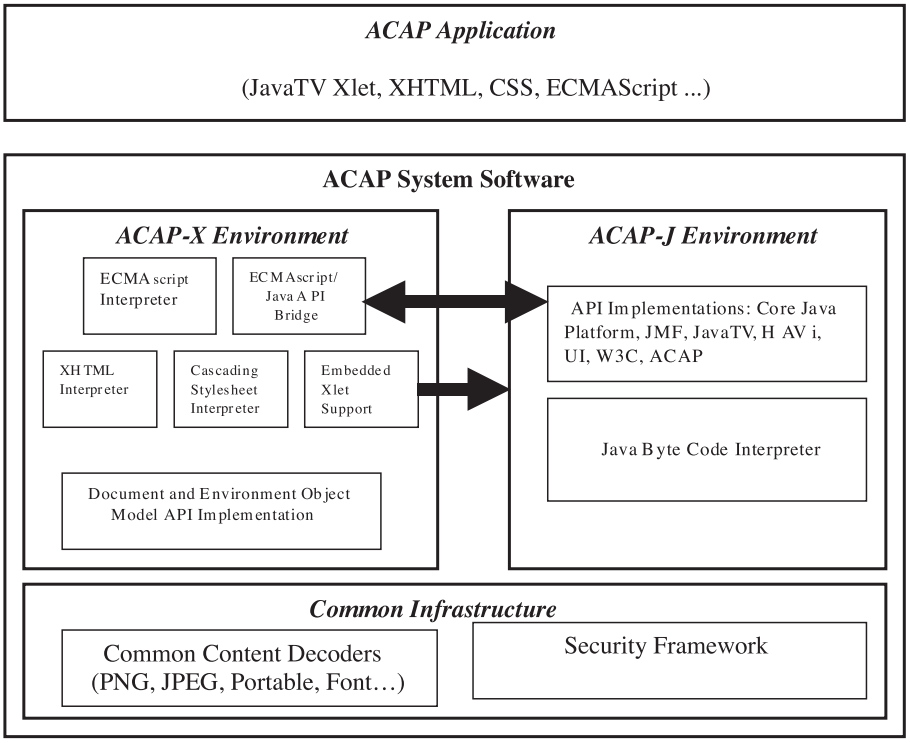


Figure 2 ACAP-J system architecture and system software.

About ACAP

In essence, ACAP makes it appear to interactive programming content that it is running on a so-called common receiver. This common receiver contains a well-defined architecture, execution model, syntax, and semantics. As a "middleware" specification for interactive applications, ACAP gives content and application authors assurance that their programs and data will be received and run uniformly on all brands and models of receivers.

An ACAP Application is a collection of information that is processed by an Application Environment in order to interact with an end-user or otherwise alter the state of the Application Environment.

ACAP Applications are classified into two categories depending upon whether the initial application content processed is of a Procedural or a Declarative nature. These categories of applications are referred to as procedural (ACAP-J) and declarative (ACAP-X) applications, respectively. An example of an ACAP-J application is a Java TV™ Xlet composed of compiled Java byte code in conjunction with other multimedia content such as graphics, video, and audio. An example of an ACAP-X application is a multimedia document composed of XHTML markup, style rules, scripts, and embedded graphics, video, and audio.

An ACAP application need not be purely procedural or declarative. In

particular, an ACAP-J application may reference declarative content, such as graphics, or may construct and cause the presentation of markup content. Similarly, ACAP-X applications may use script content, which is procedural in nature. Furthermore, an ACAP-X application may reference an embedded Java TV Xlet.

The architecture and facilities of ACAP are intended to apply to broadcast systems and receivers for terrestrial broadcast and cable TV systems. In addition, the same architecture and facilities may be applied to other transport systems, such as satellite.

ACAP is primarily based on the GEM (Globally Executable Multimedia Home Platform) specification developed by the DVB consortium and DASE developed by the ATSC. ACAP includes additional functionality from Cable Labs' OCAP specification. ACAP builds upon GEM by adding specification elements in order to offer a high degree of interoperability among different environments based on digital TV specifications from ATSC and SCTE.

Where only ACAP-J applications are supported, the application and system software are as shown in Figure 1. Where ACAP-X applications are supported, the application and system software are as illustrated in Figure 2.

In recognition of the launch of ACAP services, the ATSC has developed a Certification Mark specifically for ACAP-compliant products. See Figure 3. The Certification Mark Policy is specified in ATSC document B/35, which can be found on the ATSC Web site. See: http://www.atsc.org/policy_documents/B35_Certification%20Mark%20Policy.DOC.

Figure 3 ATSC ACAP Certification Mark.

TTA Certifies First ACAP Receiver

TTA has issued Samsung Electronics its first certificate of compliance for the ACAP Standard (A/101). Telecommunications Technology Association (TTA) is a standardizing, testing, and certifying body in the field of information, communication and broadcast technology. The certification testing on Samsung's ACAP Set-Top Box and TV covered Profile 1 as defined by document TTAS.OT-07.0001, which corresponds to ACAP-J profile in ATSC A/101.

