

IEEE VTS NEWS DIGEST

Connecting the Mobile World

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Foreword

James Irvine, Editor

Although British mobile operators are still suffering a hangover from paying some of the highest prices for 3G spectrum licenses (totalling \$32 billion), they must at least be consoling themselves that they are not in the railway business. The UK Government has just presented details of its \$90 billion ten-year plan to improve the country's rail infrastructure.

This is the latest stage in a saga which started with the Government trying to divest itself of responsibility for the railways, only to end up more embroiled than ever. The railways in the UK were sold off in a complicated privatisation which saw the fixed infrastructure sold to one company (Railtrack), the rolling stock to 3 others, the rights and responsibilities to run trains to 25 train operating companies, and maintenance, etc, to numerous others. Railtrack has been in trouble recently due to increased track renewals in the light of gauge corner cracking, the cause of the Hatfield derailment. The UK Government, which provides subsidies to operate the network, placed the operating company in administration in October 2001 by withdrawing backing from a financial vehicle which would have provided short term support.

The Government found itself in some political hot water. Its claims that the company was on its last legs financially were refuted by subsequent figures showing increased profits for its parent company. Also, the promised short-term quick fix of a three to six month period of administration, followed by the setting up of a not-for-profit replacement, is turning into a one to two year administration, with very little certainty about a replacement. A number of infrastructure projects are on hold as a result.

One of the main problems for Railtrack was the recent success of rail travel in the UK, with passenger numbers up by 20%. The regulatory regime was based on an assumption of little or no growth, and separating train and infrastructure operation meant that Railtrack gained little revenue through increased traffic while facing increased maintenance in track occupations on which penalties had to be paid. Technology also paid its part. Increased capacity on the crowded West Coast Main Line, between London and Birmingham, Manchester and Glasgow was to have been provided by CBTC. When this proved to be too high a commercial risk, the alternative was to lay additional tracks. On the overcrowded UK, the cost of the upgrade has trebled towards \$10 billion.

The lesson here – apart from the obvious, that the UK model is not a good one for privatising transport utilities – is the very long term view which needs to be taken of transport investment. \$90 billion is no small amount of money, but is less than the Germans plan to spend on their railways over the same period. The Big Dig in Boston is a 19 year \$14 billion project for one city. More relevantly for the IEEE, such expenditure requires large numbers of skilled engineers. A welcome aspect of the ten year plan is a National Rail Academy to increase the pool of trained staff; the UK has seen a number of projects cancelled or delayed for lack of signalling engineers.

Land transportation may only form a small proportion of a small society like the VTS, but, surprisingly given the current world situation, a recent poll in the UK placed transport as second only to health as an area for concern for voters. Your governments need you!

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Feature Articles in the February Issue

Ultra-Wide Band Radio: A New PAN and Positioning Technology

Kazimierz Siwiak, Time Domain Corporation

UWB (Ultra Wide Band) signaling is the modern art of reusing previously allocated RF bands by hiding signals under the noise floor. Government regulators are testing UWB emissions to ensure that adequate protection exists to current users of the communications bands, and are on the brink of authorizing its use. Technology basics for short-pulse time position coded UWB and for a direct sequence

coded UWB approaches are described, along with applications of UWB devices are for both commercial and government uses. Short pulse low power techniques have enabled practical through-the wall radars, centimeter precision 3-d positioning and communications capabilities at the high data rates.

Fuel Cell Systems for Electrical Vehicles : an Overview

M.C. Péra, D. Hissel, J.M. Kauffmann, INRETS

This paper proposes an overview about the integration of fuel cell power systems into electrical vehicles. At the present time, many car manufacturers around the world are presenting no emission vehicles build around fuel cells. But what about the general architecture of these vehicles? What

type of fuel cell is preferably used? How can the global efficiency of the whole powertrain be optimized and using what kind of simulation model? This paper will attempt to present some elements to answer these interesting questions.

GERAN – the GSM/EDGE Radio Access Network

P. de Bruin, A. Furuskär, C. Lindheimer, F. Müller, J. Sorelius and D. Turina, Ericsson

GERAN denotes a radio access network combining GSM and EDGE bearer service capabilities. With its ability to operate in existing 2G spectrum GERAN efficiently parallels other 3G radio access technologies such as WCDMA. The presently standardized feature of connecting to the UMTS core network further facilitates this. This article

presents an overview of the GERAN standard as well as discusses some fundamental Radio Resource Management aspects outside the scope of the standard. A performance evaluation of the GERAN concept is also provided. It is seen that a variety of services may be supported with high capacity and controlled quality.

Report on VTC2001-Fall

The 54th Vehicular Technology Conference was held in Atlantic City from the 6th to the 11th of October 2001. Given the location of Atlantic City, many delegates to the conference would travel via New York or Washington, and with the terrorist attacks on September 11th, many people left it late to decide whether or not to attend. VTC was not as severely affected as PIMRC had been the previous week in San Diego, and people had been encouraged to start travelling again, and invited to spend money in New York by its mayor. About two thirds of attendees for the first day tutorials came to the conference. However, those arriving later on that day for the conference itself, registered beside a somber television set giving news of the start of bombing in Afghanistan. The atmosphere at the conference was, therefore, not the usual one for VTC, and by the end of that day, only about half of those who had registered for the conference turned up. Overall, about 400 of the expected 650 delegates attended the conference, with 37%

from the US, 29% from Asia, 24% from Europe and 9% from elsewhere.

The conference was opened by Art Greenberg, who noted VTC had suffered the “double whammy” of the terrorist attacks, and a downturn in the technology sector which had restricted companies spending on things like conference attendance. For a former, it was not just an understandable reluctance on the part of some people to be travelling, but also company travel policies and insurance. In the case of one multinational, the local North Jersey-based branch prevented employees even from driving to the conference, while the same company had almost full attendance from its European offices. Fortunately the travel restrictions did not apply to IEEE conference services, who did a great job in very difficult circumstances. Those that continued to work hard, away from home, in such worrying times, deserve our thanks.

