IEEE VTS

VEHICULAR TECHNOLOGY SOCIETY NEWS

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Japanese Maglev Test Train 'On Shed' See VTC 2000-Spring article. Photo courtesy of RTRI, Japan.

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Connecting The Mobile World

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FOREWORD

James Irvine, Editor

Happy New Year! If you are reading this it means that the IEEE Y2K compliance procedures, along with those of the various Post Offices worldwide, have all worked and the VTS News has been dispatched successfully. Writing this in Scotland on the second of January, I am happy to report that the traffic lights did not fail, the utilities remained working, and I can even still connect to my ISP. Such has been the magnitude of the non-event when compared to the prophesies of doom that the media is now questioning all the money spent to ensure that the Hogmanay parties went undisturbed. We Scots know how to celebrate New Year!

Now that the clock has ticked over, it is possible to start looking at the silver linings to the Y2K cloud. The Y2K 'bug' has provoked a wide range of different attitudes, from the head-in-the-sand approach of hoping it will all go away to the overreaction of stocking up on food, heating oil and edible candles. I suspect that over the coming years Y2K will change in people's minds to one of those apocryphal stories told to young engineers (and computer scientists) to warn them of the dangers of complacency, and in particular of assuming that designs will be safely obsolete long before a critical date. If we design things to be as reliable as possible – and as engineers, that should be our aim – then it is incumbent on all of us to consider the unexpected and plan for it. As Steve Oualline, author of Practical C++ Programming, asks 'What would your program do ... if a cat walked across the keyboard, several times?' Y2K was arguably the least unpredictable problem to occur over the past 1000 years, but the 'bug' still occurred because engineers were designing for tomorrow, but not the day after tomorrow.

While those working in the transportation side will be well used to systems which last for 20, 30 or even 50 years, the mobile radio engineers may be feeling safer in the knowledge that there systems have a much shorter lifespan. The public seems to know this – last year, 13,000 mobiles were left in the London Underground and never picked up. VTC'99-Fall was full of discussion of 4th generation systems before the design of 3rd generation systems is even finished. However, when was the last time you started a design with a blank sheet of paper? Systems become more complex, intellectual property is reused, and the importance of designing for the unexpected becomes increasingly relevant.

There is another silver lining. As long as there is no such thing as bad publicity, the general population is now well aware that electronics is now ubiquitous to the point that almost everything, including transport, depends on it. Of course, that makes it more important to get things right...

VTS publication rates

Transactions on Vehicular Technology subscription price is $20 per year for IEEE members. For non members, the price is $175 per year.

Vehicular Technology Society News subscription price of $15 is included in membership in VTS. For non members, the annual price for the four issues of February, May, August and September is $30.

For inquiries and orders, see telephone numbers above.

VTC2000-Spring

On the 15th of May, VTC2000-Spring will open at the Hotel Pacific in Tokyo. This will be the first occasion that VTC has been held in Asia, but it could not come at a more appropriate time, with the advances being made in 3rd generation mobile communication systems. The theme of the conference is 'Shaping History Through Mobile Technologies', and Japan has been a key player in the global standardisation of 3G. The country also promises to be one of the first to implement the new technologies, with deployments starting this year for service from 2001. VTC2000-Spring is the first major mobile conference since the ITU decision on 3G standardisation, and it promises to be a useful opportunity to find out the way the industry is moving.

The conference has seven technical subject areas. They are

- ✦ **Antenna and Propagation** This area includes papers on Smart Antennas, Space-time Processing, Radio Channel Modeling and Prediction Tools.
- ✦ **Wireless Access** The papers in this area cover Multiple Access Technology, Spread Spectrum Technology, OFDM Technology, Access Protocols, and Channel Assignment.
- ✦ **Transmission Technology** This area includes various aspects of Transmitter and Receiver Design, including Modulation & Demodulation, Source & Channel Coding, Interference Rejection, Equalization and Synchronization, and Multiuser Detection, as well as Software Radio.
- ✦ **Multimedia, Network, and Systems** Mobile Multimedia Technology, Mobile Data Computing or Navigation Networks, and Wireless ATM.
- ✦ **Wireless Personal Communications Systems** IMT-2000, Broadband Mobile Communications Systems, Cellular Technology, and Location Techniques.
- ✦ **Mobile Satellite** Mobile Satellite Communications, LEO/MEO/GEO Networks, and Satellite Navigation.
- ✦ **Transportation** Intelligent Transportation and Vehicular Systems, as well as Vehicular Electronics.

Notwithstanding a large local contribution – 64 of the papers at VTC'99-Fall had Japanese authors or co-authors – the conference attracted 800 proposals from across the world. The 550 papers being presented have been chosen by the Technical Programme Committee on the basis of the programme subject areas to ensure a varied selection of high quality presentations. The seventy-six strong Technical Programme Committee is chaired by Professor Susumu Yoshida from Kyoto University. Mitsutoshi Hatori, from the National Centre for Science Information Systems in Japan, is General Chair of VTC2000-Spring.

In addition to the technical programme, the conference will be preceded by 15 tutorials. Also, 8 panels are planned. Tutorials and panels cover various technical subjects such as Wideband planned on Wideband CDMA, High-Speed Wireless LAN, Packet Mobile Communications/TCP/IP over Mobile Radios, Smart Antennas, Software Radio, Multi-User Detection, High-Speed Digital Transmission Technology, Mobile Multimedia and ITS.

Two technical tours have been organised. The first is to a 3rd Generation Mobile IMT-2000 Test System in the Yokosuka area just south of Tokyo. The Yokosuka Research Park opened in 1996 as a centre for research and development in mobile radio technology. The Japanese W-CDMA 3rd generation system was combined with the similar European UTRA FDD system for standardisation as ITU-DS and is likely to be one of the first true 3rd generation systems deployed.

Prototype IMT-2000 handset. One conference tour will be to a 3rd Generation Mobile IMT-2000 Test System

Photo courtesy of NTT-DoCoMo

Other types of vehicular technology are included in the technical programme and the second tour will be to the Maglev test line to see the 550km/h "Superconducting Magnetically Levitated Vehicle". Again this is an area of technology where Japan leads the world, offering the prospect of future practical land transportation at 500 km/h. For those who are interested in an example of previous high speed train technology, the conference centre is only 11 minutes by train from Tokyo station, where high-speed Shinkansen trains can be seen in operation. These are still the fastest trains in the world, having faster schedule speeds from station to station than France's TGV. The Tokaido Shinkansen from Tokyo to Osaka opened more than 35 years ago on 1 October 1964, and even today only eight countries currently have high speed trains which exceed that original line's design speed of 210km/h.

The conference will be held in Le Meridien Pacific, Tokyo. The hotel boasts a total of 6 restaurants on its 30 floors, offering French and Chinese cuisine in addition to Japanese. The hotel is well served by transportation links, being only a minute's walk from Shinagawa railway station with services to central Tokyo, Narita and Haneda airports.

While Japan is some 1,500 miles long, it is only on average 130 miles wide. Its area is roughly one 25th of that of the United States of America, but in this space live over 125 million people, only a little less than half the population of the United States. The 12 million living in Toyko make it one of the largest metropolises in the world, but only 50 miles to the west is the Kanto mountain range and the Chichibu-Tama National

Maglev train on a test run.

Park, and south of that is Mount Fuji, which rises over 3750m. May is a very good month to visit Tokyo, with little rain and a temperature averaging a comfortable 18° C. The attractiveness of the season is often expressed by quoting a famous Japanese poem by Sodo Yamaguchi:

> *Our eyes see green leaves,*
> *From mountains sing little cuckoos.*
> *Eat first bonito!*

One aspect of touring Japan which can trap the unwary is the fact that although there are many signs in English, at least on the main transport corridors, the Japanese kanji or hiragana scripts are used universally. This can make finding your way about somewhat complex, unless you have taken the precaution of recording the kanji form of your destination to compare to station signs or for ticket machines.

VTC has established itself as *the* series of conferences on cellular radio technology, not only in terms of its technical programme, but in the number of attendees which it attracts. The split into two conferences per year has resulted in a pair of conferences, each of which is almost as large as the final annual VTC in Ottawa in 1998. With its location in Japan this spring, it offers an ideal opportunity to come up to speed on the latest technical developments while spending time in an exciting country at the leading edge of R&D work in mobile.

A discounted early registration is available until the 31st of March. For further details of the conference and for a registration form, please visit the VTC2000-Spring web site on *http://www.convention.co.jp/ vtc2000s/* or contact the Conference Secretary:

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日本

The kanji for Japan. The upper symbol is a stylised sun, while the lower symbol is a tree with a horizontal bar which represents 'root' and means 'origin'.

Report on VTC'99-Fall

The 50th Vehicular Technology Conference, and the first Fall conference of the biannual series, was held in Amsterdam last September. A total of 942 delegates from over 37 countries registered to attend. One of the largest representations was from Japan, with 125 delegates, followed by the USA with 87. The Netherlands, the UK, South Korea and Germany all also had significant representations. Notwithstanding the fact that this was the second VTC conference of the year, a very large number of submissions were received (895 papers, and 30 tutorial proposals). From these, a total of 632 were accepted either for oral presentation in 75 ordinary sessions (404 papers) or for one of the five poster sessions. Allocation of papers between oral or poster sessions was done on the basis of subject and not relative quality.

The theme for the conference, in terms of the plenary sessions and the technical papers, was a move from 3rd generation technology to 3rd generation services, 4th generation systems, and IP.

The size of the conference was reflected in the size of the proceedings. The five volumes came to more than 3000 pages and weighed in at 19 pounds (8.5kg), giving rise to rumours of trips to the local canals to avoid excess baggage!

The conference was opened by Professor Ramjee Prasad from Aalborg University, who was Chair of the Conference. Professor Prasad noted that wireless was the second largest growth industry next to banking. He also remarked on the difficulty in persuading industry to support the conference, since they did not understand how the Vehicular Technology Conference related to mobile. He recommended that the VTS consider changing 'Technology' to 'Telecommunications', retaining the acronym but increasing the relevance to mobile.

The first plenary presentation was given by Robert Verrue, Director-General of DG XIII at the European Commission. In a talk entitled 'Wireless Infrastructure for the Global Communications Village', he explained what was being done at the European Union level to come up with an integrated solution for wireless networks for voice and other services. In Finland, in November 1998, wireless overtook fixed access,

Ramjee Prasad Opens VTC'99-Fall

An attentive audience listen to the opening session

and during the summer of 1999, Italy also crossed over. While there is a linear growth in fixed traffic, the growth in wireless is exponential. He noted that while web growth in the USA and Japan was approximately linear, in Europe the growth was exponential. The combination offers very good opportunities. While the proliferation of analogue systems restricted growth, a single, common, open standard promoted growth. Robert Verrue cited the fact that while it took nine years for analogue to grow to 6 million subscribers, the common GSM standard allowed growth to 30 million subscribers in half that time. He argued that that good technology translating into successful services requires a co-ordinated approach, and an open standard was essential. Finally, he introduced the new European IST programme (Information, Science and Technology) where the user is the focus.

The second opening talk was given by Tero Ojanperä, Vice President of Researche Nokia Telecom, on 3G Multimedia Networks. He predicted that as narrowband goes wireless, wideband will follow, and fixed will go to broadband. While it was very difficult to predict applications, it wasn't necessary to do this, but rather to provide good technology and let the applications emerge. Tero Ojanperä foresaw unified end-to-end applications with different access technologies glued together with IP. GPRS offered the first wireless IP network – this could evolve to form a 3G core network.

The final opening talk was 'Wireless Internet', given by Håkan Eriksson, Vice President and General Manager of Ericsson Research. He talked on the convergence of media, telecoms and computing to form an information society. 2nd generation systems used new machines for the same business; 3rd generation systems will give new machines for new systems. He said that Wireless Internet was not about making the Internet wireless, but about making a Wireless Internet. When comparing traditional and wireless approaches, voice service costs are roughly equivalent between wireless and fixed, whereas email is cheaper by wireless. However, movies are very much more expensive by wireless than wireline. The line of equivalent cost between wireless and fixed will move towards wireless, but even so, high bit rate services are going to be out of reach of wireless. This must be taken into account of when planning the Wireless Internet

Keynote presentations on the second day were combined with the opening of WPMC'99. The first talk, 'Challenges of Wireless Communications – IMT-2000 and Beyond' was deliverable by Fumiyuki Adachi from NTT DoCoMo, who is also Vice Chair of the Technical Programme Committee for VTC2000-Spring. He gave an overview of the position in Japan, where at the end of 1998 there were 45 million

subscribers growing at a rate of 70,000 per month, giving 35% penetration. He noted that the time taken to reach penetration of 10% of households, at just 5 years, was lower for the Internet than for other major technologies. The telephone had taken 76 years to reach this position, the fax 19 years, mobile phones 15 years, and the PC 13 years. The Internet is changing society more quickly than previous technologies, and it was driving communications towards multi-media. Some Internet type services can be provided over second generation systems. An example includes the NTT DoCoMo *i*-mode service over PDC. This had achieved very rapid growth, with one million users by August 1999 from a start in February of that year. Email, web access and on-line services are provided at 9.6kbit/s. 400 independent information providers were on-stream at the start; this had now risen to 1400. However, Fumiyuki Adachi said that full connectivity to Internet services would require 3G systems, and the physics of high bit rates would provide a challenge. Power is proportional to bit rate times frequency to the power 2.6. This means that providing 64kbit/s at 5GHz requires 87 times the power for providing 8kbit/s at 2GHz, or will require a 3.7 times reduction in cell sizes.

Walter Konhäuser, Senior Vice President, Siemens AG discussed Network Evolutions Towards 3G. He foresaw a strong parallelism between mobile phone and Internet subscribers. Wireless Application Protocol (WAP) and Bluetooth will provide Internet connection for wireless users. However, GSM technology will not stop; GSM will be the main revenue generator beyond 2005. The evolution path GSM→GPRS→EDGE will allow this to happen. The UMTS market will take time.