Last year TTA organized a committee called CATS for development of an ACAP test suite. The committee members—which include Samsung Electronics, LG Electronics, Daewoo Electronics, Aircode, and TTA—analyzed differences between the MHP Specifications and ACAP Standard to make use of existing MHP Test Consortium (MTC) Test Suite and to create the required new test cases. There are approximately 8400 tests in the current ACAP Conformance Test Suite. The test cases are classified into four categories; MHP tests, HAVi tests, Sun tests, and ACAP tests. The first three tests are from MTC's MHP Test Suite, some of which are modified to facilitate ACAP testing. The Tests were written by CATS and are used to test ACAP specific and Korean specific functionalities in ATSC A/101 and TTAS-OT.07.0001.

PMCP Support for ACAP

Additional developments within ATSC are aimed at facilitating ACAP implementation at broadcast facilities. CS/76A, "Candidate Standard: Programming Metadata Communication Protocol Standard, Rev. A" incorporates various changes and includes a new informative Annex that discusses the use of PMCP with ACAP and the ATSC Data Broadcasting Standard (document A/90). The Candidate Standard stage recognizes that a specification has reached a level of technical maturity that would benefit from implementation experience and technical feedback. After the Candidate Standard period ends, the document typically moves on to the next approval stage on its way to becoming an ATSC Standard.

The PMCP standard makes it possible to integrate the various information sources that are needed to compile the key PSIP tables. PMCP is designed to permit broadcasters, professional equipment manufacturers, and program service providers to interconnect and transfer data among systems that eventually must be communicated to the PSIP generator. These systems include:

- Traffic
- Program management
- Listing services
- Automation
- MPEG encoder

PSIP—the Program and System Information Protocol, specified in ATSC document A/65—is a critical element of digital television that provides the methodology for transporting DTV system information and electronic program guide data. Because PSIP and other DTV metadata is typically developed and/or processed by several separate systems, communicating the appropriate metadata to the PSIP generator can be problematic.

PMCP is intended to solve this problem by defining a method for communicating metadata that the PSIP generator requires. The overall goal is to ensure proper PSIP implementation while requiring minimum manual intervention by the broadcaster. Equipment manufacturers, system designers, and broadcasters can use the tools provided in PMCP to help achieve that goal. While targeted primarily at PSIP, the schema is extensible for other types of metadata, and can be used for the carriage of private information within the current structure. Providing for ACAP data integration was a high priority for ATSC after the basic PMCP standard was finalized.

For More Information

The ACAP specification can be downloaded at no charge from the ATSC Web site. See: http://www.atsc.org/standards/a101.html. Persons interested in participating in the field trial effort, led by Jon Dakss of NBC Universal, should contact the author, Jerry Whitaker at jwhitaker@atsc.org.

The Use of Grid Technology Within the Broadcast Arena

by Simon Thompson, M.Eng., M.I.E.E., M.I.E.E.E.

Introduction

Over the past decade, grid computing has emerged from being primarily an academic research project to a useful tool for business use. This paper describes some of the work undertaken by the British Broadcasting Corporation (BBC) in this field and asks questions about the future uses of the technology. Its sole intention is to start a lively discussion on the subject within (and without) the broadcast engineering community. The author comments on pan-United Kingdom and pan-European Union projects and presents a grid technology scenario for comment.

This article presents an overview of the BBC's work on Grid computing. It is not intended to be a fully quantitative report of the work completed, in fact only two quantitative results are presented, it is more aimed at being a discussion point. The author would like to hear the views of the broadcast engineering community.

A fictional future scenario is presented using a range of technologies available at present, in an attempt to provide readers with an understanding of how diverse the uses of Grid could be within broadcasting. In order to separate fact from fiction, the fictional scenario is italicised. Any further ideas would be most welcome.

The range of projects presented come from across the BBC, from operational divisions as well as Research and Development (R&D) and from collaborations with academia and industry.

In discussing geographical locations, distances are referred to for readers not cognisant with United Kingdom (UK) geography.

Grid Computing

Grid computing is an Internet-based service evolved from the World Wide Web. Whilst the Web allows the sharing of, and interaction with, geographically diverse documents, Grid allows the sharing of, and interaction with, diverse resources. Resources can include processing power, computer-based storage, networking infrastructure, and specialist hardware etc., turning an institution's computational resource into a single entity. Grid also provides:

- certificate-based security, ensuring trust between users and providers
- more efficient resource utilisation via active load balancing and updated software techniques
- service brokerage (services bought automatically from 3rd party companies if unavailable in-house)
- service search (find where that piece of content, or specialist service is located)
- dynamic management of diverse resources and repositories
- a platform agnostic implementation
- an end-user experience similar to that of using Web-browser software (the end-user requires little or no knowledge of what is happening behind the scenes)

Grid is implemented via open standards [1] and is used to implement workflows, an example of which in the broadcast arena could be an end-user with a 4:3 television receiver requesting content, which is automatically repurposed from a high-definition (HD) source and securely delivered. One example of such an implementation is the Globus Toolkit [2]; an architecture and protocol set built in a method similar to the GNU/Linux kernel.