Notwithstanding all this, there were still a number of innovations at the conference. There was renewed vigor given to the vehicular technology part of the conference programme with two invited sessions on different aspects of the technology. It is hoped that this momentum will be maintained at future VTCs. Another innovation which fell victim to the reduced number of attendees was a number of industrially-focussed workshops which were planned for the final day.



Figure 1 VTS President J. R. Cruz (center) welcomes delegates at the opening reception

The opening plenary speaker was George I. Zysman, formerly Chief Technical Officer of Lucent Technologies' Wireless Networks Group, where he still acts as a consultant. Dr. Zysman spoke of the market drivers and enabling technologies of 3G wireless and beyond. He noted that markets and services are the stimulus for technology. Notwithstanding the current difficulties, the future for services will be very bright. A major driver in this will be data services; which will have to have increased capacity available. The key to data is mobility, he said, and with 30 % mobile penetration, the US has lags much of the rest of the world. An example is i-mode in Japan, where 50% the data across the network is IP. This is giving in the order of \$4 billion per year of subscription revenue, and of the average monthly subscription of \$12-13 per month, 9% goes to NTT DoCoMo.

Between 1985 in 1996, the cost per unit device fell by factor of 10, while cumulative usage increased by factor of 100. We see the progression of use from when mobile phones were the preserve of high ranking businessmen, through real estate agents, to the point today where they replace calling cards. In the future, there may go to the



Figure 2 The opening plenary

stage of being used as an intercom. However, they aren't making spectrum any more, so the only solution is innovation. This year, data rates in wireless will become comparable with wireline Internet users. 94% of US residential users have IP service at 56kb/s or below. With 3rd generation mobile services, wireline will have to catch up with wireless. This means spectrum will be consumed very rapidly. More terminal options will be required – input is very difficult on a phone. PDAs offer more utility, but the full multimedia experience will require a laptop.

Dr Zysman summarized by identifying a number of trends, the key one being that next-generation systems would be defined by services. The coverage of high data rate services will not be ubiquitous, although the network will be unified with an IP backbone. Dynamic resource management will be required to maximize the bits per second per hertz per dollar, while dynamic network allocation will also be required at the higher layers of the system.

A number of questions centered on the issue of spectrum, such as where it was most likely new spectrum would be available. Dr Zysman saw the main problems being political. The entire mobile industry in the US started on poorly utilised television channels. Refarming of TV channels is possible, given the spectrum utilisation of home shopping channels. However, the problem is political will. This also affected the future of ultra wide band (see also the article on Page 4). He foresaw two challenges: technical and political. The technical problems can be resolved, but the political problems of interference to existing users are more difficult. Since the spectrum has already been sold, in effect operators who are already occupying the spectrum are being asked to give up some of their capacity to a competitor.

Dr William Lee organised and chaired a panel session on Monday evening on the subject of advanced wireless technologies and systems. The session was slightly abbreviated due to the fact that Dr Roberto Padovani, EVP from Qualcomm, who was due to talk on cdma2000, was stranded in Denver on the way to the conference by a late connecting flight. Dr. Kota Kinoshita, CTO of NTT DoCoMo, was not able to attend due to company travel restrictions, by his presentation was given by Dr. Lee.

The first presenter was Håkan Eriksson, Vice President of Research at Ericsson, who reviewed the current position of mobile, with GSM as the dominant standard, which he saw as continued for some time. In China, an extra 5 million GSM subscriptions are added each month. Two Internet industries are being formed, fixed and mobile. This is important, since with existing telephony what was on the fixed system was provided in a mobile manner. He believed that this will not be the same of the Internet. A distinction can be drawn between 3G mobile and Wireless LAN. 3G provides “any time, anywhere” services of up to 2 Mbps, or 384 kbps in wide areas. Wireless LAN on the other hand provides “some time, somewhere” coverage up to 5 Mbps. This will increase initially to 11 Mbps where the 802.11b, but in the foreseeable future up to 20 to 54 Mbps. However, one wide area mobile cell provides about the same coverage

as 10,000 Wireless LAN cells. An interesting area of study is roaming between WCDMA and Wireless LAN, or cdma2000 and in Wireless LAN. A new entry into marketplace was Bluetooth, with 300 products listed as of August 2001, approximately 80 of which are consumer products. A key development for the Internet is the move towards IP version 6. There are currently too few IP version 4 addresses, and those that are available are unevenly distributed, with MIT, for example, having more than China. IPv6 guarantees mobile Internet viability.



Figure 3 Two of Atlantic City's casinos

3G is twice as spectrally efficient as second generation systems, so 3G is not just about the mobile Internet, but also about capacity and voice. Håkan Eriksson suggested the future, towards fourth generation, would be about 'ABC' – always best connected. There has been a pattern of decades of research: the Eighties for GSM, the Nineties for WCDMA, EDGE, cdma2000 and other 3G technologies, so the 2000s will need to be the decade of research for 4G. We are just at the start of this.

The second speaker was Dr. Rajiv Laroia, founder and Chief Technical Officer of Flarion Technologies, who discussed OFDM technology. He noted the goals of a data system: affordability, in terms of price per MB; a scalable architecture; broadband user experience, which implies a high burst rate, though not necessarily a high sustained rate; low delay; and end to end IP, in fact a seamless extension of the Internet, so that all current applications work. He noted that currently 3G systems do not meet these requirements. Current systems are designed for voice, but voice and data are different; radio is unreliable, but the Internet is designed around a reliable link. OFDM has a number of advantages for data applications, having an efficient air interface (which can be up to about three times as efficient as current systems), high granularity of resource allocation (without the overheads of TDMA), and no requirement for a contention based access since large number of channels are available. This allows a low delay which is better for interactive services, and a true make before break handover without requiring soft handover.