Shuzo Kato, Executive Vice President, Mitsubishi Wireless Comm. Inc., gave the American perspective in his talk 'Personal Communications Systems Towards 21st Century'. He predicted a number of paradigm shifts: technology oriented to services oriented system design (customers do not care about capacity); portability of handset; and voice phones to Internet video phones. From an American perspective, 2G systems are not paid off and penetration is only 25%. Operators have paid a lot of money for spectrum. There is also low wireless data communication penetration (< 6%). Another issue is that there is no new spectrum for 3G, which means that spectrum will have to be shared between 2G and 3G. This introduces design factors not present in Europe or Japan which affects system evolution.

	1G	2G	3G	4G
USA	AMPS	TDMA GSM CDMA	EDGE CDMA	One system
Europe	NMT TACS	GSM GPRS	EDGE WCDMA	
Japan	NTT JTACS	PDC PHS CDMA	WCDMA	

System Evolution in USA, Europe & Japan. Shuzo Kato

One of the best attended of the five panel sessions was on 'What future for IMT-2000?', chaired by Werner Mohr of Siemens AG, with panel members Akira Hiroike from NTT DoCoMo, Howard Xia from Vodafone-Airtouch, Mats Nilsson from Ericsson and Serge Willenegger from Qualcomm Inc. Dr Mohr introduced the session discussing
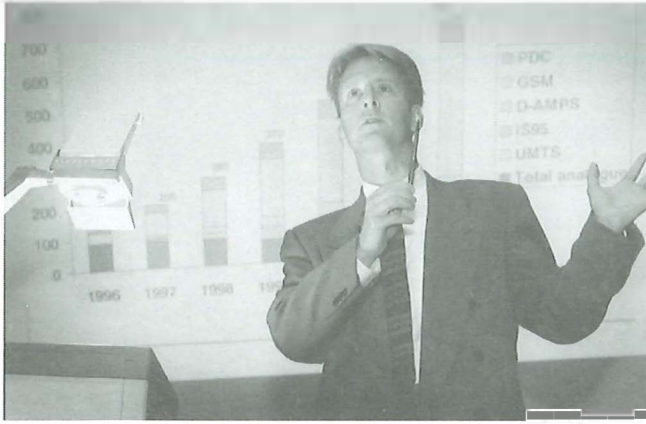
Håkan Eriksson discusses the increasing use of mobile phones

the growth in mobile alongside the growth in the Internet. In Europe it was expected to have 90 million mobile multimedia users (from 260 million total users) generating 60% of the traffic. This would require additional spectrum, and the existing spectrum is not available everywhere (in particular, North America). Therefore, the UMTS Forum is looking at extension bands.

Akira Hiroike said his three key words for the 21st century communications were personal, multimedia and universal. Testing of prototypes is underway in Japan aiming for commercial deployment from Spring 2001. Howard Xia said that the end goal was to have any information on any device at any time. He noted that Vodafone-Airtouch operates GSM, D-AMPS, PDC and cdmaOne networks, and they want harmonised CDMA for 3G. This would give operators the benefit of economies of scale. Up to this point the discussion had centred on the three CDMA flavours (what are now termed IMT-DS, IMT-MC, and IMT-TC – see 'ITU Agreed Radio Interface Standards for 3G' in the Mobile Radio column on page 19). Mats Nilsson introduced a fourth IMT-2000 option, EDGE IMT-SC. He said that this offered the first opportunity to introduce packet-based services. Over the long term, there will be a full IP based mobile network. VoIP (Voice over IP) over GPRS/EDGE will offer an upgrade path for US TDMA migration.

Serge Willenegger brought the discussion back to CDMA solutions as he gave an overview of IS-95 progression CDMA-MC.

A question was asked regarding the four different flavours discussed for IMT-2000: will all four flavours lead to 4G, or are some of them dead ends? There was some disagreement in the panel about this with the view being put that the future was CDMA and therefore non-CDMA solutions would not progress. Howard Xia said that EDGE was a good technology for packet data, but not for voice, and so would not be good for new spectrum until voice is integrated. Mats Nilsson said that there was a very bright future for EDGE, as it was very cost effective. He expected all GSM systems to move to EDGE since the costs would be very low. Akira Hiroike noted that EDGE was not appropriate for Japan since it did not have an installed base of GSM.

The audience also noted that while there were three basic flavours for 2G, with co-operation there were now four flavours being discussed for 3G. Howard Xia noted that from the 13 submissions to ITU, there were now four (actually five have now been chosen). He also said that for 2G systems, the services were simpler, and that there had never been something like the OHG (Operators Harmonisation Group) before.

The keynote presentations on the last day of the conference began with Yosi Furuhama, from Mobile Radio Centre, Inc., Tokyo, Japan. He discussed 'Prophecy in the 20th Century', by Houchi Shinbus, which was published in a Japanese newspaper at the beginning of the century (2 & 3 January 1901). This made predictions in 8 areas (Transportation, Information and Communication, Energy, Environment, Electrical Applications, Health and Hygiene, Climate Reform and Disaster Prediction, and Culture and Education. The predictions in some of the latter areas were poor (none of the latter two categories predictions were correct), but Transportation achieved a 'hit rate' of 93% and Information and Communication had 4 out of 6 right. The high success rate is probably due to the fact that these areas were already fairly well advanced at the turn of the century. The Information and Communication predictions were for telegraph and telephone (✔), picture transmission (✔), long distance voice transmission (✔), picture telephone (✔), electronic commerce and tube transmission (✔/✘), and communication with animals (✘).

The forecast contrasts with a 30 year forecast made in 1996, which had 14 surveyed areas and 1072 items in total. Yosi Furuhama looked forward to what could be expected in 2010, expecting 25-156Mbit/s indoor (against 2Mbit/s for IMT-2000), 2-25Mbit/s for pedestrians (against 384kbit/s), 2Mbit/s for vehicles (against 144kbit/s) and 2Mbit/s for satellite (against 9.6kbit/s today). Conditions for future advance included the survival of mankind, the resolution of essential problems (energy resources, food, population, and the global environment), social aspects (establishment of life ethics) and the assurance of safety and protection of privacy. He concluded by saying that most of what is technically possible today will be implemented in the next century. Wireless technology will become an essential aspect of the fabric of society. Since this will be the case, we must study the social and cultural issues as well as the technical aspects.

Mintaig Kim stood in for Seon Jong Chung, President of Electronics and Telecommunications Research Institute (ETRI) of Korea. He gave an overview of the history and evolution of mobile in Korea from AMPS in 1984 to the first commercial CDMA system in 1996. As of September 1999, there were 21 million wireless subscribers (45% penetration) exceeding the 20 million wireline subscribers. Their aim is to get IMT-2000 in operation in 2002 when they are joint hosts of the football World Cup.

Finally, Jorge Pereira, from the European Commission, gave his personal views beyond 3G. He started by asking the rhetorical question 'What is 4G?', the answer to which no-one really knows; it will be left to the market. However, he warned against playing the generation game, as Ray-

Werner Mohr from Siemens AG listens to the Opening Ceremony

Clockwise from the top : VTC2000-Spring stand; A quiet moment at the Exhibition; Your editor prepares a poster; Poster P3.18 explained; The Monday afternoon poster session; Jan Uddenfeldt (on left) presents the Stewart Meyer award to Sven-Olof Öhrvik; VTS President Kent Johnson at the Awards Lunch, VTC'99-Fall Chair Ramjee Prasad opens the Awards Luncheon, Tuesday morning poster session; Proceedings waiting to be collected – each set is almost 6 inches thick; (centre) The opening reception; (background) The RAI Conference centre, venue for VTC'99-Fall.

mond Steele put it, and undermining 3G. What 4G is not is simply higher data rates, in fact it should be user driven rather than technology driven. Returning to Håkan Eriksson's talk on the first day, while 2G was new equipment but same service, and 3G was new equipment and new service, 4G would be all equipment and all services. The user will be the focus, and will not be 'owned' by any operator. 4G will encompass all kinds of systems, inter-operate with 3G and 2G systems and be fully IP based. An open architecture will allow full re-configurability so that the most efficient or effective system can be used at all levels. In order to make such systems work, efficient resource management structures capable of coping with varying traffic, channel conditions and quality of service will be required, and new approaches to decentralised network functionality.

Overall, the conference was well received and a credit to the organisers who gave themselves the additional task

of organising WPMC'99 to run immediately after VTC. The size of the conference was one of its drawbacks, not just from the weight of the proceedings, but from the fact that it took several minutes to walk from one end of the venue to the other. This reduced the effectiveness of the policy of ensuring that sessions ran strictly to time, so if a paper was not presented, there was a break in the session, allowing delegates to move between sessions to see the papers of their choice. Unfortunately, there were a number of missing papers due to authors registering but not attending. This was particularly evident in the poster sessions, and such behaviour by paper authors is disrespectful to organisers and delegates alike. However, the conference, with its well-rounded plenary programme and panel sessions allowed a good balance between the technical developments and commercial visions, and offered an excellent opportunity to judge the current state of affairs with regard to mobile research.
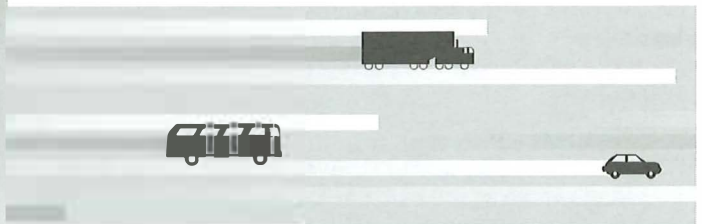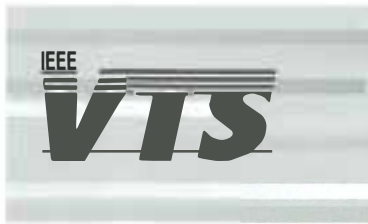
FUTURE AUTOMOTIVE ELECTRONICS

Bill Fleming, Senior Editor

In a series of articles to appear throughout the year, we will be looking at the developments which can be expected in the various areas of VTS technology in the early years of the new millennium. In this first article in the series, Senior Editor Bill Fleming looks towards the future of Automotive Electronics. Readers' views on the ideas expressed are cordially invited.

Advances in electronics offer a large number of possibilities in automotive applications. As more complex systems become more affordable, the following are expected to be commonplace beyond year 2000.

1. On-board, fix-it-on-road, diagnostic systems

Future diagnostic systems will go beyond simply capturing intermittent trouble codes. When used together with cell-phone data-links, diagnostic systems will allow real-time vehicle-trouble fixes, via on-the-road transmittal of software patches to the vehicle system computers. *"When one sees, for example, the engine trouble light go on; they simply grab their car phone, call service, and connect the car's data phone line to the ECU. Service then remotely reads and diagnoses the data, sends a software patch/fix back on the fly, and the software patch is automatically installed, fixing the problem without the car ever stopping."*

2. Smart "install and forget" sensors

Smart micromachined pressure, acceleration and gyro sensors will provide instrument-grade performance, high-level output signals, multiplex connectivity, self-diagnostic calibration checks, and electrically adjustable measurement range – all at very low cost. MEMS (MicroElectroMechanical Systems) sensors and microactuators will become so readily available, inexpensive, and reliable that they will be thought of as "zero-fail electronics" which will become "install and forget" commodities. MEMS devices and electronics will simply be embedded in structural parts of the vehicle. This will yield lighter weight, lower cost, simpler assembly, and self-diagnosing features.

3. Passive personalization and the convenience

Personalization and the convenience of electronic keyless entry systems will proliferate. Beyond today's theft-deterrent security systems that immobilize engines (and which have dramatically reduced theft rates of vehicles equipped with these systems), future systems will do much more. First, car keys will be replaced by a passive (no battery required) transponder smaller than a credit card, which you simply carry in your pocket or wallet.

Upon identifying your code (using a rolling code for added security), car doors will automatically unlock, and you can start the engine with the push of a button (because your key code will have been remotely and wirelessly read). In addition, settings of entertainment electronics, HVAC, mirror, seat, etc., will automatically be personalized by your identity card to match your preferences. The car will also recognize your voice commands and make adjustments of HVAC, mirrors, seat, radio, etc., automatically without you having to look away from the road. Transponder tags, attached to the vehicle, will make possible electronic drive-by payment of tolls, parking fees, and pay-as-you-drive use of limited-access urban expressway lanes. These can be dynamic, so the busier the traffic, the higher the toll.

4. Automotive chassis systems

Chassis systems will increasingly rely on electric power. Traditional mechanical components; such as hydraulic steering, brakes, and passive suspension will be replaced by all-electromechanical "actuate-by-wire" mechanisms. Electromechanical chassis systems offer: (a) modular packaging and assembly advantages, (b) stored-energy, on-demand, operation which reduces engine transient-mode emissions and improves fuel economy, (c) elimination of hydraulic fluid leaks and fluid-disposal environmental issues, (d) better interface with in-vehicle multiplexed electrical networks, (e) facilitation of diagnostic functions, and (f) easier integration with other systems.

Examples of all-electromechanical "actuate-by-wire" mechanisms include: electric power steering, steering-by-wire, vehicle yaw-rate stability enhancement, SUV roll-stability enhancement, active suspension, braking-by-wire, and driving/throttle-by-wire.

5. Intelligent Highways

In regard to highways, rather than building automated highways, attention will initially focus on IVI (Intelligent Vehicle Initiative) programs that emphasize collision-avoidance systems, such as rear-end collision radar warning, or automatic collision notification, etc. In the next 10 years, vehicle crash-avoidance radar systems will become reality. Effort will first focus on mitigating rear-end collisions because more than one-quarter of all injuries in motor vehicle crashes occur in such collisions. It is estimated that an extra half-second of warning will cut rear-end collisions by fifty percent.

Other applications will include: road departure warning, lane change and merge collision warning, intersection collision warning, driver drowsiness monitor, and night-vision augmentation. Ultimately, in the distant future (more than 20 years from now), automated highways and the total integration of vehicles with other vehicles and roadway infrastructure will be implemented. This will make possible large-scale, real-time, vehicle route-guidance, high-speed

vehicle platooning, etc. The primary driving force for this continues to be the unavailability of land for new roads, leaving only the option of making existing roads safer and more efficient by implementation of intelligent transportation systems.