GridCast

Various departments of the BBC in collaboration with the Belfast eScience Centre (BeSC) at the Queen's University, Belfast (QUB) have just completed a UK Department of Trade and Industry (UK-DTI) funded project called GridCast. This project was tasked with investigating the possible uses of Grid technology within the broadcasting industry. The main investigation looked at the uses of Grid within the playout chain.

Background

BBC Television currently broadcasts regional variations of its flagship service, BBC One. Seventeen variations exist within England plus three national variations (Scotland, Wales and Northern Ireland). Red Bee Media (formerly BBC Broadcast) transport the main London feed to the regional playout centres, via high bandwidth asynchronous transfer mode (ATM) lines, these centres then decide to either transmit London's version, or to insert their own local feed instead (e.g. local news bulletins). Regional centres can time-shift forwards in time using video tape recording, but cannot playout a show before London. All regional feeds are then broadcast locally (via analogue Phase Alternating Line (PAL) and Digital Video Broadcasting – Terrestrial (DVB-T)) and sent back to London via a second ATM line to uplink to satellite for direct-to-home (DTH) broadcast. Cable broadcasters utilise the satellite DTH feed.

Grid-enabled Playout

The GridCast grid-enabled playout prototype gives a greater amount of autonomy to the regions. London publishes a schedule that is delivered to the regions. The regions can then make any changes they like to this schedule, from accepting to deleting all content, and the Grid services then locate the necessary programme files on storage, organise transferral in a secure and timely fashion, brokering any required 3rd party network infrastructure, and ensuring the delivered format matches the playout centre's criteria e.g. HD only.

The test network consists of sites in Surrey, England and Belfast, N. Ireland (A distance of 500 km apart) linked to the UK joint academic network (JANET) by 1 Gbps optical fibre links. Using grid-ftp protocols, link speeds

(no storage access) of 800 Mbps and file transfers (hard-disc to hard-disc) of 500 Mbps have been achieved. GridCast has been demonstrated at the International Broadcasters Convention New Technology Campus in both 2004 and 2005.

Manifest

The BBC is currently mandated to include 25% of non-BBC produced programming within its schedules. (Under current plans outlined by the BBC Director-General, Mark Thompson, independent production houses could bid for a further 25% in competition with internal producers). This requires interaction with independent production houses to generate contracts, negotiate content changes and transport content to and from the BBC's Media Centre in West London. Traditionally programmes have been delivered on tape, via motorcycle courier or public transport.

Manifest is an exchange protocol that efficiently transports content, and can reduce the necessity for paper-based interactions, between the BBC and independent production houses. Grid is one method of implementing such a protocol, and a manifest service was built into the GridCast project deliverable.

A trial is currently underway assessing the viability of using such a system to ingest content from production houses in the Soho district of London to the BBC Media Centre in London W12 (5 km).

Prism

Prism is the follow-on project from GridCast, with more commercial partners. It builds upon the work undertaken in GridCast but alters the end-goal. Instead of delivering content to a regional playout centre, content is delivered to the end-user in the home, probably via a set-top box. Project work is due to commence in late 2005.

PrestoSpace

Preservation towards storage and access - Standardised Practices for Audiovisual Contents in Europe (PrestoSpace) is a project funded by the European Union (EU) Information Society Technologies sixth framework programme. The aims of the project are to "deliver technical solutions and integrated systems for digital preservation of all types of audiovisual collection", providing "tangible results in the domain of preservation, restoration, storage and archive management, content description, delivery and access." [3] An aim of the project is to allow the creation of pan-European preservation factories. The BBC is a member of the project steering board.

In investigating technologies to help create such an integrated system, the work of the GridCast team and their grid technology prototype was studied.

A Grid-based Future?

In the realm of broadcasting, the question still remains, what can Grid offer? In this technology-rich environment, what need is there for yet another technology, especially one which is so "unseen" by end-users. Take this passage as an example :

Outside the Central Criminal Courts, a BBC news team gathers to record events surrounding the case of Regina vs. Fawlty (Criminal Damage), presided over by Mr. Justice Deed. The camera is equipped with global positioning system (GPS) equipment, giving accurate location data, and the cameraman is recognised by his radio-frequency identification (RFID) tag providing metadata related to who and where the footage was shot.

The footage is uploaded to the centralised BBC content bin via a secure Grid connection by wide area IP networking (WiMAX or DVB-IP) via access points located around London. The cameraman ID, location and security certification provides authentication, alleviating the editorial process. The content is transferred to a 3rd party for metadata enhancement, using biometric recognition of the subjects, and the biographies are purchased.

News offices across the BBC are notified of the footage's presence within the content bin, and BBC Northern Ireland request a copy. The data transfer is brokered with a third party agent, and converted to 4:3 standard definition en route. A documentary team uses an external firm to mathematically model the trajectory, to ascertain if Mr. Fawlty's denial of throwing the brick can be refuted, and accesses the BBC archive for background material.