Dr William Lee, as Chairman of LinkAir Communications, discussed a new technique called code division duplexing. Current systems use either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD). Using TDD for CDMA causes difficulties with interference between base stations and mobiles in neighbouring cells, in terms of timing and synchronisation issues for larger cells. The new system of CDD has been trailed in Shanghai over a 1.6 MHz unpaired band with voice and video. CDD requires "smart codes", with low auto and cross correlation within a set time window. This allows interference and multipath to be ignored.

Dr Lee also gave the presentation on behalf of Dr. Kota Kinoshita, CTO of NTT Docomo. In Japan, cellular passed fixed in terms of penetration in the middle of 1999. 57% of phones as of March 2001 has i-mode capability, and Japan was about to launch FOMA – Freedom Of Mobile multimedia Access. The 'F' also stands for Frontier, Future and Flexibility. FOMA will have 384 kbps on the downlink, and 64 kbps on the uplink. Services will include an enhanced i-mode, with 384 kbps on the downlink, allowing 10,000 character e-mails and attachments. There will also be a video phone service at 64 kbps. M-stage visual will be a video delivery service, in addition to which will be a high-speed data communication packet data service, and a 64 kbps circuit data service. Multiple access to simultaneous voice and packet service will be available, and voice will have land line sound quality. As regards charging, the voice service will be charged at an equivalent level to current voice services. The 64 kbps data service will have a charge about 80% higher than voice. Packet services will be charged at 0.02¥ per packet. Three types of phone will be available at launch – a standard voice phone, a video phone, and a data card for a laptop. Future plans include i-motion, with video over i-mode towards the end of 2001, an M-stage video distribution service in Spring 2002, and later a music distribution service as well. Dual network service, with the same number for FOMA and conventional PDC, will be available in the Summer 2002, with international roaming following when other services roll out. The initial area of operation is within a ring about 30 km from Tokyo, starting on 1st October 2001.



Figure 4 The neighbors!

The Awards Luncheon was held on the Tuesday. Details can be found in the article on Page 46.

Dr Juergen Schroeter, Division Manager of Speech Processing Software and Technology at AT&T Labs, addressed the Tuesday evening banquet on the subject of the Latest Advances in Speech Synthesis. He started with a video demonstration of a speech enabled application. The drivers for such technology are cost reduction, the ability to offer new products and services, perhaps location based, and providing information access to mobiles on occasions where the reviewing of data is inconvenient, as well as on small devices where displays not possible. There are three approaches to speech synthesis: articulatory synthesis (from a voice box), format synthesis (from speech phonemes) and concatenative synthesis (snippets from recorded speech). The last technique has the potential for the most natural sound, but it is necessary to use very many different snippets rather than trying to use signal processing the massage the pitch, etc, to match the desired sound. The more

signal processing used, the lower the signal quality. However, large numbers of snippets require storage and processing. His company has optimised computation to the point where 60 streams can run concurrently on a 1 GHz Pentium 3 system.

The Wednesday lunch talk was delivered by Richard Howard, who recently retired as Vice President, Wireless Research at Bell Labs, Lucent Technologies. His talk was entitled "Where's the Beef - An Amateur's Look at The 'Real' Value Behind the Internet Hype". He pointed out that the Internet was perhaps not completely new - we have, to an extent, been here before. The wireless web was foreseen with Dick Tracy in 1946. This was done within six months of Arthur C. Clarke's geostationary satellite proposal, and since radios were at a more advanced state in 1946 than rockets (compare a walkie-talkie to a V2 rocket), the wireless web could have been expected first. However, communications satellites took 20 years, but we are still waiting for the wrist communicator with web access.

Dr Howard noted that while it was obvious that the Internet was going to facilitate change in human society, it was not obvious that is the latest in a long line of changes; "history may not repeat itself, but it often rhymes". He cautioned delegates to remember the basics. Good investments create something people want. In particular, buying entertainment is not an investment, and on the whole, investments must be worth more than the cost. Human beings are the key - machines don't purchase things. Also, humans can only pay attention 16 hours per day; time sharing is just that, no new capacity is created. To many choices lead to people avoiding buying or doing anything!

The market is limited, at the moment, to 6 billion customers. At one stage, during the summer of 2000, the market capitalisation of Qualcomm was \$120 billion. This was equivalent to \$20 for every person on the planet. As a safe investment might yield 8% (prime rate), such a capitalization would mean that everyone on the planet would have to pay Qualcomm \$45 in profit in ten years. Given a 10% profit margin, this would mean that they would have to buy \$450 of Qualcomm products in ten years, and these figures are for no risk. If there is any risk, the investment rate should be increased accordingly. Other fundamentals are that the revenue of equipment suppliers must be less than the revenue of the service providers, and the revenue the advertisers must be less than the revenue of the producers. However, sometimes the promoters of new technologies have ignored these basic rules.

On access to information, between 668 and 627 BC, the Royal Library at Nineveh (Assyria) has 10,000 volumes. From the third century BC to the third century AD, the library at Alexandria had 700,000 volumes. The Gutenberg Bible was published in 1455. By 1500, there were 9 million books in Europe. By the middle of 17th century, there were 300 newspapers in England, and broad access to information fuelled the Renaissance and the Reformation. In the 19th century, the telegraph changed the character of communication. In April 1844, it took one hour for a message to travel the 37 miles between Baltimore and Washington by railroad. In May 1844, this was reduced to less than one



Figure 5 One of the two bookstalls. There were also a number of exhibits



Figure 6 Networking during the coffee breaks

minute, with the first commercial telegraph in North America. In 1861, it took ten days for a message to travel 1,800 miles from St Louis to Sacramento by pony express. In 1865 transatlantic communications took 14 days by steam ships. In each case the telegraph reduced the communication time to the order of minutes, and similar quotes were being made at that time as are being made now about the Internet.

Between 1965 and 2000, the price of transistors fell by factor of 10,000,000. The web took less than seven years to reach 30% of US households, compared to 46 years for electricity, 38 years for the telephone, and 17 years for TV. 93% of worldwide information is created digitally, and only 0.003 % is in print. If the Internet improves productivity by 0.5% per year, this will result in a \$1.2 trillion budget surplus over ten years. However, is any electrical engineer knows, if there is too much gain in the system with the wrong time constant, you end up with instability.