6. Automotive Powerplants

For the next 20 years or so, automotive engines are expected to evolve as follows. For the near term, within the next 5 years, engines will utilize electronic direct injection (both gasoline and diesel) and electromechanical valve timing, mated with continuously variable transmissions. This approach is expected to yield 20-to-30 percent improvements in fuel economy and emissions reductions. Five to ten years from now, hybrid powertrains, which combine electric-drive motors and small IC/diesel engines, will appear. In the longer term – 10 to 20 years from now – fuel-cell/electric vehicles are predicted. However, purely electric vehicles are considered to be economically unlikely because: "they are a prisoner of their batteries due to excessive cost, weight, re-charging time/nuisance, and limited battery life".
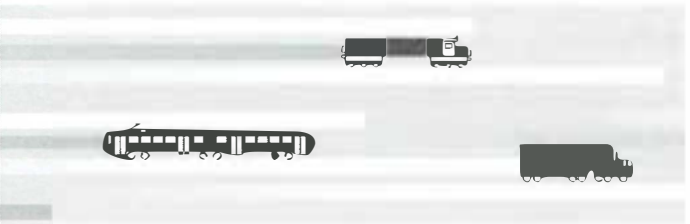
CHAPTER NEWS & MEETINGS

Gaspar Messina, Senior Editor

Philadelphia, PA

The Land Transportation Division has held a varied series of monthly meetings over the past year.

On February 10, 1999, Mr. Andy Jones from Amtrak, gave a talk entitled 'AMTRAK's Electric Traction System on the North East Corridor'. Another Amtrak speaker, Mr. John Popoff, gave a presentation on the Electrification of AMTRAK's High Speed Rail Line Between New Haven and Boston on May 5, 1999.

ACSES on AMTRAK was the title of the March 10, 1999 presentation by Mr. Bob Glass, of RSD, and in April, Mr. Bob Glines of ALSTOM Signaling Inc., gave a talk on Integrating PTS & ITS to Improve Grade Crossing Performance.

PATCO's Bill Klein gave a tour of PATCO High Speed Line Control Center on June 2, 1999, and after the summer break, Richmond Frequency Converter Project on AMTRAK was presented on September 8, 1999 by Mr. Wolfgan Recker of Siemens. In October, Mr. Peter Allibone, of SYSTRA Consulting spoke on the New York East Side Access Project

Ottawa

At a series of meetings held jointly with Electron Devices, Microwave Theory & Techniques and Antennas & Propagation Societies in November 1998, a Training Video Course on RF Devices and IC's for Wireless Applications was presented. The speakers were Mr. Robert Broderson of U. C. Berkeley, Mr. Paul Davis and Mr. Y. K. Chen of Lucent Technologies, Dr. Masahiro Muraguchi of NTT, and Mr. Eric Strid, of Cascade Microtech, Inc. Attendance totaled 45.

More recently, a talk was given last November by Kim Lochhead, from the Geodetic Survey Division of Geomatics Canada, which is part of Natural Resources Canada on the Global Positioning System in Canada & D-GPS in real time for various applications. Kim listed many DGPS services offered in Canada - and some worldwide, too. One particular usage is with the Canadian MSAT system providing the D-GPS information; this service is being expanded and will be offered Canada-wide soon. There was much discussion on the topic and the evening was considered very worthwhile.

The Ottawa Chapter VTS runs 2–4 meetings per year, and similar D-GPS lectures are planned for the future.

SE Michigan

Professor Khalil Najafi gave a talk last September on MEMS For Automotive Electronics. MEMS – Micro Electro Mechanical Systems – are miniature, multifunctional, systems consisting of sensors, Actuators, and Electronics which allow the formation of physical as well as electronic devices and use many of the standard silicon IC fabrication techniques. The talk covered mainstream micromaching technologies, how to integrate sensors and actuators with electronics, automotive applications devices (accelerometers, gyroscopes, anti-skid braking control, etc) and a review of current developments.

As well as being Professor of Electrical Engineering at the University of Michigan, Professor Najafi is also Director of their Solid-State Electronic Laboratory. He has an extensive and varied association with the IEEE including Associate Editor of Smart Sensors for the Journal of Micromechanics, and has been a member of the technical program committee for MEMS conference 1995-2000.
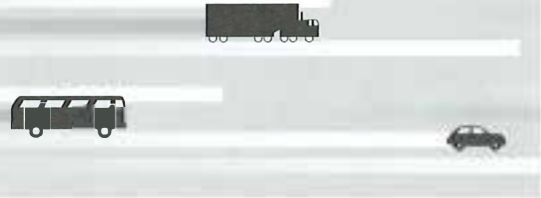
ELECTRONICS HARNESSES ENERGY ALTERNATIVES FOR AUTOMOBILES

George F. McClure
Editor, Technology Policy Council

The National Renewable Energy Laboratory of the Department of Energy (DOE) is dedicated to reducing reliance on fossil fuels for transportation and to the development of automobiles having at least twice the fuel efficiency of present ones and with the potential to use a variety of alternative fuel sources, such as ethanol, methanol, natural gas, liquefied petroleum gas, hydrogen, or electricity in addition to petroleum-based fuel.

A joint venture to develop and produce hybrid electric vehicles is about to bear fruit. The Partnership for a New Generation of Vehicles (PNGV) involves DOE and the Big Three automakers, Daimler Chrysler, Ford, and General Motors, working in tandem to develop a vehicle with triple the fuel efficiency of today's midsize cars but equal or better safety, performance, emissions, and price. The goals, announced in 1993, included better emission performance and a faster cycle time for automobile development. Concept vehicle propulsion systems capable of providing up to 80 miles per gallon were to be ready by 1998, production prototypes by 2000, and market-ready Hybrid Electric Vehicles (HEVs) by 2003 were scheduled.

The automobile manufacturing industry accounts for one out of seven jobs in the U.S., and 4.5% of the gross national product. The new generation of vehicles will therefore contribute to U.S. competitiveness. Better fuel economy could reduce the rate of carbon dioxide emissions and cut petroleum imports, now running at a rate of more than 50% of consumption.

Improved batteries for electric vehicles, with greater storage capacity, are the goal of the U.S. Advanced Battery Consortium, consisting of the Big Three automakers teaming with DOE to share technology in selected research areas. Other agencies, such as NASA and EPA, DOD and DOT are also participating.

The Hybrid Electric Vehicle (HEV) is a focused near-term subset of the PNGV program, expected to yield double today's fuel economy using existing technologies. The HEV uses a small power source in tandem with energy storage to provide high efficiency while meeting the variable power demands of over-the-road operation. The power source may be fuel cells, gas turbines, diesels, or lean-burn gasoline engines. The energy storage system may use flywheels, batteries, or ultracapacitors. Advantages include regenerative braking capability, returning energy to the storage medium rather than dissipating it; use of a smaller, lighter engine designed for the average load, not the peak load; greatly increased fuel efficiency with a corresponding reduction in emissions; and potential for use of alternative fuels.

The most economical HEV is a series configuration, where a low-emission constant-speed heat engine drives a generator to charge the energy storage unit that supplies electric drive motors. A parallel configuration permits higher maximum power because the heat engine is coupled to the wheels through a transmission so it can assist the electric motors in driving the wheels.

The DOE HEV Propulsion Program teams the United States government with industry for society's long-term benefit. DOE is funding about 50% of the development costs for the GM, Ford, and Daimler Chrysler independent HEV programs. All three have cost-shared propulsion system development programs, valued at $148 million for GM, $138 million for Ford, and $84.8 million for Daimler Chrysler. Ford and GM began five-year programs in 1993; Chrysler began a four-year program in 1996.

HEVs are expected to overcome the chief objections to electric vehicles - limited range without recharging (100 to 125 miles), slow acceleration, and a lengthy recharge time (6 to 30 hours). California has a 2003 goal of ten percent of the vehicles sold having zero emissions. The California Air Resources Board is considering near-zero emission vehicle standards that HEVs can meet, recognizing that even purely electric vehicles are accompanied by emissions from the power plants that provide their charging electricity. Twenty pounds of carbon dioxide are produced for every gallon of gasoline burned.

The DOE Fuel Cell Program is developing highly-efficient low- or zero-emission automotive fuel cell propulsion systems with an objective of having validated, competitive units available by 2004, capable of operating on methanol, ethanol, natural gas, and gasoline.

American ingenuity has found expression in various HEVs. During HEV challenge competitions in 1993, 1994, and 1995 students converted standard vehicles into HEVs (Ford Escort station wagons, Saturn SL2s, and Chrysler Neons). A spinning energy-storage flywheel driven by a small gas turbine engine was the power train in a HEV first tested in 1997, and described in Scientific American.

Ingenuity appears elsewhere, too. The Toyota Prius appeared in 1994, a parallel configuration HEV with computerized power splitter to allocate engine power to the wheels and to the generator, matching demand. Honda is introducing its "VV" HEV 2-seat coupe late this fall. With a five-speed manual transmission it should cost less than $20,000, achieving a 70 mpg EPA fuel economy rating. Powered by a 1.0 liter, 3 cylinder engine, the car weighs less than 2,000 pounds, has a range of some 700 miles, and top speed over 100 mph, according to Honda. Honda expects to produce 5,000 to 6,000 VVs for the 2000 model year.
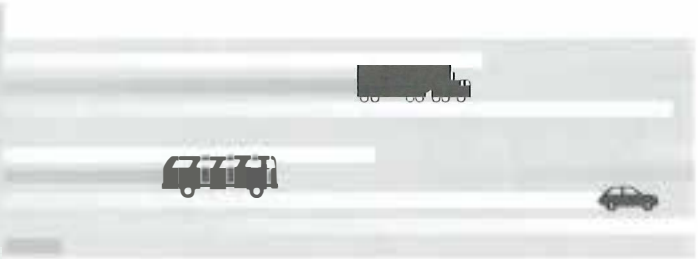
AUTOMOTIVE ELECTRONICS

Bill Fleming, Senior Editor

100-Year Scenarios

Robert Lutz, former Chrysler automotive chief executive officer, now chairman of battery maker Exide Corp., wrote a futurist article [1]. He offered the following three possible scenarios of what might happen during the 21st century.

1. Global Environmentalists Prevail The automotive industry is forced into radical change, and a host of new technologies will be forced into use by government mandate; namely: genuinely-usable electric cars, fuel-cell hybrids, and dinghy-like minivehicles/scooters that uncouple from remotely parked "mother ships" for transportation into car-free downtown areas.

2. We Warm To a Warmer Planet It may turn out that it is scientifically proven that motor vehicles have an infinitesimally small effect on global warming. Hybrids, fuel cell, and pure electric vehicles will continue to be developed because of their benefits (low emissions and utilization of alternate energy sources), as well as automated highways and mini-urban dinghies. However, IC engines will enjoy a rehabilitation and renaissance via new-found availability of very-low-cost synthetically produced fuels. Personal vehicle choice, and associated staggering diversity, will result in a thriving automotive industry.

3. Cybertravel Makes Autos Obsolete In Scenario Three, the price of personal transportation will rise at the same time that the information highway becomes vastly more capable. Videoconferencing will be replaced by boardrooms full of 3-D holographs of participants who are in different cities. With the perfection of the "cyber suit" – a thin second skin of receptors and transmitters in intimate contact with our own neural system – we'll be able, via Internet-types of communications, to visit others not only in realistic three-dimensional visualization, but we'll also be able to reach out and feel, touch, and smell, as if we were actually there.

Constant Net Links for Cars Along with Lutz's Scenario Three, cyber advances may simply expand the utility of automobiles. For example, another prediction was made by futurist George Gilder, founder of Forbes ASAP [2]. Due to giant electronics advances, communications bandwidths will soon be so wideband, and so inexpensive, that vehicles will be connected permanently to the Internet, and all automobiles will be constantly on the Net.

Motorists will be able to access data networks themselves through a computer, which will probably take on some form of a multi-function phone. This imminent wide-bandwidth bonanza will mean that things like real-time centralized monitoring of driving performance, or on-the-road engine control maintenance and upgrades will become routine. (Editor's Note. *A permanent Net connection might also make it possible for a "big brother" government to remotely shut down road-rage vehicles, or to remotely control whose vehicles are allowed to operate and whose are not).*

Growing Consumer Interest in Onboard Navigation

The Consumers Electronics Association conducted a telephone survey of 1000 randomly selected car owners [3]. The survey showed that:

1. Emergency distress signals were the most popular smart car feature, with 64-percent of respondents expressing some level of interest in the service.
2. Ability to find the shortest route was second most popular (57 percent).
3. On-demand vehicle traffic information – jumping up from sixth place in 1995 – was now third (55 percent).
4. Step-by-step navigation directions were fourth (50 percent).
5. Ability to monitor vehicle mechanical condition and servicing needs was fifth (40 percent).

Advanced Uses for Navigation Information

It has often been proposed to use navigation-equipped vehicles as traffic probes to feed traffic flow information back to central control points to better direct traffic flow. BMW goes another step, and proposes that navigation-equipped vehicles serve as mapping probes to feedback updated road map information to permit continuous updating of maps (to better keep up with rapid changes in roads – new roads, closed roads, road detours, etc.) [4].

And, given accurate enough map information, headlamp control and cruise control adjustments can predictively and automatically be made. If the navigation system shows that a vehicle is entering a curve, and the map information predicts that the curve lasts a certain duration; then the headlamp beam pattern can be adaptively steered to cover the direction in which the roadway is turning. In the same way, adaptive cruise control can decelerate a vehicle entering a curve, hold a reduced speed in the curve, and then accelerate the vehicle as it goes out of the curve. In this way, both headlamp and adaptive (radar) cruise control will take advantage of navigation system data to predictively, and automatically, steer the headlamps and adjust cruise-control speed, as the vehicle negotiates roadway curves [4].