Automatically a web-version of the content is created and delivered to the website, allowing news to be represented geographically rather than temporally, and those end-users representing a keyword match are delivered a personally tailored version of the content to their domestic set-top boxes. Educational institutes are provided with a version for study use via the BBC Creative Archive.

Meanwhile, within corporate HQ, payroll is utilising the camera crew ID metadata to authorise secure payment of wages, and engineering is using the collated data to create a map of access point coverage.

The majority of these technologies are not fictitious:

GPS prices are falling to the point where addition to a broadcast-standard camera would produce a minimal cost rise. For example, serial based GPS were available at time of writing for less than £30.

Biometric data is being used for recognition in many areas, and interesting new techniques are being researched. For example, researchers at the University of Southampton can identify people by their gait whilst walking or running [4].

Geographic representations of the news, whilst non-mainstream, do exist. BBC Backstage, a project to allow viewers access to computer data feeds for software-writing purposes, has numerous examples of such systems [5].

Trajectory modelling is already an established technique in UK broadcasting following the introduction of

Hawkeye by Channel 4 (a United Kingdom terrestrial broadcaster). Hawkeye is used to model the flight of a cricket ball from release at the popping crease to see if a leg has prevented impact with the stumps (a leg-before-wicket decision), measure speed and provide virtual replays [6].

Grid represents the "glue" which holds diverse technologies together. In the example GPS, RFID, WiMax, biometric recognition, broadcast and web infrastructure, production computers, set-top boxes and payroll software are all interfaced by Grid technology.

Conclusion

Grid is an emergent technology that could, if utilized correctly, provide numerous solutions for broadcasters. As with all emergent technologies, questions are raised which require careful thought, and work, amongst the broadcasting community.

Amongst questions that require answers (and, hence, future work), the most important include:

- Just how secure is secure? If a broadcaster is relying on the inbuilt security of Grid technologies to support transfer of important media, how sure can the broadcaster be that the media will arrive, and will not have been tampered with? How can the broadcaster be assured of the validity of a piece of content and of the identity of its author?
- What are the technological limits? Are there a certain number of people who can be served with data direct to home? Is there a maximum number of incoming links?
- What can be done in real-time over a Grid network? Can data always be re-purposed en route? Is there a minimum reliable network specification?
- Is the Grid network extensible enough to cover the introduction of new technologies? Will HDTV data-rates be handled without problem?
- What new and exciting technologies could feasibly be interfaced using Grid? Does this offer new opportunities to the broadcaster?
- What will the end-user experience be? How as engineers can we manage expectations and frustrations? If a GUI is used, what will it look like? Will it be standardized?
- If a diverse group could connect to the Grid in a way similar to today's Web; could the concept of programming by the audience, for the audience, using audience-generated content become the norm? The concept of "Community Collaborative Radio" was recently (Sept. 2005) investigated by a rapid prototyping session at BBC R&D, and was proven to be feasible [7].
- Grid, due to its use of security certification, has an in-built auditing service. In a broadcasting role, could Grid alleviate the pain of manual metadata and meta-metadata [8] insertion?

If Grid is to be used, open standards for use within the industry, such as those developed in conjunction with the BBC, are required. Work also needs to be done on finding the limitations of the technology.

The author is certain that numerous exciting applications could be created with this technology and looks forward to a lively discussion of such ideas.

Acknowledgement

The author wishes to acknowledge the efforts of Chris Chambers, Luke Sluman and Paul Brown of BBC R&D, Stephen Craig of BBC Northern Ireland, Brendan Malloy of BBC Scotland, Kevin Price and Rhys Lewis of BBC Technology Direction, Ant Miller of BBC Information and Archives and Dr. Terry Harmer, Mark McColgan, Julie McCabe and Christina Cunningham of the Belfast eScience Centre (QUB) for all their effort and support in GridCast related work. The author wishes them every success with the follow on project, PRISM.

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by Allen G. Pitts (W1AGP)

Hello – (a) an expression or gesture or greeting; (b) a thematic campaign in 2006 based on the word "hello" targeted to give a positive, friendly face for Amateur Radio and celebrate 100 years of voice over the airwaves

Broadcast Engineers have a long history with ham radio. It has been through their ham experiences while tinkering, experimenting- and at times even failing and blowing things up – that many of today's best engineers got their start in practical electronics engineering. Unlike most of today's consumer electronic gadgets, ham radio remains the one place where most people can literally make their own radio, try it and see what happens, open and modify it, and try again. This hands-on, practical experience is still the best teacher known! It is something that is missing with cell phones and iPods. The book-learned theory of Ohm's law takes on a whole new meaning when applied across your pliers.

"Hello!" is a coordinated public relations campaign for 2006 involving all areas of the ARRL, the national association for Amateur Radio in the USA. Since its beginning, several international associations have also joined in this campaign based on the simple word "Hello" and having a positive, upbeat tone which highlights the one-to-one and international communication opportunities of Amateur Radio.

Excellent, professionally done audio and video 30 second public service announcements are available and being broadcast to promote the celebration and ham radio.