Dr Howard pointed out that data, information, knowledge and wisdom are not synonyms, and basic human intellectual capacity is not changing fast. The opportunities are there, in a wide range of information easily available, in a democratic, egalitarian, and archived form, although this latter point requires care. The format of library of Alexandria can be read today, but ten-year-old computer media may not. The key factor is that too many choices goes overload, so more attention must be given to training in searching an evaluating information. The value is not in the data itself, but in the wisdom becomes from it.

The terrorist attacks were not the only obstacle to would-be attendees. The first days of the conference were picketed, not very effectively, by local carpenters protesting about the use of non-union labor. However, in spite of all the difficulties, those who did attend found an interesting and useful conference. See you all in Birmingham!



Figure 7 The Atlantic City Conference Center, with one of the camera-shy pickets (circled)

Regular Columns in the February Issue

Transportation Systems

Harvey Glickenstein, Senior Editor

These are the items covered in the Transportation Systems column in the February 2002 VTS News. Please see the printed version for the full article.

- Houston voters supported light rail.
- Light rail service in Los Angeles is being expanded.
- Bay Area Rapid Transit (BART) in the San Francisco area has approved an agreement with the Valley Transportation Authority (VTA) of San Jose to extend its system to San Jose.
- Shenzhen Metro in China has ordered 114 cars from a joint venture of Bombardier and Changchun Car Company.
- Portland, Oregon's Tri-Met opened its Airport MAX Line in September of last year.
- Amtrak opened a new station on the Northeast Corridor (NEC) to serve Newark Airport.
- The Central Phoenix/East Valley Light Rail Project placed four proposed vehicle exterior concepts on their web site last November in order to obtain public comment.
- The Orange County Transportation Authority (OCTA) has approved the alignment for a 20-mile light rail line.
- The largest airport Automated People Mover (APM) in the world is being designed for the Dallas/Ft. Worth airport.
- The Dallas Area Rapid Transit (DART) light rail line to Plano is expected to open in December 2002, six months early.
- Metra, the commuter rail operation serving Chicago, has installed a new system to provide train location information to commuters.
- Light Rail Transit in the Norfolk, Virginia Corridor of the Hampton Roads area received a boost from the Norfolk City Council when they approved matching funds for construction.
- Fare collection integration in the New York City metropolitan area took a large step forward.
- Utah Transit Authority (UTA) has opened its University Line.
- The Sacramento Regional Transit District started construction of its Amtrak/Folsom light rail extension.
- The Board of Commissioners of the Port Authority of New York and New Jersey announced a \$544 million program to restore PATH service to lower Manhattan.

Automotive Electronics

Bill Fleming, Senior Editor

- 4-Wheel Steering Debut
- Cylinders-On-Demand Debut
- S-Class Mercedes V8 Diesel Electronics
- 2002 BMW 7-Series Electronics
- Instrument Panel Control Function Identification
- Spotlight on Headlight Glare
- Non-Radiating Passive Vision Through Fog
- What's Really Far Out the Future?
 - 0 to 10 years in the future
 - 10 to 20 years in the future
 - 20 to 50 years in the future

Standards

Dennis Bodson, Senior Editor

- IEEE-Standards Association (IEEE-SA) Board of Governors (BOG) Meeting
- IEEE-SA Standards Board (IEEE-SASB) Meeting
- DRM for digital radio broadcasting below 30 MHz
- Motorola Involved in 3GPP2 Adoption of CDMA2000 1xEV-DV Baseline Framework
- Wireless Personal Area Networks Featured in IEEE Network Magazine
- Cell Phone Carriers Get Extension on E911 Locator System
- Software Radio Approach Delivers Increased Software Content
- IEEE Publishes New Wireless Personal Area Network Standard
- IEEE 802.11g Standard Approved

Mobile Radio

Javier Gozalez, Senior Editor

- Technology and research news
- M-commerce and location-based services
- Wireless Data
- FCC & US mobile market
- 3G trials and roll-out
- Mobile satellite communications
- Mobile phones and health concerns
- Wireless industry forecasts and surveys
- Spectrum licenses
- Wireless LAN and Bluetooth
- African mobile market
- Initiatives and Forums
- Other news

VTC2002-Spring in Birmingham, AL

Birmingham, AL will host the IEEE Spring Vehicular Technology Conference 5-9 May 2002. The Conference will be held at the Birmingham-Jefferson Civic Center with accommodations at the Sheraton-Birmingham Hotel.

The conference will provide opportunities to participate in numerous technical sessions and to visit exhibits of state-of-the-art applications. Over 400 papers and posters will be presented on innovative mobile wireless technologies such as antennas and propagation, wireless access, transmission, networks and systems, mobile satellite, and transportation. Special sessions, with invited papers, are planned for automotive transportation topics. The conference begins on Monday, 6 May 2002 with a day of tutorials covering the latest developments in ever-changing wireless technologies.

As a part of the development of the technical program, a number of session chairs must be identified. If you wish to contribute to the success of the conference by volunteering as a session chair, please contact Dr. Charles E. Hickman, Technical Program Chair, at c.hickman@ieee.org.

Advance registration is available until March 31. The cost of advance registration for members is \$500 and for non-members \$575. After March 31 cost is \$575 and \$650 respectively. Student members and life members may attend the conference for a reduced fee of \$75. Student non-members fee is \$100. Special hotel rates are available for students and reservations can be made on the website. Other fees and cost of tutorials are listed on the VTC2002-Spring website, www.ieee.org/vtc02spring.

Further details of registration and the conference program itself can also be found on the web site.