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2. T. Moran, "Futurist Sees Constant Links to Net for Cars", *Automotive News*, p. 30N; Sept. 27, 1999.
3. "CEA Survey Finds Growing Interest in Vehicle Navigation Products", Consumers Electronics Association News Release, Arlington, VA, 3 pages, Nov. 17, 1999.
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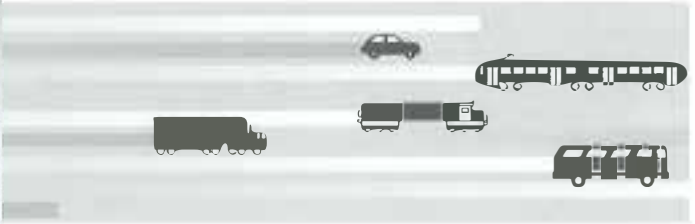
PROFESSIONAL ACTIVITIES

Frank Lord, Senior Editor

I participated in the IEEE-USA Professional Development Conference in Dallas over the Labor Day weekend. Up to this time the event was called the PACE (Professional Activities Committee for Engineers) Conference and was more for the purpose of addressing matters that affect engineers' careers; but that are outside the realm of their technical specialties. Portable pensions and tax treatment of the cost of continuing education are examples.

The PACE Conference tended to focus on the activities of the 35 or so committees that report to the IEEE-USA Board of Directors. It also involved training of members new to this arena. Now the focus has changed to a broader treatment of the areas of concern while suggesting that engineers might have to be alert to such factors and may have to take individual action on their own behalf on occasion. It is thought that this modified approach will be more appealing to the general membership and thus be of more value to more members.

Some sessions I have attended pointed out that organizations which might be considered adversaries generally have more money than we do because they are government and business organizations. Generally, each of these organizations are involved with one matter that affects engineers while IEEE-USA is trying to cover all appropriate matters. What we do have is a large number of educated members with educated family and friends. Politicians have to have votes in addition to campaign money to stay in office. Thus a large number of voters can beat moneyed opponents. We would need more participants than are typically inclined to act, but are doing better. Also, we have a larger communications staff than in the past. A member of that staff, Chris Currie, presented a talk entitled *How to write a Letter to the Editor*, an outline of which follows. Readers can easily adjust this to apply to other recipients.

For example, in a letter to a legislator, the suggested 7th grade level for newspaper material could be raised somewhat. Also, the length of a letter could be extended to as much as a page, but never any more. If you think you absolutely have to include more material that some staffer might read, do it through use of referenced appendices.

The advice given here is specifically intended for the USA, so members in Regions 8, 9 and 10 will have to be mindful of any differences in culture, law, government, industry practices and media styles. However, most of the advice will be relevant, and sections and other entities in these regions can employ the general philosophy and approach to create appropriate guidance for their own circumstances.

How to Write a Letter to the Editor
By Chris Currie,
IEEE-USA External Communications Supervisor

Preparation:
- If responding to an offensive article, assess whether your letter would settle the issue or mostly serve to give the opposing view more attention.
- Decide if the best response is a letter to the editor, an op-ed, or a note to the reporter responsible for the original article.
- Check the publication's masthead or Website for letters requirements and submission instructions.
- Research the issue to gather appropriate facts and arguments to support your position.

Composition:
- Limit yourself to 150-350 words and 2-6 paragraphs, depending on the publication.
- Make one point, using no more than three supporting arguments.
- Write to the level of your audience (7th grade – about 12 year old – level is appropriate for most newpapers).
- Use short sentences and paragraphs to maintain readability.
- If responding to a previously published article, cite the date and title in the first paragraph.
- Standard structure is to introduce the topic and your opinion in the first paragraph, give your supporting arguments in the second (and possibly third and fourth) paragraphs, and summarize or deliver a punchy conclusion in the final paragraph.
- Include a local angle, if possible, when writing for a regional magazine or newspaper.
- Highlight any special expertise or involvement you have with the issue you're writing about.
- Strive for an objective tone; be strong without being strident and convey sureness without shrillness. Don't rant – no more than one exclamation point per letter!

- ✦ Focus on issues, not persons; ad hominems and potentially libelous statements will ensure your letter a quick delivery to the circular file.
- ✦ If opposing the editorial position of the publication, avoid harsh blanket attacks on the organization and adopt a tone of firm, but polite and constructive correction.
- ✦ Avoid jargon and all those engineering acronyms, unless writing for a trade publication.
- ✦ Verify the accuracy of all data, facts, and quotations cited in your letter.
- ✦ Review your letter to delete redundancies and unnecessary details, tighten up sentences and transitions to improve smooth flow and strong impact, and check spelling and grammar.

- ✦ Sign your name and include your address and daytime phone number; ask for anonymity at the risk of not having your letter published.

Transmission and follow-up:
- ✦ Faxing your letter is usually best, unless the publication has a strong e-mail culture; mail is always okay unless your letter is time-urgent.
- ✦ Call the letters editor a few days after you send it and ask if your letter will be published; offer to edit or rewrite, if appropriate.
- ✦ Send a copy of your letter to an advocacy organization – like IEEE-USA – that espouses your position, to help them track media coverage of the issue and possibly give your letter further publicity.
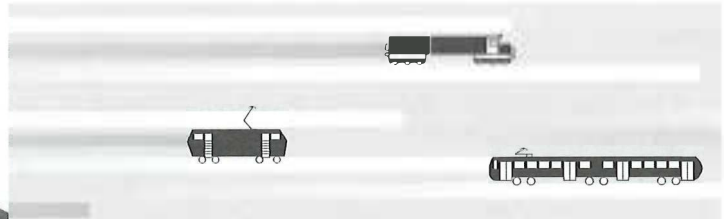
TRANSPORTATION SYSTEMS

Harvey Glickenstein, Senior Editor

The Rail Transit Vehicle Interface Standards Committee met at New Jersey Transit's offices in Newark New Jersey on November 9-10, 1999. The meeting started with a report by Mark Gooley of New Jersey Transit on their plans for upgrading their commuter rail fleet. All of the cars they will be procuring or overhauling, starting with the low bid from Alstom for 200 new commuter cars approved at the November 10 board meeting, will use the new IEEE 1473 communications standard developed by the committee. By the year 2010, all of the New Jersey Transit commuter equipment, with the exception of the Comet IV cars that recently went into service, will be using this standard.

Present commuter equipment uses 54 physical wires to communicate information between the cars and the locomotives. The 99 Comet IV cars also have a 19-pin connector and use the LonWorks protocol for multiplexing such things as the on board automatic audio and visual station announcement displays and public address systems. In order to assure backward compatibility, all of the cars procured or overhauled will have the 54-pin connectors in addition to two new redundant 19-pin connectors. Cars procured or overhauled after 2010 will no longer need the 54-pin connectors.

In addition to reports on the work going on by other groups that impact the work of the Rail Transit Vehicle Interface Standards Committee, the working group chairs reported on their work.

The CBTC Standard was balloted successfully and was scheduled to be approved by the Standards Board for issue in January. Working Group 2 will meet in early 2000 to determine where to go next. Potential standards for interoperability and driverless operation will be reviewed.

The first ballot for Safety Standards for Software Systems produced by Working Group 4 was balloted. Resolution of negative votes and reballoting was expected before the end of 1999 with presentation to the Standards Board for issue of the final standard also expected in January.

All of the negative votes on the Auxiliary Power Systems proposed standard that was prepared by Working Group 6 have been resolved and it is expected to be approved as a standard in January.

These two standards would bring to seven the number of standards produced by this committee and published by the IEEE since 1996.

The environmental standard produced by Working Group 8 underwent a line-by-line review by the full committee, with the comments returned to the Working Group for more work.

Working Group 10 is in the final stages of completing their draft standard for physical sizes of nickel cadmium batteries used on rolling stock. Rather than standardizing on the sizes of individual cells, the working group will provide standard tray sizes for two to six cells. These sizes will be for capacities from 80 ampere-hours to 300 ampere-hours in increments of 20 ampere-hours. The draft will be presented to the full committee for line-by-line review at the next committee meeting in March.

Working Group 12 has had three meetings on software documentation, with a fourth meeting scheduled for January

2000. They expect to have a draft ready for line-by-line review by the full committee by the end of the year 2000.

Two new working groups were proposed. One would work on a draft standard for electrical sizing of nickel cadmium batteries for use on rolling stock. This standard would complement the existing IEEE standard for sizing nickel cadmium batteries for stationary use. The working group would address batteries for all services on the vehicles with the exception of cranking service.

The second working group would address interfaces between the wayside terminator and the roadway subsystem portion of the National ITS Architecture. This architecture shows the crossing warning devices, flashing light signals and gates, to be in the roadway subsystem, while control of these devices is shown as coming both from the railroad control box in the wayside terminator and from the intelligent highway traffic controller in the roadway subsystem. The need for standards in this area was identified at the July 1999 workshop on ITS Standards for the Highway-Rail Interface. The new working group would coordinate its work with the Rail Subcommittee of the Advanced Public Transportation Committee of ITS America.

A conference on High Speed Ground Transportation will be held in Philadelphia in May. This conference will address both business and technical aspects of high-speed rail and magnetic levitation systems. In addition to the technical sessions there will be an exposition at which companies will display their high-speed rail technology. For information contact the High Speed Ground Transportation Association in Washington, DC at (202) 789-8107.

Salt Lake City opened its TRAX light rail line between Sandy and Delta Center in downtown Salt Lake City on December 4, 1999. The UTA is projecting 14,000 daily riders on the 15-mile north-south line, which has opened about three months ahead of schedule.

In addition to the north-south line, the Utah Transit Authority (UTA) is constructing a west-east line. The west-east line will operate from the University of Utah, the site of the Olympic Village for the 2002 Winter Olympic Games, west to the Delta Center, the downtown Salt Lake City terminus of the north-south line. The west-east line will also serve the Olympics media center and the area where some of the events will take place. An extension west to the airport was originally planned, but postponed due to lack of funding.

MTA New York City Transit (NYCT) has chosen the leader team for their Communications Based Train Control (CBTC) Project on the Canarsie Line. Siemens Matra, along with Union Switch & Signal, has been chosen as the lead supplier. The contract is worth $138 million. The other two teams in the competition, Alcatel and Alstom, have been asked to stay in the project as follower suppliers, demonstrating interoperability with the leader's technology. As the largest rail transit system in North America, NYCT's system is expected to become the standard for CBTC on transit systems in the U.S. and Canada.

Singapore's Land Transportation Authority opened its fully automated light rail line in November 1999. The system is 4.9 miles long and has 14 stations.

Adtranz North America, a wholly owned subsidiary of DaimlerChrysler Rail Systems, describes one of the unique features of the vehicles—active misting windows. The windows automatically turn opaque when they run adjacent to apartment buildings to protect the privacy of residents.

The $205 million light rail system will serve as a feeder linking the existing mass rapid transit system with a bus interchange, local recreational facilities, commercial complexes, and schools.

Bombardier has received an order for 21 100% low floor streetcars from the city of Linz, Austria. The order includes an option for an additional 18 vehicles.

Most low floor light rail vehicles being put in service in the United States, such as on the Newark City Subway and the Hudson Bergen light rail line in New Jersey, are only 70% low floor. Conventional trucks at each end of the vehicle incorporate the motors and require a high floor at the ends. The vehicles being supplied to Linz will use split axles that allow the low floor to extend for the entire length of the vehicle.

Westinghouse Air Brake Company (WABCO), the air brake company founded by the great inventor and engineer George Westinghouse, and Motive Power Industries, the former locomotive manufacturing arm of Morrison Knudsen, have merged. The new company is to be known as Wabtec Corporation. Its headquarters is in Wabco's hometown of Wilmerding, east of Pittsburgh, PA.

The Hudson Bergen Light Rail Line will open its first section this spring. The portion to open will be from Bayonne to Exchange Place in Jersey City, where there is an interchange with the Port Authority Trans Hudson (PATH) trains to Hoboken, World Trade Center in Manhattan, and Newark, New Jersey. The balance of the Initial Operating Segment (IOS) to Hoboken was delayed due to real estate problems, but construction is now underway. At press time New Jersey Transit (NJT) was negotiating with the Twenty-First Century Rail Corporation, the consortium that won the design build operate maintain contract for the IOS, to add the SOS portion that would extend the line from Hoboken to Weehawken, New Jersey to their contract.

The Newark City Subway will be replacing their Presidents Conference Committee (PCC) streetcars in May. These are the last such cars operating in the United States except for such vintage streetcar operations as the San Francisco Muni "F" line. Last year Pittsburgh had retired their last PCC cars and temporarily replaced them with a bus shuttle until the rehabilitation of their system is completed and their newer light rail vehicles could serve the entire system.

The new light rail cars that will be used on the Newark City Subway are identical to the ones that Kinki Sharyo supplied for the Hudson Bergen Light Rail Line. They will be maintained at a new facility being built at Grove Street, beyond the present terminus of the line at Franklin Avenue. These cars are double articulated units. In order to facilitate loading, all four doors on each side will be used for both loading and alighting from the vehicles. This required NJT to convert the subway from a pay enter type system to a proof of purchase type system. Last year NJT also closed the subway for several weeks while they renewed the trolley wire replacing it with a heavier wire to accommodate the additional power requirements of the new cars and new wire supports to allow the use of pantographs instead of the trolley poles that were in use on the PCC cars were installed during the shutdown. All of the PCC cars were converted to pantograph for power collection at the same time.

Enough cars were ordered under the Hudson Bergen Light Rail procurement to reequip the Newark City Subway and also to handle the First Operable Segment (FOS) of the Newark Elizabeth Rail Link (NERL). The FOS will allow Newark City Subway cars to serve Newark's Broad Street commuter rail station as well as Penn Station on Amtrak's Northeast Corridor. Broad Street Station serves commuters on the former Morris & Essex (M&E) lines from Dover, Morristown, and Montclair. Once the Montclair Connection is completed, the electrification will be extended from

Montclair to Great Notch and trains on that portion of the former M&E will be able to operate over the Midtown Direct connection into Penn Station, New York.