"Hello"

That's possibly the most pleasant word in any language.

As a ten year old in 1876, Reginald Fessenden heard his uncle describe Alexander Graham Bell's miraculous accomplishment of sending the human voice over wires. With child-like wonder, Fessenden thought, 'Why do they need wires?"…

Early attempts at sending voices over the air were unintelligible, but on December 24, 1906 Fessenden made the first voice broadcast on radio. That Christmas Eve, instead of using the usual dit-dah Morse code for his weather report, he was going to TALK to people on the radio! At the appointed hour, radio operators all across the North Atlantic were shocked to hear a voice coming out from their radios.

While Commercial broadcasting didn't begin for another 14 years after Fessenden's historic feat, thousands of inquisitive hobbyists began to experiment with this new fangled electromagnetic technology. They were, and are still, called "amateur" radio operators. They labored in attics, barns, garages and cellars to perfect what we now call Radio. Amateur radio operators have continued to be at the forefront, experimenting with and developing technologies years in advance of when they are rolled out to the public. FM, television, mobile telephones, VoIP technologies -These were all used by amateur radio operators years ahead of the public. And you should see what the hams are doing today!

Ham operators say Hello to the world in many languages and many ways. But whether they prefer Morse code on an old brass telegraph key, voice communication on a hand-held radio or computerized messages transmitted through satellites, they all have an interest in what's happening in the world, and they use radio technologies to reach out. AM, FM. SSB, TV and digital modes- we use them all to open the door to new world-wide relationships over the airwaves with people we may never meet, but come to call friends.

WWW.Hello-Radio.org was created as one central, simple website to which people curious about Amateur Radio can go to quickly learn more and, most importantly, gain contact information about hams and groups in their home areas. The ARRL has learned that the best way to create new hams is to have contact WITH a ham. The curiosity and excitement are contagious, and the role of an "Elmer" (ham nickname for an Amateur Radio mentor) is crucial in teaching the practical skills needed. No matter if the end result is a simple Technician Class ham operator, or an advanced Broadcast Engineer at a major facility, the basic, practical skills learned in the Amateur Radio Service last a lifetime and lead to a much larger appreciation for the science of electronics.

The Hello campaign will climax during the week between Christmas and New Year's Eve with special operating activities planned to allow participation by both broadcasters and hams in a joint celebration. "Stay tuned for more!"

To learn more about ham radio, go to www.Hello-Radio.org.

To learn more about the Hello campaign itself, go to www.arrl.org/pio/contact/

To receive one of the public service announcements, write to hello@arrl.org

The Videotape Recorder Turns 50

Routine NAB preview event showcased revolutionary technology

by James E. O'Neal, Technology Editor, TV Technology and BTS Member

In an age when video cameras and recording devices are virtually everywhere, it's difficult for some of us to believe that it wasn't always possible to walk into a Wal-Mart or Best Buy store with $50 and leave with a new video recorder.

The science of magnetically recording video images is so mature today that it's taken completely for granted, but that was not always the case. Television broadcasting as we know it appeared in the mid-1930s. Video recording technology lagged by another 20 years.

Imagine a large meeting room fifty years ago filled with 200 people assembled for a more or less routine briefing. The only thing slightly out of the ordinary is a video camera trained on the speaker and some monitors sprinkled around the room. However, television is no longer a stranger and the presence of even large tube-type cameras of that era had become fairly routine.

The event was a Saturday pre-NAB (then the National Association of Radio and Television Broadcasters) meeting of CBS affiliate owners and managers. The setting was the Normandie Lounge in Chicago's Conrad Hilton, the speaker was William Lodge, CBS engineering vice president and the date was April 14, 1956.

During his remarks, Lodge mentioned a new technological breakthrough, but was not specific. At the conclusion of his address, he continued to remain at the podium. As the crowd began to murmur and break up, the video monitors went from black back to an image of Lodge. Only this time, Lodge was still making his presentation, not standing silently. This was a seeming impossibility, as the only means for preserving video images was kinescope recording, a process in which a special motion picture camera photographed a television monitor.

The Ampex video recorder is unveiled at the NARTB show in Chicago April 14, 1956

When the recording was finished, the film had to be unloaded and sent away for developing. Under normal circumstances, this could take hours.

The crowd, realizing that they were experiencing something very unusual, became hushed and locked onto the monitors, viewing an image of Lodge that was indistinguishable from the video seen just moments before. Again, this was quite uncanny, as even the best "kine" had a distinctive look that set it apart from the live video it had captured.

Then a curtain opened, revealing a strange machine and four individuals hovering around it. The crowd couldn't restrain itself and amid cheers, whistles, back slappings and applause, began pushing and pressing in around the world's first video recorder and part of the team that had made it possible. Some even stood in chairs to get a better look at the device that was making this miracle possible.

That was the scene 50 years ago this year.

Practical video recording had been born. The machine was the Ampex Mark IV VTR prototype, which was to become the VRX-1000, the great granddad of all video recorders. It was the star of the convention and even though Ampex had set a selling price of $45,000 for production models (more than $320,000 in 2006 dollars), orders were written that week for more than 70 machines. (Marketing research conducted prior to the show indicated that there would be a demand for no more than a dozen machines globally.)