VTS News

Help Wanted – Call for Assistant Editors

Do you have a few hours to spare every quarter to help contribute to the success of the *VTS News*? We are looking for Assistant Editors to help our Senior Editors in specific areas of their remit across the full range of the Society's activities. While these positions can't offer fame and fortune (although you do get your name in the newsletter), they do offer rewards in other ways, and are a very good way of getting more involved in your society. No experience is required. If you are interested, please contact the editor, James Irvine, at j.m.irvine@ieee.org.

CBTC Standards

The CBTC working group is currently considering proposals for expanding the IEEE Rail Transit Vehicle Interface Standards Committee Working Group 2 with additional members drawn from the automated people mover community to develop a revised CBTC performance and functional requirements standard that is applicable to driverless/Automated People Mover (APM) applications

At present the only internationally used standard related to driverless automatic train operation is *ASCE 21-96, Automated People Mover Standard*. This standard is a performance/functional standard and is not specific to any particular train control technology. Also, *IEEE 1474.1, IEEE Standard Method for Communications Based Train Control (CBTC) Performance and Functional Requirements*, provides performance/functional standards specific to CBTC technology for applications in commuter rail, heavy rail and light rail transit systems with operators.

However, there are a number of train control standards efforts underway requiring coordination, including plans for IEEE 1474.1 to extend its CBTC Performance Standard to cover driverless systems, IEC WG39 work on *Railway Applications – Urban Automated Guided Transit*, and proposed IEC WG40 work on *Urban Guided Transit Train Control Standards*.

The purpose of the proposal is to provide the basis for cooperation between current individual members of the

IEEE Rail Transit Vehicle Interface Standards Committee's WG2 and the *ASCE Automated People Mover Standards Committee* in harmonized development of train control standards for CBTC technology. CBTC technology is increasing being selected as the train control technology of choice for driverless applications, regardless of whether the application is classified as an APM or an Automated Urban Transit System. CBTC suppliers and users are seeking a single standard to define the performance and functional requirements for this technology for a wide range of application, both driverless and with drivers. There already exists a high level of consistency between the existing IEEE and ASCE standards.

It is planned to update and revise both the IEEE and ASCE standards in essentially the same time frame. It is therefore proposed that the IEEE standard be expanded to encompass driverless operations and APM applications, that current members of the *ASCE APM Standards Committee* be permitted to participate in the *IEEE RTVISC WG2*. In addition, it is proposed that the ASCE standard be revised to include the same definition for CBTC technology as is used in the IEEE standard, and the ASCE standard would simply refer to the revised IEEE standard for those APM applications that utilize CBTC technology for train control functions. For further details contact Tom McGean, t.j.mcgean@ieee.org.

IEEE Leon K. Kirchmayer Paper Award

Congratulations are due to VTS member Muriel Medard from MIT in Cambridge, MA, for winning the IEEE Leon K. Kirchmayer Paper Award. She won the IEEE award for her paper "The Effect Upon Channel Capacity in Wireless Communications of Perfect and Imperfect Knowledge of Channel" published in the *IEEE Transactions on Information Theory*, Vol. 46, No. 3, May 2000.

Membership Matters

Fifty two VTS members were elevated to Senior Member during 2001. The members, and their sections, are as fol-

lows: **Oscar E Agazzi** (Orange County), **Massoud Amin** (Saint Louis), **Makoto Ando** (Tokyo), **Angelo Bruno** (Central & So. Italy), **Antonio Artes Rodriguez** (Spain), **Brian K. Butler** (San Diego), **Edgar H. Callaway, Jr** (Palm Beach), **Hasan Cam** (Phoenix), **Kavitha Chandra** (Merrimack Valley Subsection), **Yue Chen** (Santa Clara), **Hyung Jin Choi** (Seoul), **John P Cullen** (Louisville), **Peter Cullen** (U.K.& Rep of Ireland), **Daniel J Dailey** (Seattle), **Ramez L. Gerges** (Central Coast), **Joseph P Heck** (Broward), **James Irvine** (U.K.& Rep Of Ireland), **Whan Soon Jeon** (Seoul), **Peter B. Kenington** (U.K.& Rep of Ireland), **Rodney A. Kennedy** (Australian Capital Territory), **Cheol-Sung Kim** (Kwangju), **Ammar Kouki** (Montreal), **Thomas Kurner** (Germany), **Weng Kin Lai** (Malaysia), **Ty A Lasky** (Sacramento), **Francois Le Chevalier** (France), **Ronald A Lemp** (North Jersey), **Marco Lops** (Central & So. Italy), **Hiroshi Nogami** (Tokyo), **Tomoaki Otsuki** (Tokyo), **Ana J Perez-Neira**

(Spain), **Kinh D. Pham** (Oregon), **Gregory J. Pottier** (Coastal Los Angeles), **Robert C. Qiu** (North Jersey), **Hayder Radha** (Southeastern Michigan), **R.M.A.P. Rajatheva** (Thailand), **Fernando Ramirez-Mireles** (Oakland-East Bay), **Seiichi Sampei** (Kansai), **Abu-Bakarr Sesay** (Southern Alberta), **Nava Setter** (Switzerland), **Erik G. Strom** (Sweden), **Sami Tabbane** (Tunisia), **Mitchell Tasman** (Boston), **Oguz Sunay** (Turkey), **Cesar Vargas-Rosales** (Monterrey), **Richard Dale Wesel** (Coastal Los Angeles), **Kainam T Wong** (Hong Kong), **Danny R. Webster** (U.K.& Rep of Ireland), **Weihua Zhuang** (Kitchener-Waterloo), **Brian D. Woerner** (Virginia Mountain), **Mohammed O. Zaatari** (Northern Virginia), and **John R. Zeigler** (Metropolitan Los Angeles).

IEEE members with 10 or more years of professional service are eligible to apply for election to Senior Member grade. See <http://www.ieee.org/organizations/rab/md/smpprogram.html> for details.

Joint Rail Conference

The 2002 Joint Rail Conference, sponsored by the Land Transportation Division of the VTS and the Rail Transportation Division of the ASME will take place in Washington, DC from April 23rd to 25th 2002. In this issue we reproduce the titles of the 11 papers accepted from the IEEE in order to give you a flavour of the conference. There will also be papers at the conference from the ASME. If this encourages you make the trip to Washington, a registration form is available on the VTS web site.