When the new cars go into service they will only operate between Franklin Avenue and the Penn Station Loop. By the end of the year, NJT plans to extend some of the service to the new terminus at Grove Street, with some cars continuing to turn at Franklin Avenue. When the FOS of the Newark Elizabeth Rail Link goes into service, the Newark City Subway cars will operate from Franklin Avenue or Grove Street to Penn Station, go around the loop at Penn Station, and then proceed at street level out to Broad Street station. Along the way they will serve Newark's Performing Arts Center and their new ballpark along the Passaic River.

Design of the FOS is now underway. The next portion of NERL, which will extend the line to Elizabeth via Newark Airport, is not yet funded.

Ottawa, Ontario is proposing a 5-mile light rail line. This line would be integrated with their existing bus-only rapid transit system. Presently OC Transpo operates grade separated busways in the capital region of Canada.

The light rail line would use three-car trains of Talent series equipment from Bombardier. It would serve five stations including Carleton University. The line would be operated on existing Canadian Pacific Railway tracks between Greenboro in South Keys and Bayview on LeBreton Flats.

An environmental assessment is being prepared for approval this spring, with revenue service planned for summer 2001.

Amtrak and the Commonwealth of Pennsylvania have entered into a $140 million high-speed rail funding agreement. The agreement calls for 90-minute 90-mile-an-hour service between Philadelphia and the state capital at Harrisburg. Although the agreement calls for all-electric train service, it is not clear how it dovetails with the Commonwealth's purchase of new diesel multiple unit trains for this corridor.

Pennsylvania has been funding the Keystone Service, which is being folded into Amtrak's new Acela Regional Service this spring. Since 1995, ridership has grown from under 400,000 per year to about one million.

The new agreement calls for a new station to serve Harrisburg International Airport, station improvements at existing stations, safety improvements at the three rail/highway grade crossings on the line, and upgrades to track, signals, overhead electric power systems, and bridges. The cost of these improvements will be shared between Amtrak and the Commonwealth.

Voters in San Francisco passed two major propositions concerning public transportation in November. The first one calls for extension of the Caltrain commuter service from its present inconvenient terminus at Fourth and Townsend to a more convenient location at First and Mission Streets. It also calls for conversion of the commuter service between San Francisco and Gilroy from diesel to electric operation.

The second proposition reorganizes the operation of the San Francisco streetcar network. A new Municipal Transportation Agency will take over operation of the San Francisco Municipal Railway (MUNI). The agency will have seven board members appointed by the mayor and confirmed by the Board of Supervisors. Although the Board of Supervisors will have veto power over the budget of the new agency, its budget will be separated out from the city's general fund.

Denver overwhelmingly approved expansion of its light rail system in November. Two lines, totaling 19 miles in length will be built to serve the southeast corridor. The extension will be financed by bonds, with no increase of taxes.

Seattle's Sound Transit has approved the route for their new 21-mile light rail line. The line will run from the University District, to Boeing, Tukwila, and SeaTac. Along the way, the line will serve downtown stopping at the Westlake Station of the downtown transit tunnel presently used by electric trolley buses.

A new rail tunnel under the Alps between France and Italy is being studied. The tunnel, which would be on the line between Lyons and Turin, would be 33-1/2 miles long. The fire in the Mont Blanc highway tunnel, in which 41 people were killed, was the impetus in reviving this study, which had been shelved several years ago.

VTC2000-Fall Call for Papers

A reminder that the deadline for submissions for VTC2000-Fall, which will be held in Boston from 24-28 September 2000, is the 15th of February. A full Call for Papers was published in the last VTS News. Submissions are invited in the areas of Antennas and Propagation, Wireless Access, Transmission Technology, Multimedia, Network and Systems, Wireless Personal Communications Systems, Mobile Satellite Communications, Transportation and Applications. Papers should be submitted electronically to *http://www.vtc2000.org*, where further details can be obtained.

VTS NEWS

VTS Board Elections

The recent ballot for members of the VTS Board of Governors has resulted in three new Board members. These are John T. Gilsenan, Deputy Director, Office of Multilateral Affairs International Communications and Information Policy at the US Department of State, Anil T. Kripalani, Senior Vice President, Standards Planning and International Administration at Qualcomm Inc., and James A. Worsham, Jr., from BellSouth Science and Technology.

Three existing Board members, William C Y Lee, Jyun-Cheng Chen and Eric Schimmel retired from the Board and did not seek re-election. Eric Schimmel remains in the appointed position of Vice President Mobile Radio. The two remaining Board members who we seeking re-election were both successful. They are J. R. Cruz, who is Editor of the Transactions on Vehicular Technology, and Tom Rubinstein, who is VTS Webmaster and is also responsible for New Member Liaison and Conference Site Selection. All the Board members elected this year will serve until the end of 2002.

VTS Society Speaker Program

The VTS runs a Society Speaker Program open to any IEEE entity in need of a society speaker. The scheme is co-ordinated by Gaspar Messina (whose address is given on Page 2). To request a speaker, either contact him or the speaker directly. A subsidy for speaker travel/ accommodation expenses is available from Society. This requires advance approval. The following speakers are available.

Linda Sue Boehmer	Microprocessors in Rail
Clairton PA 15025	Transit Controls
Tel: (412) 653-1082	Computer Training
Fax: (412) 653-4602	Multi-Media Training

J. R. Cruz	
University of Oklahoma	Adaptive antenna arrays for
Norman OK 73019	CDMA systems
Tel: (405) 325-4280	Wireless communications
Fax: (405) 325-3836	and the Global Village

Al Gross	Radio communications historian
Chandler AZ 85248	and pioneer. Inventor of military
Tel: (602) 814-6387	radio in WW-II, and developer of
Fax: (602) 814-6987	personal wireless communication
	devices.

VTS News Questionnaire

Many thanks to all the members who have completed the VTS News Questionnaire which was included in the last issue. The closing date for return is the 15th of March 2000, and results will be included in the next issue. If you haven't completed it yet, you can fill it out on the web and save the cost of a stamp. Follow the link from the VTS News section of the VTS web site *http://www.vtsociety.org*.

CONVERGENCE Fellowship

The IEEE Vehicular Technology Society (VTS) has announced that the biannual competition for the CONVERGENCE Fellowship in Transportation Electronics is in progress. This fellowship, which has a stipend of $12,000, is provided by IEEE VTS and the CONVERGENCE Transportation Electronics Association.

The fellowship is for one year of full-time graduate studies in electrical or electronics engineering at an engineering school of recognized standing, located in the United States or Canada. Recipients are selected by a committee on the basis of the candidate's potential to contribute to the profession of electrical and/or electronics engineering, and with preference for studies involving transportation electronics.

To be eligible, the student must have received a bachelor's degree in electrical engineering from a university or college of recognized standing. Preference will be given to applicants about to begin their first year of graduate studies in electrical engineering.

Recipients of this fellowship may not hold or receive other fellowships for the same academic year. The fellowship may be supplemented with grants to cover tuition, fees, and other expenses, and assistantships, which are directly related to the graduate studies. Thus, recipients must pursue full-time graduate studies in electrical and/or electronics engineering, and evidence of satisfactory academic performance is required.

Although not a prerequisite, it would be helpful if test scores were provided by the Educational Testing Service for any applicant who has taken the Graduate Record Examinations. Scores should be addressed to me, at the address listed above. A certified transcript of academic performance is required.

Further information and application forms may be obtained at the IEEE Vehicular Technology website at *www.vtsociety.org*. You should click on "CONVERGENCE Fellowship in Transportation Electronics."

The completed application and letters of recommendation should reach Prof. Robert E. Fenton, whose address is given below, by March 15, 2000. The fellowship award will be made as soon thereafter as possible.

Prof. R. E. Fenton
Dept. of Electrical Engineering
The Ohio State University
2015 Neil Ave.
Columbus, OH 43210-1272
U.S.A.

VTS Awards

Ray Trott, Awards Chairman

On Tuesday, May 18, 1999, the Annual Awards Luncheon was held at VTC 99 in Houston, TX.

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 luncheon, the following awards were presented:

1998 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 Matthias Pätzold, Ulrich Killat, Frank Laue, & Yingchun Li, *"On the Statistical Properties of Deterministic Simulation Models for Mobile Fading Channels"*, February, 1998 VTS Transactions. The prize was a certificate and $125 for each of the authors.

VTS 1998 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 to V. Anand Sankaran, Daryl Sitar, M. Abul Masrur, *"Can an AC (Alternating Current) Electrical System Replace the Present DC System in the Automobile?"*, August, 1998 VTS Transactions. The prize was a certificate and $166.66 for each of the authors.

1998 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 Erik Dahlman, Per Beming, Jens Knutsson, Fredrik Ovesjö, Magnus Persson, & Christiaan Roobol, *"WCDMA – The Radio Interface for Future Multimedia Communications"*, November, 1998 VTS Transactions. The prize was a certificate and $83.33 for each of the authors.

1998 VTS Best Land Transportation Paper Award This is to recognize the best paper relating to Land Transportation published in the *Transactions on Vehicular Technology*.

The award was presented to Takeo Ishikawa, *"Development of a Road Traffic Simulator"*, August, 1998 VTS Transactions. The prize was a certificate and $500 for the author.

Outstanding Service Awards These awards are given to members to recognize outstanding service to the Society. Prizes for these awards were plaques.

Members of the VTC98 Committee – For outstanding performance in the planning and execution of the 49th VTC, l9-22 May 1998, Ottawa, Canada.

Linda Sue Boehmer – For outstanding long-term service and leadership to the Society.

Samuel A. Leslie – For outstanding long-term service and leadership to the Society.

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 1998 winner was for the second year in a row, the Tokyo VTS Chapter.

The Daniel A. Noble Fellowship Award This award is given to a student pursuing graduate-level study in Vehicular Technology with a preference to the field of Vehicular Communications. Along with a certificate, the awardee receives $7,500 which is funded partially by Motorola, Inc. and partially by VTS.

The 1999 Winner was Mr. Thomas P. Krauss who is pursuing a Ph.D. in Electrical Engineering at Purdue University.

The following award was presented at the Fall VTC 99 in Amsterdam.

Stuart Meyer Memorial Award This is an award to 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 Sven-Olof Öhrvik, Sweden, head of the consulting company, RAKONSULT.

Mr. Öhrvik was one of the leaders in the development of cellular radio in Europe. He was the head of Research at Ericsson Radio from 1963 to 1985, where he pioneered data communications over land mobile radio. He started research of digital cellular radio in the late 70's, more than a decade before the first digital cellular radio system (GSM) was implemented in 1991. He was a Professor at Lund University from 1986 to 1993.

He has served VTS very well. He was the Chairman of the Swedish Chapter from 1985 to 1987, the Director of Region 8 in the late 80's and was heavily involved in organizing Eurocon '88 and VTC 94 in Stockholm.

ITU Agreed Radio Interface Standards for 3G

The ITU has formally agreed five different radio interface standards for IMT-2000 harmonisation. At a meeting in Helsinki from 25 October to 5 November 1999, the ITU approved IMT-DS (Direct Spread), IMT-MC (Multi-Carrier), IMT-TC (Time Carrier), IMT-SC (Single Carrier) and IMT-FT (Frequency Time). IMT-DS is the new name for the Euro-Japanese W-CDMA UTRA FDD wideband CDMA air interface. IMT-MC is the American cdma2000 multi-carrier CDMA proposal. The two TDMA proposals are IMT-FT, which is the European DECT system, and IMT-SC, which is the UWC-136 EDGE proposal, which provides an upgrade path from DAMPS and GSM on a 200kHz carrier. IMT-TC combines the TD-SCDMA and UTRA TDD proposals. This CDMA hybrid is designed for unpaired spectrum, whereas IMT-FT can be used of either paired or unpaired spectrum. The other standards are designed for use on paired spectrum.

In a related development, the ITU also agreed on 10 December 1999 six sets of specifications for network aspects of IMT-2000. The race is on to get the network specifications in place by the end of 2000 to allow services to start in 2001. To achieve this goal, the initial standard development work needed to evolve from second generation to third generation networks for each of the two major core networks will be carried out by the Third Generation Partnership Projects – 3GPP for evolved MAP (GSM) and 3GPP2 for evolved ANSI-41. The ITU will focus its work on the required interfaces between the two systems to provide seamless operation for users. Also envisaged are core networks based on IP.

Project 25 approves TETRA Standard for Private Mobile Radio in the US

Project 25 has approved the TETRA standard, supported by the European Telecommunications Standards Institute (ETSI) and the TETRA Memorandum of Understanding (MoU), as a phase 2 option for future applications in the Public Safety Domain in the United States.

TETRA (Terrestrial Trunked Radio) is the ETSI standard for a new generation of digital land mobile radio communications designed to meet the demands of Professional Mobile Radio (PMR) and Public Access Mobile Radio (PAMR) users. It is a TDMA (Time Division Multiple Access) technology with four user channels on one 25kHz radio carrier.

Project 25 is a voluntary standards effort that is supported by the Federal Law Enforcement Wireless Users Group (FLEWUG), the National Communications System (NCS), the Department of Defense's National Security Agency (NSA), APCO (Association of Public Safety Communications Officials), the National Association of State Telecommunications Directors (NASTD) and numerous other city, county, state and federal agencies. Phase 1 equipment is currently available using FDMA on 12.5kHz carriers using C4FM. A Phase 2 approach using FDMA with π/4-DQPSK modulation on 6.25kHz carriers was proposed originally, but TETRA already provides a system with 6.25kHz per speech user. Acceptance of these technology proposals meets the Project 25 Steering Committee's requirement for complete compliance with its Phase 1 Common-Air Interface (CAI) and Vocoder standards.

Project 25 Director, Craig Jorgensen, said "Brian Oliver, ETSI's Project TETRA Chairman, and I began our discussion on how to improve interoperability between the world's two most accepted public safety, two-way radio standards in 1996. Today's acceptance of a TETRA proposal is just the tip of the iceberg of what we and our partners and peers in the European Union expect in the future."