CBS got the first delivery and put it on the air in late November that year to air the west coast feed of "Douglas Edwards and the News." This eliminated the requirement for Edwards to have to repeat his broadcast for the Pacific time zone. However, as the video recording technology was so new, CBS made kinescope recordings

as backup and had them at the ready "just in case" during the first month of the new machine's use.

WHY DID IT TAKE SO LONG?

Recording of video goes back to the late 1920s when television pioneer John Logie Baird made recordings of his 30 line images on ordinary 78 rpm phonograph records. What was so special about the Ampex recorder and why did it take so long to come to market?

Those of us who can't remember a world without VTRs perhaps have little comprehension of the tremendous technical challenges involved in electronically recording television images. To put the problem in perspective, magnetic audio recording evolved over several decades and by the late 1940s was fairly mature when Ampex introduced its first audio machine. To capture and reproduce high quality audio, a recording device needs to have a passband of some 20 Hz. to 18,000 Hz., or about 10 octaves. To record acceptable video, this had to be stretched to 18 octaves.

Other groups had been working on video recording schemes for at least five years prior to Ampex's success. All relied on pulling tape past fixed heads at high speeds. The BBC's efforts resulted in a machine known as VERA (Vision Electronic Recording Apparatus). It moved 1/2-inch tape at 16 feet per second, with a 21-inch reel of tape providing a mere 15-minutes of recording time. Video response was capped off at 3 MHz. and heavy leather gloves to provide assistance with reel braking were part of the operator's tool set. Another U.S. group established by Jack Mullin, the engineer who introduced audio tape recording to America, and funded by singer Bing Crosby, also devised a longitudinal video recorder. This machine spread the video across multiple tracks on a 1-inch tape running at a mere 120 inches per second. It made pictures, but as the response topped off at a bit over 1.5 MHz, it really wasn't up to broadcast applications. Not one to be left out or outdone, RCA's David Sarnoff mandated that his R&D people build a video recorder. In a rather questionable move, the top audio engineer there, Harry Olson, was given the job. Even though RCA held a patent on rotary head recording, Olson simply tried to scale up a conventional audio transport to do the job. His first machine used 1/2-inch tape pulled at 30 feet per second. It took 7,200 feet of tape to provide four minutes of recording time and the pictures were not much better than those of the other groups. As relatively crude as the kinescope recording process was, none of these video recording technologies could equal its quality, storage time and ease in handling.

The VTR design team (L to R) Fred Pfost, Shelby Henderson, Ray Dolby, Alex Massey, Charles Ginsberg and Charles Anderson

Ampex engineers early on saw the futility of longitudinal recording for video and based their efforts on a rotating head design first patented for audio in 1938 by an Italian inventor. The Ampex work was kept under wraps, and due to changing economics, was actually terminated at one point. This group consisted of Charles Ginsburg, the team leader; Charles Anderson, FM expert; Ray Dolby, then an engineering student and later a household name in the audio field; Shelby Henderson, master machinist and model maker; Alex Maxey, the mechanical genius behind the rotary head design, and Fred Pfost, who solved the problem of making practical high speed recording heads.

In addition to discarding high-speed longitudinal tape movement for achieving the necessary writing speed, the Ampex team also realized that FM offered some advantages not available with conventional recording technology, and could possibly help in squeezing those additional octaves onto tape. Research was started on an FM system that smacked of heresy—the carrier frequency was very near the highest modulating frequency and conventional wisdom dictated that the carrier frequency must be at least 10 times that frequency. The carrier frequency was set by available tape head technology and this rather revolutionary FM system resulted in some mathematically interesting consequences (sidebands which could fold over into the desired signals). Nevertheless, the thing worked, and worked better than

An early Ampex VTR installation at CBS

any AM signal system could have, producing a greatly improved S/N ratio and compressing the necessary 18 octaves into the space of three.

The video recorder shown to the crowds in Chicago, and destined to set the standard for all video recording, used a special 3M 2-inch tape, a four-head quadraplex or "quad" rotating head assembly and pulled tape along at a sane 15 inches per second. It could provide up to 90 minutes of recording time and recorded the full 4.2 MHz bandwidth needed for 525-line television.

FAR FROM PERFECT

These early machines were bulky (they could not fit through an ordinary doorway), weighed more than 1,000 pounds and the scores of vacuum tubes used consumed a very substantial amount of electricity. An external supply of compressed air and a vacuum system were necessary for operation. Operational costs were extremely high by today's standards. An hour's worth of 2-inch tape cost hundreds of dollars and the life of the machine's video recording head assembly was measured at best in just a few hundreds of hours. This figure was sometimes much lower and head refurbishment costs amounted to $1,000 or more. The recorders were finicky and required both a highly skilled operator and a fairly intensive setup and adjustment period before each use. A great deal of heavy maintenance and specialized tools were needed to keep them operational. Video was not instantly available, as the machines took several seconds to get up to speed and stabilize. This required care on the part of operators and TDs in making sure that the requisite back timing and pre-roll were done. Due to mechanical differences in the rotating head assemblies, none of the early machines produced recordings that were really fully interchangeable. The networks got around this by making sure that the head assembly used for recording also did the playback. This had to be carried out in the extreme if a show were recorded in Los Angeles and then played back in New York. In such cases, the video head was removed from the recorder and shipped along with the tape. Still, the convenience and video quality made the machine an instant success.