Electro Magnetic Interference Effects Due to Line Reactor Coil-To-Coil Short Circuits

Ross Potter, Bombardier Transportation

Electrical Reliability Analysis for Transit Applications

Richard Eacker

Substation Nuisance Trips Result in Operational Interruptions and Force Re-Design of Protective Devices – A Case Study

Thomas Heilig, P.E. Tri-Met, Dennis L. Porter, Ralph S. Thomas, P.E., LTK Engineering Services

New Radar System for Train Tracking and Control

Takuya Ishikawa, East Japan Railway Company, and Howard Zebker, Stanford University

Computer Modeling Techniques and Analysis Used in Design of Tunnel Ventilation Fan Plants for the New York City Subway

Don Willemann, J. Greg Sanchez, MTA-New York City Transit

On-Board Electrically Peaking Drive Train for Diesel or Electric Railway Vehicles

Sébastien E. Gay-Desharnais, Mark Ehsani, Texas A&M University, Ned Snead, Bill Harris, Snead Institute, Dock Burke, and Sadler Bridges, Texas Transportation Institute

Managing the Effects of Weather on the Rail Network

Dr John E. Thornes, University of Birmingham and Dr Brian W Davis, Vaisala Ltd

Automatic Fault Location and Isolation on 2x25kV AC Traction System

Krishna K. Agarwal, P.E. and Tom Carney

Solution of DC power flow for non-grounded traction systems using chain-rule reduction of ladder circuit Jacobian matrices

Bih-Yuan Ku and Jen-Sen Liu

Continuous Track Monitoring from Locomotives for Track Safety

D Magnus, KLD Labs, Inc.

A New Twist on an Old Technology: Underground Movies Benefit Public Transportation

John Butziger, P.E., and Gaspar Messina

9 October 2001 VTS Board of Governors Meeting Report

The VTS Board of Governors' Meeting was held at VTC 2001-Fall in Atlantic City. Attendees included Charles Backof, Treasurer, Dennis Bodson, Executive Vice President, J.R. Cruz, President, Mark Ehsani, Chair of the Electric and Hybrid Electric Vehicle Committee, Bob French, ITS Council Coordinator, John Gilsenan, Harvey Glickenstein, Vice President-Land Transportation, Charles

Hickman, Technical Program Chair, VTC2002-Spring, James Irvine Newsletter Editor, Preston Jackson Chair, VTC2002-Spring, Kent Johnson, Past VTS President, Jae Hong Lee Chair, VTC2003-Spring, Joe Long Facilities, VTC2002-Spring, John Kingham Chair VTS/LTD, Melvin Lewis, Conference Coordinator, Tad Matsumoto Secretary, VTC2000-Spring, George McClure, LRP, Sam

McConoughey, Reuven Meidan, Chair, VTC2001-Spring, Eric Schimmel, Vice President-Mobile Radio, Raymond Trott, Chair, Awards Committees, Charles Wood, Treasurer, VTC2002-Spring, and Jim Worsham, Past Conferences.

Treasurer's Report: Charles Backof reported that while the financial position of the Society was strong, there were many developments at IEEE level and the situation was extremely fluid. The IEEE societies had to contribute to cover deficits made by the IEEE centrally, and at the current level, the VTS would run out of reserves in six years. However, the current IEEE model is unsustainable, because in fact the VTS would be one of the last to go bust; some societies would not be able to repeat the current contributions for even one more year. The society budget for 2002 is therefore for a standstill; no cutbacks are required but there are no new initiatives either. Society president J R Cruz noted that we can't assume a steady state model. September 11 will impact on conference attendance, and the economic cycle may affect retention rate and membership.

Charles Backof also reported that there would be no **Dan Noble Fellowship Award** since there had been no applicants.

Art Greenberg reported on **VTC2001-Fall**. Income was \$229,000, against an estimated worst-case expenditure of \$251,000, but that included the maximum no occupancy penalty from the conference hotel. 613 people had preregistered, with 92 withdrawing prior to the conference. Of the remainder, 389 had arrived by that point (the start of the second full day), with a further 15 on-site registrations. The board expressed its thanks to Art for his work under very difficult circumstances, which include a strike in the conference centre itself.

There was a discussion of **Technical Interest Profiles (TIP)** codes. The Technical Activities Board (TAB) is reviewing these codes, and proposing to drop those codes with less than 5% of interest from society members, as some terms were outdated and could be rephrased. The land transportation code is currently chosen by 4.87% of members, although a disproportionate number choose this as their first preference. The President and Vice Presidents will draft a new list for agreement.

Publication Review: The TAB Publications Review had noted that while the Society has three areas of interest, one of these, mobile, dominated the transactions. There are good reasons for this, given that in one year, there were no papers at all submitted in one area. However, TAB Publications Committee had required the society to submit a plan to show how papers in the other areas will be encouraged. This plan had been submitted, and in a slightly amended form was recommended to be accepted, but with a yearly review.

There was also some discussion of the Society's name. There is an argument that what makes VTS distinctive is mobility, so a name involving 'mobile' might be acceptable. However, any name change is unlikely to get through TAB in the current environment, and may open discussion on the scope of the society more generally. Charles Backof noted that GE and IBM were well known brands in their own right, without the companies concerned worrying too much about what the letters stood for. 'VTS' is a brand, and it would be sensible to keep that. This was agreed.

Conferences. It had been previously been agreed at the May board meeting to have one board member on the committee of each future VTC to assist with liaison. J R Cruz had consulted other societies who have conferences of a comparable size of the case a, and such conferences are usually not run by volunteers but by conference management companies, with a separate Technical Programme Committee. There was an extensive discussion as to whether this is a pattern that the VTS should follow. A number of past and future conference chairs were present, with a wide variety of views which generally amounted to the fact that good conference management companies were well worth the money they cost, but that poor conference management companies actually created more work. Mel Lewis pointed out that Sections currently receive a proportion of the surplus for organising VTC, and this benefit would be lost; in effect, money that currently goes to sections would go to conference organisers. There is also the middle road of making more use of IEEE Conference Services. It was agreed to look further into the possibilities and the services these companies could offer.