2nd TETRA World Congress Takes Place in Amsterdam

More than 550 delegates attended the 2nd TETRA World Congress held in Amsterdam from 15–18 November 1999. The keynote address was given by Karl Heinz Rosenbrock, ETSI Director General. He expressed his satisfaction in seeing another ETSI standard – this time for Professional Mobile Radio Networks (PMR) and Public Access Radio (PAMR) – becoming a commercial success.

In his closing remarks, Phil Godfrey, TETRA MoU Chairman said "With contracts of over 1.5 Billion Euros being placed for TETRA communication solutions around the world, the market is clearly demonstrating its acceptance of TETRA as a world-wide standard. This global interest in TETRA is reflected in the mix of delegates from all continents, representing Users, Manufacturers and Regulators".

Amongst other speakers, Hans Borgonjen of the Dutch Home Office ITO gave an update, both on the C2000, the nationwide TETRA project for Public Safety Communications in the Netherlands, and the steps taken by the Police Co-operation Working Group in relation to TETRA and the pan-European system for the police. Mark Riley of Dolphin Telecommunications Ltd. gave an update on the successful start in rolling out their pan-European PAMR TETRA systems in the UK under the name ExpressNet.

An Outstanding Contribution to TETRA award was presented by Professor Ole Lauridsen, Honorary President of the TETRA MoU, to Ranko Pinter from Simoco.

IMT-2000 - Just hold on a minute!

John Bush
University of Strathclyde

Recently the ITU has agreed to work towards five standards of third generation mobile communications – the IMT-2000 'family'. These standards are to be the vehicle for a vision of *'seamless global roaming'* and data rates in the region of 2Mb/s. This is all very noble, but just how feasible is this ideal? Who has considered the social, political or economical factors?

The one fact that distinguishes the mobile communications field from fixed networks is that there is a limited resource – radio spectrum – available for use. From this perspective, third generation mobile is a great idea: greater capacity for the network operators to cram in more subscribers. This is certainly proving to be the case in Japan. The driving force here has been the large population density has really put a squeeze on the capacity of existing 2nd generation networks. Japan *needs* 3rd generation systems to facilitate demand for voice, let alone data. In the USA and Europe, while new spectrum allocations and better use of existing spectrum is always a good thing, the current motivation is the promise of email and the Internet through mobile stations.

The Internet through mobile stations. This needs some careful thought. Bill Gates apparently sees this dream extending to personal handheld devices, projection headsets and all manner of uses. All very novel, but all of this will cost money to the consumer.

The current UK mobile market is very vibrant and does have some cheap deals to the consumer. Promises that a mobile will be cheaper to run than a fixed line are rife. However, much of this is to build market share; whether prices will stay this way without regulatory intervention is another question. After brand names and market shares have been established the operators will be looking for a profit. The high prices per customer being paid in recent mobile operator takeovers bear this out. Data calls require more resources than voice calls; in a capacity constrained system there is little incentive for operators to sell data calls for less than the cost of voice calls they could otherwise support on that resource.

To put this in perspective: will consumers use the 'mobile Internet,' or use a fixed line connection in the comfort of their own home to peruse the world wide web at their leisure at a fraction of the price?

Common sense suggests that 'Surfing the Net' will not be done while the subscriber is walking. This limits the alleged use of such large data rates to people standing about or in vehicles. As Alan Sugar, boss of Amstrad, asked (Electronics Weekly, November 1999), 'How many people want to use email in the middle of a field?' When subscribers are moving in their cars or on a train they will not be getting 2Mb/s data rates – something around 144kb/s will be closer to the figure. All that glitters in the ITU proposals is not gold.

While this puts the data rate of 3rd generation systems under scrutiny, the other main objective for IMT-2000 is global roaming. To seriously consider this prospect is to take account of competitive regulation, spectrum allocation, competition from previous 2nd generation operators, new infrastructure costs, production and roll-out of new terminals (that the consumer has to obtain in preference to their current phone)...the list of variables is *very* long and will change between countries.

Conclusion eight from ERC report 60 – on global circulation of terminals – stated that *"single global conformity … appears unrealistic at this time"*. 3rd generation systems **will** arrive, but they will come from evolution. Global roaming will not be the great selling point to the consumer – there must be a tiny proportion of mobile users who actually roam all over the globe! Most consumers will want cheap voice (maybe data as well). It will be down to bodies such as the ITU to encourage harmonisation within their IMT-2000 family.

The problem with this is that the ITU has limited say when spectrum is auctioned off to companies, and while there is a reasonable correspondence of 3rd generation allocations outside North America, the multiplicity of systems would suggest at very least a dual mode phone will be needed. Is it such a jump to have a phone that can understand a number of 3rd generation techniques? This would reduce the need for harmonisation and allow cheaper infrastructures that are compatible with previous networks.

From a technical standpoint, 3rd generation systems are coming and will work – although exactly what systems and where are questions that cannot be definitively answered. This is not to decry the need for 3rd generation systems. It is simply to put some focus into the rose-coloured press releases and pledges by the champions of UMTS et al.

Comments on the issues raised in this article would be most welcome. They should be addressed to the Editor at the address on Page 2.

8th October 1999 VTS Board of Governors Meeting Report

Previous practice has been to include the Board of Governors' meeting minutes in the VTS News. However, since the minutes need to be officially approved at the following meeting, there is a long lead time before publication. Also, the minutes can sometimes be very cryptic without their attached papers, which cannot be included in the VTS News due to their size. Therefore it was decided to replace the minutes with a Meeting Report from the October meeting. The report should not be taken a being a full record of the meeting – for this you will have to consult the minutes which will continue to be available on the web site after they have been approved. However, the report will include the main points discussed and the decisions taken.

A meeting of the VTS Board of Governors' took place in Boston on the 8th of October. Present at the meeting were

Kent Johnson, VTS President, who was in the Chair, along with Board of Governor members Dennis Bodson, J. R. Cruz, Bob Fenton, Bob French, Mel Lewis, Bob Mazzola, Tom Rubinstein, Eric Schimmel, Essam Sourour and Ray Trott. James Irvine (Editor of VTS News) and Stu Lipoff (Chair of VTC2000-Fall) were also present.

After approval of the agenda and the minutes of the last meeting, Kent Johnson, President, made his report. He began by covering initiatives from IEEE headquarters that have been topics of considerable interest at recent TAB meetings. A new financial model has been proposed by headquarters and modified as a result of suggestions from TAB. A trial run is scheduled for the 2000 budgets. Branding has also been discussed within TAB. It is still very controversial with most members of TAB having strong feelings that the current IEEE symbol (the kite) should be maintained as is. Kent Johnson also noted the presentation of the Stewart Meyer award to Sven-Olof Öhrvik at VTC'99-Fall in Amsterdam. The presentation was made by Jan Uddenfeldt who did an excellent job. Also reported was the work that had been done to close out several conferences at headquarters. Jim Worsham has been very helpful in that process and the President expressed his appreciation for Jim's work. Nominations for the IEEE millennium medals were discussed, and it was agreed that a small committee would generate a list of candidates to submit to headquarters.

Mel Lewis gave his report as VTS Conference Coordinator. The books of VTC'98 have been closed with a surplus. VTC'99-Spring had a good turnout and technical programme. The conference made a surplus but it is not yet clear what the amount is, and final accounts are awaited. VTC'99-Fall attracted about 950 registrations to a well organised conference held jointly with WPMC. The social programme was more involved than usual for VTC, but it was explained that this is normal for a European conference, and anything less would be noticed in this context.

Turning to future conferences, planning for VTC2000-Spring is well underway. 810 papers were submitted, with a very similar breakdown of originating country to VTC'99-Fall. The conference had been planned on the assumption that attendance would split between the conferences, whereas in fact the combined attendance between both conferences had risen to the order of 2000. Additional hotel accommodation is being investigated. 440 papers can be accepted, and questions were raised as to whether this would lead to the rejection of high quality papers. While it was suggested that an increased rejection rate may not be a problem, the prevailing view amongst those of the Board who had just completed reviews for the conference was that the standard of submission was high, and that quality was not being diluted. The Organising Committee will be asked if there is any scope to increase the number of papers presented, but given the time to the conference, this may not be possible.

VTC'01-Spring is being organised in Israel. The Israel chapter chair, Reuven Meidan, is also general chair of the conference. They are currently negotiating proposals from two conference companies. The venue will be the David Intercontinental Hotel, on the beach between Tel Aviv and Jaffa, which is the largest hotel meeting space in Israel.

The organising committee for VTC'01-Fall has signed a contract with the Sheraton in Atlantic City. The main organising positions have been filled.

The proposal for VTC'02-Spring for San Diego has been dropped. Another option, Guadalajara, is being pursued but a detailed proposal has not been submitted so this may have to be dropped as well.

A budget for VTC'02-Fall (Vancouver) is still awaited following the proposal agreed at the May Board meeting. However, an outline budget for VTC'03-Spring (Korea) has been received for the chair, Prof Jae Hong Lee. Two hotels have been identified as possible venues, and quotations will be sought.

Looking longer term, Los Angles is being thought of for Fall 2003, with Oceania for Spring 2004.

Stu Lipoff, General Chair of VTC2000-Fall, gave a comprehensive presentation on plans for the conference, before a tour of the conference facilities in the hotel. Seven parallel tracks are proposed. The conference programme will accommodate a roughly similar number of papers to the Toyko conference, which re-opened the discussion on paper selection. J. R. Cruz argued that papers should be selected on merit, and the number in the conference adjusted to suit, rather than the other way round. There is some scope for increasing the number of papers by dividing the meeting rooms to provide further tracks, although there is a practical limit to this. Extending the conference was considered but it was felt that many people would then leave before the end. The problem of people submitting papers and registering, but then not attending to present them was raised. This removes space in the programme for other papers which could have been presented. Some conferences record this and blacklist presenters, while others have 'stand-by' presentations to fill gaps, but it was felt the latter would create a two-tier system, while the problem was not significant enough at present to consider the first option.

The proceedings will mainly be on CDROM. It was first suggested that no printed proceedings be produced, but 450 printed copies must be produced for the book broker programme. Some additional copies can be printed for sale. To supplement the CDROM for use at the conference, Stu Lipoff proposed a digest with abstracts, an idea which was widely welcomed. These abstracts will be given with the paper as part of the submission process, which will be completely electronic.

The meeting turned to the weighty issue of conference lunches. The award luncheon will be sit-down, but to keep the registration fee down the other lunches could be unbundled or for speed and cost-effectiveness, packed lunches could be provided.

The next agenda item was the VTS News. A new editor, Dr James Irvine, has been appointed, and proofs of the first issue since this appointment were distributed. James Irvine gave a short presentation on plans for future issues, and proposals for increased coverage of the Society's activities. It was agreed that a page count of about 24 pages per issue should be aimed for.

On some housekeeping matters, it was agreed that minutes should be circulated quickly to allow for them to be more widely published. However, as part of this discussion, it was agreed that it would be better to present a meeting report in the VTS News rather than a set of minutes since this can be produced immediately after the meeting without waiting for approval at the following meeting.

The last main item on the agenda was reports from individual Board members. **Harvey Glickenstein, VP Land Transportation** was not present at the meeting but circulated a written report on his work on Land Transportation. At the recent ITS workshop in Washington (reported in the VTS News in November 1999) a need was identified for a standards group to develop standards for the rail-highway grade crossing situation.

Dennis Bodson, Standards Committee Chairman, reported on standards work within the VTS. He had attended two IEEE-SA Standards Board meetings since the last Board Meeting. In the VT area, two standards on Communication Based Train Control, and one on Rail Transit Vehicles, were approved at these meetings. Dennis Bodson

noted that some VT standards had been mistakenly logged in the catalogue as ITS standards – this has now been corrected. It has also been suggested that VT standards be made available in a single package. The IEEE has agreed to this, but also wishes the same to be done for ITS standards. These will be made available either as separate VT or ITS bundles, or as a combined VT/ITS package.

The IEEE Industry Standards and Technology Organization (IEEE-ISTO) has requested that the VTS takes note of the publication of IEEE-ISTO 5001, 1999, and recognizes it as a significant contribution to the automotive industry. In addition, IEEE-ISTO, has requested that the VTS, if asked, would be willing to act as the sponsor for this standard through the IEEE-SA standards process. This was approved by the Board of Governors.

J. R. Cruz, Executive Vice President and Editor of Transactions on Vehicular Technology, reported that IEEE Transactions on Vehicular Technology had now joined Opera. Currently, issues back to 1996 are archived, but this would be extended back to 1988 by the end of the year. Staff of the Transactions are being re-organised to improve response time on paper submissions.

J. R. Cruz had also investigated the possibility of making all issues of the Transactions back to their beginning in 1952 available as a set of CDs. There are two issues: the first being the cost and the second being the fact that a complete set of transactions would be required to make the electronic master, and that this copy would be destroyed in the process. Depending on the number of CDs ordered, costs would be in the region of 50 to 100 thousand dollars. There was some doubt expressed as to the worth of such a set to members, since vehicular technology articles had a shorter shelf life than those of, for example, information theory, whose society had produced such an archive. Important early VT papers have been reprinted and so are available. It was agreed to try to assess member interest through an article in VTS News before taking any decision. An article on the inclusion of the Transactions in Opera was also agreed.

Bob Fenton, reported on the convergence scholarship. The application forms for this will be placed on the VTS web site.

Bob French, ITS Coordinator, reported on the formation of the ITS Council, which the VTS was instrumental in creating. Its first meeting had been held in Boston in June. It publishes an electronic newsletter, and the editor also writes a column in Electronics Systems magazine on ITS. Bob French was invited to write an overview for the first issue and will update this for an article in VTS News.

Mel Lewis, having reported on his conference responsibilities earlier in the meeting, discussed the VTS-sponsored distance learning course. Progress on the course has paused awaiting conversion of the first draft of the course, which has received favourable reports from reviewers, to HTML. The groundwork undertaken by the VTS was therefore not being used by the Society, although other IEEE societies were making use of it and were likely to have their courses in place more quickly. Mel Lewis will discuss the conversion of the course to HTML with the course author.