RCA saw the handwriting and scrubbed their longitudinal recorder R&D work, licensed Ampex technology and shortly rolled out their own quad machine, the TRT-1. RCA was the only other serious competitor to Ampex and in the years that followed, a tech war of sorts evolved between the companies. Improvements were fast and numerous: air bearing heads, rotary transformers to replace slip rings, time base correction technologies, color recording, genlockable servo systems, high band recording, velocity compensation, electronic editing, better head alloys, low noise tape coatings, vacuum column tape handling…the list of these "one-up-manships" continued right on up until the end of 2-inch recording developments in the 1970s. Ampex's quad design endured for well over 20 years, until it was gradually displaced by 1-inch type "C" helical scan technology.

An incredible 50 years later, there are some quad machines out there still at work. According to Pat Johnston, director of project management for AheadTek, his company is rebuilding about 200 quad heads per year.

RCA is now just a dimming memory in the broadcasting landscape. Ampex continued to build new VTR models into the dawning of the digital age, but was essentially out of broadcast video recording by the end of the millennium. The company name still exists in connection with data recording and archival storage technology, but isn't seen much in television stations anymore.

With the advent of digital television and the DVD and hard drive video recording that it spawned, videotape use is on the wane. Some of the biggest producers of magnetic tape pulled out of the market years ago. The phrases "tapeless television station" and "the end of tape" entered the vernacular at least 10 years ago. With the exception of data cartridges for archival recording, these prognostications may well may come to pass. Even that application appears shaky, as data packing advances in optical disc recording methodologies seem destined to surpass what can be done with magnetic storage.

For decades, video recording quality has been such that it is indistinguishable from live video. Recording devices have become so reliable and commonplace that no one is excited in the least

by the words “video recording.”

Still there are a few remaining from that crowd, who, 50 years ago, witnessed the first demonstration of real video recording and who remember the electricity and shivers of excitement that went with it. There are many more of us that recall our initial encounter with video tape and the fascination that came with it—the solid snap as the guide shoe engaged; the pleasing, almost musical “buzz” produced by that massive, yet very delicate, rotary head assembly spinning at its 14,400 rpm rate; and the smell of the tape coating as the heads literally tore into it.

An early video recording textbook described the rotary head recording process as one in which the head’s pole pieces “created a localized dimple, moving across the tape.” Actually, something far more profound happened as the heads moved. They froze time and left behind moving images for future generations to witness and enjoy. They also launched a business that has become the single largest element in broadcasting and a technology that has become an integral part of hundreds, if not thousands of other businesses.

What Was It Like?

There is a special kind of captivation or fascination that goes along with being witness to an event destined to have historic significance.

John T. Moore, the youngest witness to the Wright brothers accomplishment in December, 1903 was reported to have run down the beach at Kitty Hawk yelling at the top of his lungs to anyone listening, "They done it! They done it! Damned if they ain't flew."

This atmosphere was certainly present that Saturday in April, 1956 when Ampex showed to the world that it had perfected a video recorder.

If anyone should know what the situation was like in the Hilton’s Normandie Lounge, it would have to be Charles Anderson, one of the Ampex VTR design team members who was there with the Mark IV machine. As Anderson described it:

“The (CBS) affiliates meeting was in the Normandie Lounge, the foyer of a ballroom. We were in an alcove there with the machine, behind a curtain. No one knew we were there. CBS had cameras and monitors scattered around the lounge, but that was nothing unusual.

There were a lot of people in the room and on cue we started to record. Bill Lodge was explaining to the group that there was something new they wanted to show. On another cue, we rewound the tape and started playing it back.

All of a sudden, there was a deafening silence.

Did we screw up somehow?

Then came a roar. The curtain was opened and people started to swarm back around machine. Before we knew it, we were knee deep in people.”

Anderson recalled that Charles Ginsburg, Fred Pfost and Phil Gumby were with him that day.

“That machine was demoed a lot. It was a very successful show for the network. That night, Ginsburg and I went out with Blair Benson from CBS to the Blue Angel to celebrate. Ginsburg was dancing on the tabletop.”

Pfost also recalled the silence that initially ensued once the playback started.

“There was total silence for about 15 seconds. Then people began to realize what they were looking at. It made such an impression on me that I get tears in my eyes telling the story. People screamed and clapped for probably 10 minutes.”