Jens Zander made a presentation proposing Stockholm as a host for **VTC2005-Spring**. Sweden has an international reputation in the mobile communication community, but also has sizable research in the automotive field. He circulated a folder with expressions of support from local industry and government, and expected high local participation. After some discussion, it was agreed to accept the proposal.

Preston Jackson reported on **VTC2002-Spring**. Over 600 abstracts had been submitted. They propose a difference in the student price between IEEE members and non-members; IEEE student members will pay \$75 compared to \$100 for non-members.

Jae Hong Lee gave a presentation on **VTC2003-Spring**. This had been proposed for Seoul, but the conference committee proposed moving the venue to Jeju, since visa-free entry was easier and the costs are lower. Jeju is on Cheju Island with good air links to Seoul and other south Asian capitals. The venue change was agreed.

Vijay Barghava reported on **VTC2002-Fall** in Vancouver. The student rate will be higher - \$150 dollars for IEEE students and \$175 dollars for other students, but students will also be included in the meals, to give an more inclusive conference.

Past conferences: JRC1999 and JRC2000 were closed out without a surplus or deficit. There is nothing further to report on VTC1999-Spring, and further methods to pursue this will be undertaken. The seed money for JRC2001 has now been returned to the IEEE.

Board of Governors Elections: Kent Johnson reported that Charles Backof, Dennis Bodson, Tad Matsumoto, Sam McConoughey and Eric Schimmel had been elected to the Board of Governors for the term 2002 to 2004. Mel Lewis is an appointed member of the board and will remain in this position. Past presidents remain appointed members of the Board for three years, so Kent Johnson will also stay on the Board. Vice presidents are limited to four consecutive one-year terms, so Harvey Glickenstein was not eligible for re-election. John Kingham was elected in his place as VP Land Transportation. Other office bearers were re-elected to their existing positions.

Mark Ehsani reported on the **Electric Vehicles Committee**. This has been formed with an initial membership and is growing. Invited sessions have been arranged at VTC in Atlantic City. He proposed a change in the name of the committee to the Vehicle Power & Propulsion Committee or the Vehicle Electronics, Power and Propulsion Committee. This will be decided by e-mail. Mark Ehsani is also taking over chairmanship of the **Convergence Fellowship Committee**.

Bob French reported on **ITS**. There had been a request from the ITS Council for support in justifying the updating of the ITS video. The two representatives from each society to the ITS Council have staggered terms. Bob Barrett's term expires this year, and it was agreed to reappoint him for two years.

On **chapters**, prospective sites for new chapters are being identified.

James Irvine reported on the **VTS News**. A new banner had to be redesigned at short notice for the August issue, as US postal regulations required the full title in the ban-

ner, rather than has had been thought in the top half of the page.

Harvey Glickenstein noted that the agreement with the ASME over the **Joint Rail Conference** requires two years notice to revise, so the unilateral change with regard to modifying sponsorship to technical sponsorship agreed at the last meeting is not possible. He proposed a working group of John Kingham, Charles Backof and Dennis Bodson to look at the revision of the JRC agreement in order to retain technical sponsorship, but devolve ourselves of financial responsibilities. This was agreed.

Dennis Bodson updated the board on progress on the reprint of the **Land Mobile Radio Handbook**. This is getting bogged down in the IEEE system. There are two ways of proceeding, either to print copies in the normal manner, or to use print on demand. He will get costing information on these options. He will also be asking Propagation Committee to review the existing text and suggest suitable papers for the update.

VTS Awards

Ray Trott, Awards Chairman

Awards Luncheons were held on Tuesday, May 8, 2001, at the Spring VTC01 in Rhodes, Greece and on Tuesday, October 9, 2001 at the Fall, 2001 VTC in Atlantic City, NJ.

The VTS recognizes those who contribute to & support VTS in an exceptionally worthy manner. There are several awards and fellowships that VTS considers in expressing its appreciation to members of the Society. Although all of these awards are considered, not all are awarded annually. These awards also have differing prizes: Plaques, Certificates and/or money.

At the Rhodes, Greece VTC luncheon, the following awards were presented:

Chapter of the Year Award – This award is presented to recognize the outstanding Chapter of the Vehicular Technology Society. To be eligible, a Chapter must submit to IEEE Headquarters the meeting attendance report form, L-31. The award is a plaque.

The 2000 winner was for an unprecedented fourth year in a row, the **Tokyo VTS Chapter**. The award was presented to the 2000 Tokyo VTS Chapter Secretary, Hirohito Suda.

Outstanding Service Awards – These awards are given to members to recognize outstanding service to the Society. Prizes for these awards were plaques and stipends of \$250 each.

- ♦ **Kent Johnson** – For outstanding long-term service and leadership to the Society as a Past President and Treasurer.
- ♦ **Melvin A. Lewis** – For outstanding long-term service and leadership to the Society as Conference Coordinator.
- ♦ **Tadashi Matsumoto** – For meritorious service to the Society and to the Board of Governors.

2000 Neal Shepherd Memorial Best Propagation Paper Award – This is to recognize the best paper relating to Propagation published in the *Transactions on Vehicular Technology*.

The award was presented to **Homayoun Nikookar & Homayoun Hashemi**, “Phase Modeling of Indoor Radio Propagation Channels”, March, 2000 *Transactions on Vehicular Technology*. The prize was a certificate and \$250 for each of the authors.

The following were presented at VTC2001-Fall in Atlantic City:

VTS 2000 Best Automotive Electronics Paper Award – This is to recognize the best paper relating to Automotive Electronics published in the *Transactions on Vehicular Technology*.