Bob Mazzola, Vice President Motor Vehicles and Convergence Conference Committee Representative, is preparing an article for VTS News on convergence. He suggested that it was time for another member survey, since the last one had been done many years ago but had formed an important role in strategic planning. The May issue of VTS News could provide a vehicle. This will be decided at the upcoming December meeting. The theme of that meeting will be the future identity of the VTS.

Tom Rubinstein, Webmaster and New Member Liaison, reported that he had sent follow up emails to the 1035 new members who received the welcome letter. He'd received 35 responses varying from 'thanks' to detailed suggestions for the Society.

Tom Rubinstein also reported that the web site had a new domain name, *www.vtociety.org*, although subdirectories cannot be directly accessed using this address although the redirection vendor had promised that they would. He proposed implementing a previous decision to make VTS News available online. Discussion ensued about making such access public, as limiting access to VTS members would be difficult to arrange. It was agreed to publish the table of contents and abstracts on-line with open access.

Finally, he reported that he had received a request for a chat room on VTS matters. An issue here is security. He will raise the matter at an upcoming IEEE Webmaster's meeting and report back.

Eric Schimmel, Vice President Mobile Radio, reported that there were seven candidates for the five Board places. Three existing Board members, Jyun-Cheng Chen, William C. Y. Lee and Eric Schimmel himself, were not standing for re-election. Tom Rubinstein and J. R. Cruz were standing for re-election, along with John Gilsenan (US State Department), Anil Kripalani (Qualcomm), James Worsham (Bell South), Sabah Towaij (Industry Canada) and Asrar Sheikh (Hong Kong Polytechnic). Ballots would be posted to members on the 25th of October for return by the 6th of December. The results would be avail-

From left to right: Raymond Trott, J. R. Cruz, Robert Fenton, Dennis Bodson, Robert French, Eric Schimmel, Kent Johnson, Essam Sourour, Tom Rubenstein, Robert Mazzola, and Stuart Lipoff

able by the 10th of December. Eric Schimmel also reported on recent work by ITU on VTS related activities, and on the work of the IEEE Committee on Communications and Information Policy, which has focussed on creating a workshop on "US Telecommunications Infrastructure Over the Next Decade". Within ITU, work is beginning on contributions to the next Working Party 8A meeting at the end of February next year. EC is the Convenor of the US delegation t WP8A. New areas of interest are topics such as Wireless Local Loop and Local Area Networks. Internet over Wireless. Adaptive Antennas and Software Defined Radios, and Fourth Generation Wireless.

Ray Trott, Awards Committee Chairman, reported that nominations were being sought for awards for 2000. He will circulate the Board. Award recipients can chose to receive their awards at either the Tokyo or Boston conferences.

A report was also received from David Michelson, VT-S Propagation Committee chair. He has submitted a report on the VT-S Propagation Committee to the VTS News. A proposal to lend the Society's technical sponsorship to propagation tutorials at upcoming VT conferences was approved.

Since there will be an election for the Board of Governors, another meeting is required in 1999. This will be held in Atlanta on the 13th of December 1999.

Minutes of the 18th May 1999 VTS Board of Governors Meeting

By Essam Sourour, Secretary

1- Call to Order
The IEEE VTS Board of Governors (BOG) met on Tuesday, 5/18/1999 in Houston, Texas, during the VTC 99 Spring conference. President Kent Johnson called the meeting to order at 8:30 AM.

2- Roll Call
The following BOG members attended the meeting:

Name	IEEE/VTS function
1-Dennis Bodson*	Vice President mobile radio, chairman of the standards committee
2-Eric Schimmel*	VTS past president, Vice President for communications, CCIP and ITU representative
3-Essam Sourour	VTS secretary
4-George McClure*	Conference Committee Chair, Public Relations
5-J.C. Chen*	PCS Committee chair
6-Jae H. Lee	VTS Korea Chapter Chair
7-Kent Johnson*	VTS President
8-Linda Sue Boehmer	VTS Past President, Standards Committee Vice Chair
9-Masayoshi Aoki	VTS Tokyo Chapter Chair
10-Melvin Lewis*	National Conference Coordinator, North Jersey chapter chairperson
11-Mitsutoshi Hatori	VTC-2000 Spring General Chair
12-Raymond Trott*	Awards committee chairman
13-Robert Fenton*	Convergence fellowship, Convergence conference committee
14-Robert French*	ITS coordinator and IEEE VTS council representative
15-Robert L. Gottschalk	VTS ITS Committee Chair
16-Robert Mazzola*	VP-motor vehicles, convergence conference representative
17-Tad Matsumoto	VTS Tokyo chapter secretary
18-Tom Rubinstein*	VTS Webmaster
19-W. C. Lee*	VTS Transnational Committee Chair

* Elected BOG member.

Twelve elected board members were present at the meeting, which constitutes quorum. In addition to the above-mentioned names, other people attended for short times to make presentations on their respective matters, as mentioned below.

3- Distribution of Documents
Documents and reports were distributed before the meeting and as the meeting progressed.

4- Adoption of Meeting Agenda
President K. Johnson presented the meeting agenda (attachment Pages 1-2). The agenda was approved unanimously.

5- Approval of Minutes of 27 Feb 1999 Meeting
The minutes of the BOG meeting of 27 Feb 1999 were approved with some editorial corrections. G. McClure moved to approve the minutes. D. Bodson seconded the motion and the motion was approved.

6- Treasurer's Report
C. Backof submitted a written report (attachment page 56).

7- President's Report
K. Johnson reported that the IEEE USA requested a VTS representative to be a contact person. He must be a new graduate, with less than 10 years after graduation. G. McClure suggested one of the VTC 99, Spring, awards recipients.

K. Johnson reported about the new IEEE financial model. The initial IEEE financial model proposal was rejected in TAB. TAB formed a committee to come up with a new proposal to IEEE. Consequently, the IEEE brought up new modifications that were mostly approved by TAB. A test case on the year 2000 budget will be run. The impact on VTS society will be clear in the June TAB meeting.

8- Status: Stuart Meyer Award Nomination
The award will be presented in VTC 99, Fall, Amsterdam.

9- Report on Visit to Tokyo: Mel Lewis
See attachments, page 48.

10- Report From Dr. Hatori On Plans For Tokyo VTC 2000, Spring

Prof. Mitsutoshi Hatori made a presentation about the preparation for VTC 2000 Spring, in Tokyo (attachments pages 4-26). He presented the different committees and their activities. A contract is signed with Hotel Pacific on January 7, 1999. The room rate is $150-$210. The conference itself will be in Japan Convention Center. The registration fee is 60,000 to 69,000 yen. The 2nd call for papers is sent out and a website is setup. The budget does not show a surplus but Dr. Matsumoto noted that they expect surplus when they collect donations for the conference.

K. Johnson commended the Tokyo VTC Committee for their wonderful job.

11- Proposal for Victoria Conference: Vijay Bhargava

Prof. Vijay Bhargava, from the University of Victoria, British Columbia, Canada, made a presentation proposing to host the Fall VTC 2002 (attachments pages 36-42). Prof. Bhargava demonstrated the extensive experience in IEEE conference organization. He talked about the city and the potential for a good conference there.

M. Lewis requested an official proposal with a draft budget for the BOG to vote on. Prof. Bhargava promised to provide it.

On answering questions from the BOG, Prof. Bhargava noted that they would not use an outside company for conference registration. He also noted that he was aware of the IEEE VTS surplus distribution policy. They do not have a VTS chapter at this time.

G. McClure moved to accept the proposal, Robert Mazzola seconded, and the proposal was approved unanimously.

12- Conferences and Meetings

R. Trott noted that the VTC Fall conferences are getting closer in date to the PCS trade shows. He expressed concern about the possible schedule conflicts.

W.C. Lee expressed his concern about the name of the VTC conference. He noted that the name does not imply wireless communication, which makes it difficult to attract support from wireless communication industry. After some discussions among the BOG members about the VTC name, M. Lewis suggested adding an extra slogan to it. K. Johnson suggested that BOG members send suggestions to M. Lewis.

M. Lewis presented a written report (attachment pages 47-50). In addition, T. Rubinstein submitted a Conference Site Selection Report (attachments page 54-55).

VTC 98 (Ottawa)

M. Lewis reported that VTC 98 surplus is US $243k. The final audited report is completed.

VTC '99 Spring (Houston):

Conference chairman, Kumar Krishen, reported that more than 820 papers were submitted for the conference and 540 papers were accepted. There are 11 tutorial sessions, which were very popular. There are about 200 students out of 750 attendees. Student registration was only $50.

He pointed out that the name of the society and the conference (Vehicular Technology) caused some confusion at the beginning. The organizing committee thought that the conference is only about transportation and not communications. However, the misunderstanding was fixed later.

He also pointed out that the Houston IEEE section was not sufficiently cooperating with him. The Galveston Bay section showed better cooperation. Eventually he got an advance of $10k from the Houston section and $5k from the Galveston bay section. He also received $10k and 4 dedicated employees as a support from Southwestern Bell. NASA space center bought 25 registrations but only 2 attended the conference due to the confusion about the name of the conference (i.e., being Vehicular Technology rather than wireless communications). He expects the conference will make a surplus, but he was not sure how much.

He recommends that all future VTC conference announcements and program distribution must be electronic to reduce cost.

He noted that, because of the Internet, the need for conferences is less than before. Therefore, he recommends that new ways for conference advertising must be considered to convince people about the importance of conferences and personal contacts.

J.C. Chen noted that the conference proceedings arrived late. Kumar noted that this was a problem from the IEEE conference services. He also noted that he had other problems with the IEEE conference services.

At the end, President K. Johnson expressed the appreciation of the BOG for all the work that K. Krishen and the VTC'99, Spring, organization committee have done.

VTC '99 Fall (Amsterdam)

Prof. R. Prasad made a presentation about the preparation for the VTC 99, Fall, in Amsterdam. He reported that the Advance program was already mailed out. He noted that the seed money provided by VTS was not received yet. T. Rubinstein will contact IEEE and resolve the problem. They received 895 papers and accepted 423 papers for oral presentation and 228 for poster presentations. There are 15 tutorial sessions. He also reported that the WPMC 99 conference will be held in conjunction with VTC 99, Fall. He clarified that the budgets of the two conferences are completely separated. He received considerable support from the industry. An award luncheon will be held on Tuesday 9/21. In addition to the VTS awards there are some other local awards. On answering concerns from BOG members about student and IEEE life-member registration fees, he noted that reduced registration fees would be available for them. An author registration will be required for any paper to be published in the conference proceedings.

VTC '00 Spring (Tokyo)

See agenda item number 10.

VTC '00 Fall (Boston):

M. Lewis reported that work has started. They have a technical program chair and they started staffing different committees.

VTC 01 Spring (Israel):

M. Lewis reported that they are moving forward in their plans. They will sign a hotel contract soon. They are requesting VTS to offer them a "no liability" if they incur losses. This was accepted by the BOG. The surplus distribution will be 25% (Local chapter) to 75% (VTS).

VTC 01 Fall (North Jersey)

M. Lewis reported that they are currently selecting a hotel. They are looking for Atlantic City as a possible location. They will use IEEE conference services for registration. They received the VTS seed money.

VTC 02 Spring (San Diego):

M. Lewis reported that San Diego is not a conference location for VTC 02 any more, due to lack of interest from local section.

VTC 02 Fall (Victoria proposal):

See item number 11 in the agenda.

VTC 03 Spring (Korea)

No news since last BOG meeting.

Past Due Financial Reports:
VNIS 94:

IEEE headquarter is still waiting for the audited report. J. Worsham is helping resolving this problem. K. Johnson noted that the BOG should request a report from J. Worsham. M. Lewis will invite him to next BOG meeting. R. French noted that he sent the necessary information and forms to perform the audit to the conference chairman, Prof. Takaba.

13- Publications Committee Reports

(a) VT Transactions:

J.R. Cruz (was not present) submitted a report (attachments page 65). He recommended increasing the page budget for the VT Transactions to 2500 pages for the year 2000. G. McClure moved to approve 2500 pages as a page-budget for the year 2000. D. Bodson seconded the motion and the motion was approved.

(b) VTS Newsletter

The BOG members expressed their dissatisfaction of the current situation of the newsletter. The newsletter is not issued on time. K. Johnson solicited recommendations from BOG members. G. McClure and D. Bodson volunteered to contact and help G. Stone and J. Furie to get the May issue out. They will also try to find a permanent solution for the problem. They will also check if there is need to hire a part time person to do it. D. Bodson requested the board to authorize K. Johnson to take decisions before the next BOG meeting if needed.

14- Electronic Communications

Webmaster report

T. Rubinstein submitted a webmaster report (attachments page 53). He reported that the IEEE has changed the VTS domain name. He noted that this might happen again in the future, which causes confusion to VTS members. He recommended that the VTS should obtain its own domain name. The cost is about $120 in the first year, $30 the second year and $65 per year after that. The VTS BOG approved T. Rubinstein's proposal and authorized him to obtain a domain name and up to 4 sub-domain names.

15- Other Committee Reports

Education Committee:

M. Lewis reported that Stevens Institute of Technology completed phase 1 of the Web Based Vehicular Technology Distance Learning, for which they were paid $10k (attachments, pages 49-50). They were expecting an additional $10k from the IEEE EAD for the second phase. However, the IEEE EAD made a change in their plans and did not want to continue with Stevens Institute. They want the course to be an IEEE course, not a Stevens Institute course. In addition, they do not want to stick to one university. Pat Morreale, from Stevens Institute, submitted a proposal to EAD (attachment pages 51-52) with an 8 hours course, to be a course offered by her, not Stevens Institute. Peter Wiesner from IEEE EAD was not satisfied with the course description and questioned Pat Morreale dedication to prepare it appropriately.