After that presentation finally ended, Ampex executives realized from the reaction of the crowd that the company had a hit on its hands. The CBS demonstration had been just that—a closed-door session for invited guests. It was hastily decided to rent hotel space to exhibit the VTR for the balance of the show. Anderson remembers that part of the experience as not being so euphoric:

“I believe the room was 512. Very early the next morning (Sunday), the VP was on the phone with orders to move the videotape machine. We weren’t at our best from the night before, but we went ahead and moved it there. From then on there was a steady stream of people throughout the rest of the show.”

Pfost also recalled relocating the recorder.

“After the (CBS) demo we took machine up to fourth or fifth floor in the hotel. For the rest of the show that room was totally full. At the end of the week, the orders for machines amounted to more money than Ampex had been doing in a whole year. We went back (to Redwood City) and had to figure out how to build all these machines.”

Ray Dolby stayed behind in Redwood City to demonstrate video recording for members of the press and Ampex executives. The reaction was similar to that in Chicago, according to Dolby.

“Everyone was enthusiastic, there was a lot of applause and laughing and clapping…but on the other hand, you have to remember that this was an engineering lab, not a plush hotel room as they has in Chicago,” he said.

Even so, sales orders were being written on an almost non-stop basis. According to one source, Ampex ran out of sales forms and was writing orders on any scrap of paper they had at hand.

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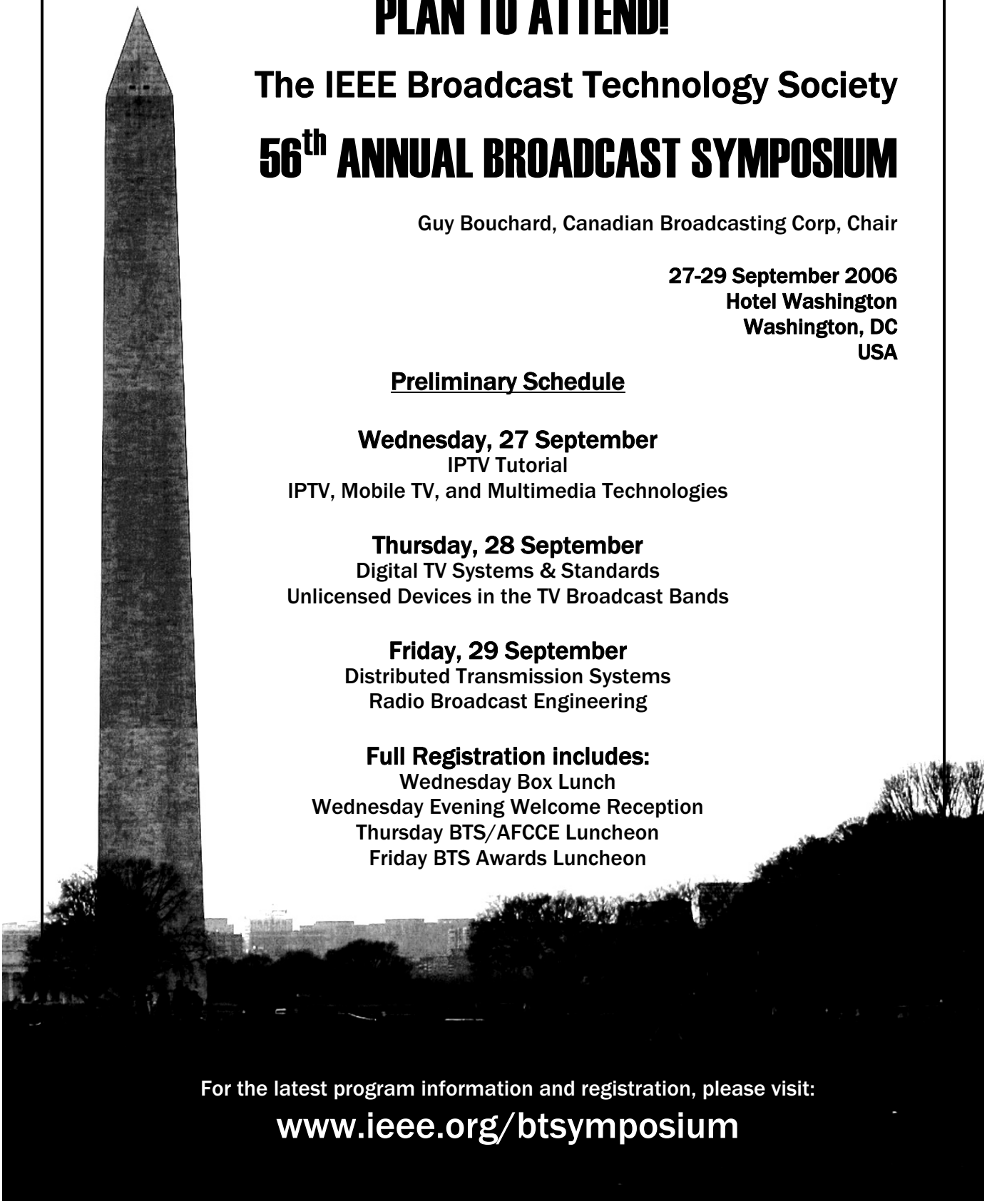

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