The award was presented, in absentia, to **Luigi Giubolini**, for “A Multistatic Microwave Sensor for Short Range Anticollision Warning”, published in the November, 2000 VT *Transactions*. The prize is a certificate and \$500 for Dr. Giubolini.

2000 Jack Neubauer Memorial Best System Paper Award – This is to recognize the best paper relating to Systems Engineering published in the *Transactions on Vehicular Technology*.

The award was presented to **Henry L. Bertoni & Dongsoo Har**, “Effect of Anisotropic Propagation Modeling on Microcellular System Design”, July, 2000 VTS *Transactions*. The prize is a certificate and \$250 for each of the authors.

Stuart Meyer Memorial Award – This is an award that recognize those members of the Vehicular Technology Society who have both served their Society and also have contributed to the development of radio technology and

science in an outstanding and exemplary manner. The prize is a plaque and a stipend of \$2,500.

This award was presented to **William C. Y. Lee**, LinkAir Communications, Inc., Santa Clara, CA.

James R. Evans Avant Garde Award – This is an award to recognize leadership and other contributions in promoting new technology in the fields of Vehicular / Wireless Communications, Vehicular Electronics and Land Transportation. The prize is a desk top award and a stipend of \$250.

The award was presented to **Dr. Mehrdad (“Mark”) Ehsani**, Texas A&M, for his contributions to the theory of Hybrid Electric Vehicles.

Special Service Award – For outstanding performance in the planning and execution of the Fall 2000 VTC, September 25 - 28, 2000, Boston, MA. The award was presented to Stuart Lipoff, Fall 2000 VTC Chairman.



VTS Awards, Mark Ehsani and the new James R. Evans Avant Garde award (top left), Tad Matsumoto with Mel Lewis (top), Ray Trott, William Lee, Henry Bertoni and Dongsoo Har (top right; clockwise from top left), Toyko VTS Chapter Chair Hirohito Suda (bottom right), VTC2000-Fall Chairman Stu Lipoff (bottom), Neal Shepherd awardee Homayoun Nikookar (bottom left), Kent Johnson (center left) and Mel Lewis (center right).

Conferences of Interest

The following table shows VT-06 sponsored and co-sponsored conferences as well as related conferences not sponsored by the Society. While every attempt was made to ensure accuracy, you should contact the respective conference committee to confirm date and location.

DATE	CONFERENCE	LOCATION	WEB PAGE
26-28 February 2002	European Wireless 2002	Florence, Italy	http://www.ing.unipi.it/ew2002
17-21 March	WCNC2002	Orlando, FL	http://www.wcnc.org/2002/
19-21 March 2002	11 th Int. Conf. On Road Trans. Information and Control	London, UK	http://conferences.iee.org/RTIC
4-6 April 2002	ISART2002	Boulder, CO	http://www.its.blrdoc.gov/isart/
23-25 April 2002	JRC2002	Washington, DC	
28 April – 2 May 2002	ICC2002	New York, NY	http://www.icc2002.com
6-10 May 2002	VTC 2002-Spring	Birmingham, AL	http://www.ewh.ieee.org/soc/vtc02spring/
6-8 May 2002	3G2002	London, UK	http://conferences.iee.org/3G2002
15-17 May 2002	Wireless Design	London, UK	http://www.wirelessdesignconf.com
28-31 May 2002	3G Wireless 2002	San Francisco, CA	http://delson.org/3gwireless02/
16-21 June 2002	APS International Symposium / URSI Radio Science Meeting	San Antonio, TX	http://www.ieeeaps.org/2002APSURSI/
16-21 June 2002	IST Mobile Summit	Thessaloniki, Greece	http://www.iti.gr/summit2002
18-20 June 2002	IV'02 Intelligent Vehicles Symposium	Versailles, France	http://www.ewh.ieee.org/tc/its/conf.html
14-19 July 2002	SPECTS'2002	San Diego, CA	http://scs.org/confernc/spects02/spects2002cfp-gen.html
2-5 September 2002	ISSSTA 2002	Prague, Czech Republic	http://www.ure.cas.cz/isssta2002
3-6 September 2002	ITSC '02	Singapore	http://www.ewh.ieee.org/tc/its/conf.html
15-18 September 2002	PIMRC 2002	Lisbon, Portugal	http://www.pimrc2002.org
23-27 September 2002	European Microwave Week	Milan, Italy	http://www.eumw.com/
24-29 September 2002	VTC 2002-Fall	Vancouver, BC	http://www.fallvtc2002.org
21-23 October 2002	Convergence 2002	Detroit, MI	http://www.convergence2002.org
27-30 October 2002	WPMC '02	Honolulu, Hawaii	http://www.wpmc02.gatech.edu/
17-21 November 2002	Globecom 2002	Taipei, Taiwan	http://www.globecom2002.com
24-26 March 2003	Int. Symp. On Wireless Systems and Networks (ISWSN'03)	Dhahran, Saudi Arabia	http://www.kfupm.edu.sa/ee/ISWNWeb/first_call.htm
21-24 April 2003	VTC 2003-Spring	Jeju, Korea	mailto:jhlee@gong.snu.ac.kr
23-25 April 2003	EPMCC2003	Glasgow, Scotland	http://www.epmcc.com
11-15 May 2003	ICC2003	Anchorage, AK	
Fall 2003	VTC 2003-Fall	Lake Buena Vista, FL	mailto:mguizani@cs.uwf.edu
Spring 2004	VTC 2004-Spring	Genoa, Italy	mailto:vatalaro@ing.uniroma2.it

Conferences marked '✓' have open calls for papers as of 28 February 2002. This list is based upon the conference calendar at our web site, which is updated more frequently than this list can be. To access it go to the following URL: <http://www.vtsociety.org/>, then click on "Conference List" in the left frame.

Corrections and additions to this list are most welcome. We are particularly interested in adding listings for Automotive and Transportation conferences. Please send corrections and additions to Tom Rubinstein at t.rubinstein@ieee.org.