L. Boehmer noted that $10k should be enough to produce a prototype not just a course layout. M. Lewis requested the BOG members to review the work already done and provide him with feedback (www.ati.stevens-tech.edu/~skalra/IEEE/sitIEEE.htm. The BOG discussed the past agreement with Stevens Institute and the future possibilities. The BOG members expressed their dissatisfaction with the IEEE EAD change of decisions and breaking the agreement regarding this course. G. McClure proposed that the BOG members look at the website and decide whether to continue supporting the course as a VTS project. After considerable discussions, the sense of the board was to review the material on Pat Morreale's website and provide comments to M. Lewis.

Rail Transit Interface:

A report is submitted by Tom McGean (attachment pages 43-44). L. Boehmer reported that four Railroad standards will be completed by the end of the summer. Work on these standards is progressing very well.

Awards Committee:

R. Trott presented a report listing the awards to be presented in VTC 99, Spring (same day of the BOG meeting) (attachments page 3).

ITS Committee:

R. Gottschalk presented a report on the ITS Committee activities (attachments pages 27-35). He noted that, since he is the chairman of IEEE SCC32 and the VTS ITS Committees, he could combine the effort. With the approval of the ITS council, he also chairs the ITS Council standards committee. They have a teleconference every month and one annual meeting. He was given the directions from IEEE to bring all ITS standards under IEEE SCC32 sponsorship. The IEEE took the position that any project that is federally funded should stay under SCC32, not IEEE. Therefore, SCC32 will provide all standards development for the ITS Council. He had problems convincing many people with this position, and he requested support from the VTS BOG.

He reported that they have a very informative website and he requested a link from the VTS WebPages to the ITS WebPages. He also asked if the VTS could provide publication space in its newsletter. In addition, he requested if the SCC32 to meet during the VTC conference and may be having a panel discussion. His requests were all welcomed by all BOG members. He also requested help to find volunteers for working group chairs. He requested a Liaison from the VTS BOG since there is a lot of wireless communication work within the ITS Council. He reported that the ITS Council has no funds and has problem with expenses.

M. Lewis offered to help in finding volunteers to work with R. Gottschalk. D. Bodson offered to be in contact with R. Gottschalk to provide. E. Schimmel noted that the BOG should establish a working group to work in the ITS and SCC32 standards activities.

ITS Council (www.ieee.org/its):

R. French reported that there were no meeting in the ITS council since last VTS BOG meeting. The next meeting is in June 1999. The ITS council issued 2 newsletters, which are available in the website. He noted that the VTS representatives in the ITS council need the sense of the board about the issue of distributing the ITS meeting minutes, since they are not open at this time. R. French thought that the meetings minutes of the council should be open. After some discussions, the sense of the board was that the minutes should be open.

Propagation Committee:

K. Johnson reported that, in a follow up for last VTS BOG meeting, he received a letter from D. Michelson (attachment pages 45-46) proposing to re-activate the VTS propagation committee and offered to be the chair of the committee. K. Johnson requested comments from the BOG. The BOG agreed with the proposal. G. McClure moved to accept it without financial any obligations at this time. T. Rubinstein seconded the motion and the motion was accepted. K. Johnson will contact D. Michelson and inform him about the BOG decision.

Strategic Planning:

G. McClure referred to the VTS strategic plan and reviewed some of the items that need to be worked on. Some of the items that he identified are improving VTS newsletter, increasing the VTC frequency to twice a year, increasing VTS chapters support, supporting the distinguished speakers program and publishing a list of action items after each BOG meeting.

Membership Committee:

T. Rubinstein prepared a letter to be sent to every new member to the VTS (attachment pages 57-58). The letter welcomes the new member and tells him/her about the society. T. Rubinstein also noted that he will follow up this letter by an email after 6 months.

Standards Committee:

D. Bodson submitted a report (attachments pages 63-64). He noted that in his reports he will try to talk about the various standards of interest to VTS members. He will also update the Standards section of the VTS website and put the appropriate links. In addition, he will put standards related information the in a special section in the VTS newsletter.

Chapter Committee:

G. Messina submitted a written report (attachments pages 59-62).

Nomination Committee:

E. Schimmel noted that he is preparing the roster for upcoming BOG election and he requested nominations. M. Lewis recommended J. Worsham.

16- Other Business:

None.

17- Next Meeting:

Next meeting is on October 2, 1999, in the Seaport Hotel, Boston.

18- Adjournment

G. McClure moved to adjourn and R. Mazzola seconded. The motion was passed and the meeting was adjourned at 4:30 PM

Respectively Submitted
Essam Sourour, Secretary

CONVERGENCE 2000

International Congress on Transportation Electronics

Convergence 2000 will be held October 16-18, 2000 at the Hyatt Regency Hotel in Dearborn, Michigan. For over twenty-five years the Convergence Transportation Electronics Association (CTEA) has sponsored this premier automotive electronics conference. The IEEE Vehicular Technology Society continues to be a technical co-sponsor for this conference along with several other industry organizations. This conference has consistently brought together the leading technologists, engineers and executives from around the world.

The theme for Convergence 2000 is "Automotive Electronics: Delivering Technology's Promise". Conference Chairman J. T. Battenberg III, Chairman, CEO and President of Delphi Automotive Systems, promises a thought-provoking global forum with over 100 technical exhibits and 12 sessions containing 70 technical papers. Over 5000 attendees are expected. Always one of the conference highlights is the industry reception and banquet and the featured speaker will be William Ford, Jr., Chairman of the Board, Ford Motor Company.

For further Convergence 2000 details including technical session descriptions and registration information, visit the website at *www.convergence2000.org* or contact Ms. Denny Freitag at Delphi Automotive in the USA at 248-813-3085. Hotel reservations may be made by contacting the Hyatt Regency - Dearborn at 800-233-1234 or 313-593-1234.

The Convergence Transportation Electronics Fellowship Award will also be presented at Convergence 2000 by the IEEE Vehicular Technology Society. For further details please see the article on page 17.

Call for Papers

IV 2000
IEEE Intelligent Vehicles Symposium
The Ritz-Carlton Hotel, Dearborn, MI, USA
October 1-3, 2000

The IEEE Intelligent Transportation System Council (ITSC) is sponsoring a professional-level conference on basic research and present and future application for Intelligent Vehicles. Papers dealing with vehicle-centered intelligent systems are solicited.

This symposium is characterized by a single session format so that all the attendees remain in a single room for multilateral communications in an informal atmosphere. As another tradition, the meetings have enthusiastic participation from industry, as well as research centers and universities.

Program Topics: Driver Assistance Systems, System Architectures, Sensors, Navigation/Guidance Systems, Imaging and Vision Enhancement Vehicle Control, Information Systems, Human-machine Interfaces, Active Safety, Traffic Monitoring and Control Communications and Networks, CAN.

Paper Submission: Prospective authors are invited to submit a paper in electronic (Postscript) form by FTP at: *ftp://ftp.ce.unipr.it/iv2000* by **March 1, 2000** for peer review. Submitted papers must be no longer that six pages in IEEE two-column format, including figures and references. Papers exceeding this length limit may be rejected without review. The first page should include (1) the title of the paper, (2) the names of the authors, (3) the technical categories, and (4) the name, mailing address, telephone and fax number, and e-mail address of the contact author.

Paper submission should be followed by an e-mail to Alessandra Fascioli at fascal@ce.unipr.it specifying (1) authors' complete affiliation; (2) contact author's postal address, phone and fax numbers, and e-mail address; (3) title and topic of the paper and up to 5 keywords, and (4) name and length of the file uploaded to ftp.ce.unipr.it.

Papers will be reviewed for technical content, originality, completeness and clarity.

Deadlines:

Papers due for peer review	**March 1, 2000**
Notification of acceptance	**May 1, 2000**
Camera-ready copy for proceedings due	**July 1, 2000**

Please refer frequently to the following websites for the most up-to-date information or contact the General Chair (Jim Rillings, jrilling@notes.gmr.com), the Program Chair (Alberto Broggi, broggi@ce.unipr.it), or see the IV-2000 Home Page at *http://www.ce.unipr.it/iv2000*

ITSC-2000
3rd Annual IEEE Conference on Intelligent Transportation Systems
The Ritz-Carlton Hotel, Dearborn, MI, USA
October 4-5, 2000

The IEEE Intelligent Transportation Systems Council (ITSC) is sponsoring a professional-level conference on basic research and on the applications of leading-edge advances in communications, computers, control and related electronics-based technologies to Intelligent Transportation Systems (ITS).

Program Topics: Sensors (infrastructure & vehicle-based), Communications (side area & vehicle-to-roadside), Simulation (continuous, discrete, real-time), Man-machine Interfaces (displays, artificial speech), Control (adaptive, fuzzy, cooperative neuro), Decision Systems (expert systems, intelligent agents), Systems (engineering, architecture, evaluation), Information Systems (databases, data fusion, security), Computers (hardware, software), Reliability & Quality Assurance, Navigation and Guidance System, Signal Processing, Technology Forecasting & Transfer, Imaging and Image Analysis, Vehicle Control, Standards, Traffic theory in ITS, Routing and Route Guidance, Transit applications and Air traffic control.

Paper Submission: Five copies of complete manuscripts must be submitted no later than March 1, 2000 at the following address:

Prof. Petros A. Ioannou, PC Chair, ITSC-2000 Center for Advanced Transportation Technologies, University of Southern California 3740 McClintock Avenue, Suite 200B Los Angeles, CA 90089-2562, USA Tel: +1-213-740-4473, Fax: +1-213-740-4449, E-mail: ioannou@rcf.usc.edu

Submitted papers must be no longer than six pages in IEEE two-column format (US letter size), including figures and references. Papers exceeding this length limit may be rejected without review. The cover sheet should include (1) the title of the paper, (2) the names of the authors, (3) the technical categories, and (4) the name, mailing address, telephone and fax number, and e-mail address of the contact author. Details on the electronic paper submission can be found on *http://www.ewh.ieee.org/tc/its/cfp-itsc-2000.html* Notification of Acceptance is scheduled for **May 1, 2000.**

A single reduced rate-registration option will be available for attendance at both IV2000 and ITSC200 Conferences, as well as individual registrations. The same paper may not be submitted to both IV and ITSC conferences.

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
2-3 March 2000	IMT 2000 3G Wireless Technology Conference	Dallas, TX	http://witmail.hypermart.net/3G2000.htm
20-25 March 2000	16th ACES Symposium	Monterey, CA	http://aces.ee.olemiss.edu/cfp2000.htm
26-31 March 2000	INFOCOM 2000	Tel-Aviv, Israel	http://www.cse.ucsc.edu/~rom/infocom2000/
27-29 March 2000	3G2000	London, United Kingdom	http://conferences.iee.org/3G2000/
4-5 April 2000	10th Int'l Road Transport Info. and Control Conference	London, United Kingdom	Email rtic2000@iee.org.uk
4-6 April 2000	Joint Rail Conference JRC '00	Newark NJ	http://www.ieee.org/organizations/society/vts/conf/jrccfp2000.html
9-14 April 2000	AP2000	Davos, Switzerland	http://www.estec.esa.nl/CONFANNOUN/AP2000
10-14 April 2000	NOMS '00	Honolulu, HI	http://www.noms.org/2000
17-19 April 2000	CSNDSP 2000	Bournemouth, United Kingdom	http://dec.bournemouth.ac.uk/CSNDSP2000/index.htm
7-12 May 2000	17th World Telecommunications Congress and ISS2000	Birmingham, United Kingdom	http://www.wtc2000.org
15-18 May 2000	VTC2000-Spring	Tokyo Japan	http://www.convention.co.jp/vtc2000s
17-19 May 2000	AFCEA/IEEE EuroComm 2000	Munich, Germany	http://www.eurocomm.org
14-16 June 2000	2000 Virginia Tech Symp. on Wireless Personal Comms	Blacksburg, VA	http://www.mprg.ee.vt.edu
18-22 June 2000	Int'l Conference on Communications ICC '00	New Orleans LA	http://www.icc00.org
10-12 July 2000	Wireless '00	Calgary AB	http://www.cal.trlabs.ca/wireless
10-13 July 2000	HF Radio 2000	London, United Kingdom	http://www.iee.org.uk/conf/HFRadio/
16-21 July 2000	AP-S International Symposium / Radio Science Meeting	Salt Lake City UT	http://www.caeme.elen.utah.edu/aps2000
22-25 August 2000	ISAP	Fukuoka, Japan	http://www.crl.go.jp/pub/ISAP2000/
10-13 September 2000	RAWCON '00	Denver CO	http://rawcon.org
18-21 September 2000	PIMRC '00	London, United Kingdom	http://www.pimrc2000.com
24-28 September 2000	VTC2000-Fall	Boston, MA	http://www.vtc2000.org
1-3 October 2000	3rd IEEE Conf. on Intelligent Trans. Sys. ITSC-2000	Dearborn, MI	http://www.ewh.ieee.org/tc/its/itsc2000/cfp-itsc-2000.html
4-5 October 2000	IV 2000 IEEE Intelligent Vehicles Symposium	Dearborn, MI	http://WWW.CE.UniPR.IT/iv2000/
16-18 October 2000	Convergence 2000	Dearborn, MI	http://www.convergence2000.org
6-8 November 2000	APWC2000	Waltham MA	http://www.eece.unm.edu/apwc2000
12-15 November 1999	WPMC-2000	Bangkok, Thailand	http://www.tc.ait.ac.th
27 November – 1 December 2000	Globecom 2000	San Francisco, CA	http://delson.org/si/gc00/
17-20 December 2000	ICPWC '00	Hyderbad, India	http://www.citr.ece.uvic.ca/icpwc2000
Spring 2001	VTC '01/Spring	Tel-Aviv, Israel	
Fall 2001	VTC '01/Fall	Atlantic City, NJ	http://www.vtc2001fall.com
Spring 2002	VTC '02/Spring	Region 9	
September 2002	VTC '02/Fall	Victoria, BC	
Spring 2003	VTC '03/Spring	Seoul, Korea	

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.