## **Chapter Chatter**



Todd Robinson, Associate Editor

ere is a fun story from Daryl Gerke of Kimmel Gerke Associates, Ltd. If you are reading the EMC Newsletter over breakfast or lunch, you may want to save this story for later. Per the usual style of Chapter Chatter "Amazing But True" headliners, the following is from the source's (Daryl) point of view.

"Many people have heard me refer to grounds as the "sewer system" of electronics; as a return path, "used current" must flow back to the source. This is as opposed to the "cesspool theory" of grounding, where "bad electrons" are simply dumped. Obviously, one can have fun embellishing this analogy.

Several years ago I was called in to work on a real sewer problem. Noise from a sewage lift station was jamming nearby radio receivers. In reviewing the problem, I was led to and given a look into a real sewage pit. Not a pretty sight, and I was concerned that we might actually have to do some troubleshooting in the pit. It turned out my client (a civil engineer) was just having some fun with me, and he assured me that only the motor (not the electronics) was submerged.

It turned out the problem was due to crosstalk in the motor cable; from the variable speed drive output lines to two control lines. This allowed high frequency energy to be coupled into the power mains, which then acted as pretty good radio antennas. A small filter on the two control lines solved the problem. However, whenever I talk of grounding as an "electronic sewer," I still vividly remember that real sewer.

Daryl can be reached by E-mail at dgerke@emiguru.com.

#### Croatia

The last quarter of 2006 was quite busy for the Croatia Chapter; the Chapter held two symposiums and several technical/social meetings. To overcome the disadvantage of being a small Chapter, the Chapter organized its events in conjunction with similar events sponsored by other organizations. The Croatia Chapter was the co-organizer of the 14th International Conference on Software, Telecommunications and Computer Networks -SoftCOM 2006 (sponsored by the IEEE Communications Society) and Chapter activities were organized in conjunction with this conference. The collaboration of the EMC and communication communities created very positive synergy and each

group had the opportunity to learn about the others challenges, exchange solutions, and share knowledge. Additionally, much was learned about the common problems faced by both groups of engineers. Also, this event improved the cooperation between the researchers from academia, industry and government. The Chapter members and the guests had the opportunity to attend the presentations of distinguished lecturers and invited speakers. For example, over 50 people attended the presentation entitled, "Toward the Era of Ubiquitous Networks," given by Dr. Nim Cheung, president of the IEEE Communications Society.

Another successful event, "The Symposium on EMC: Safety Aspects," was

held on 29-30 September in Split. The cruise ship "Dubrovnik" sailing on the attractive route Split-Dubrovnik provided the pleasant ambience. Thirteen speakers, from four countries, provided excellent on-topic papers. There were two invited speakers. Professor David Larrabee from East Stroudsbury University presented a very interesting topic entitled, "Electromagnetic Effects on Transmission Lines." Next, the 35 attendees enjoyed an excellent talk, "Assessment of Human Exposure to Power Substation Electric Fields," given by Professor Dragan Poljak from the University of Split. Several of these papers are being considered for publication in the Special Issue on Safety Aspects in Mobile and Wireless



Nim K. Cheung, president of the IEEE COMSOC talks about the elevation of mobile networks.



Dragan Poljak, from the University of Split, during the invited presentation at the opening of the Symposium on EMC in Split.

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Discussion following David Larabee's presentation with Session Chair Dragan Poljak (left) in Split.



Kurt R. Richter, from the Austria Academy of Science, presenting the paper on Nikola Tesla to the Croatia Chapter.



Attendees interested in IEEE EMC Society membership visited the Croatia Chapter's stand at the Symposium on EMC and SoftCOM 2006.



Croatia Chapter Chair Vesna Roje (right) received the Chapter Founder Award from EMC Society Distinguished Lecturer Heyno Garbe.



Congratulations to the author of the best student paper, Damir Cavka (right), by Nominating Committee and Symposium Chair, Vesna Roje.



Choir Mirta singing the traditional Dalmatian songs during the concert organized for the participants of Symposium on EMC and SoftCOM 2006.



Croatia Chapter members and friends enjoy a beautiful sunset while sailing from Split to Dubrovnik.



Croatia Chapter members and friends arriving at Dubrovnik on their excursion from Split.



Hong Kong Chapter attendees during the facility tour conducted by Mr. Wai Leong (Consultant of EMC Center) at the March meeting.

Communications of the Journal of Communications, Software and Systems (JCOMSS). Guided by the proven idea to plan Chapter activities in conjunction with other related events, presentations of the IEEE EMC Chapter were held during the Career Day at the University of Split, FESB. During the Career Day, benefits of IEEE EMC membership were extolled to the students, as well as to researchers from academia and industry. Similar action has been organized during the EMC Symposium and SoftCOM 2006 conferences. On November 6, 2006 the Chapter took the advantage of hosting EMC Society Distinguished Lecturer Professor Heyno Garbe at the University of Split. Dr. Garbe's outstanding presentation was entitled, "What's Different in EMC Measurements." The use of teleconferencing also made the presentation accessible to 52 additional members and guests in three Croatian University centers: Zagreb, Osijek and Rijeka. During his stay in Split, Professor Garbe delivered the Chapter Founder's Award to Professor Vesna Roje, Croatia Chapter Chair.

#### Hong Kong

The Hong Kong Chapter had a meaningful day on 24 March 2007, holding an accredited EMC laboratory visit at the EMC Centre of the Hong Kong Productivity Council (HKPC). The half-day laboratory visit attracted 40 attendees including 13 IEEE members. The visit was aimed at providing information on how products are tested to Hong Kong EMC standards. A brief promotion was also carried out for the 2007 IEEE International Symposium on EMC in Hawaii to the attendees present. The laboratory visit started off with a session by Mr. Wai Leong outlining the history and the latest EMC developments of HKPC. Mr. Leong is the consultant for the EMC Center. The tour included various emission and immunity measurement sites, such as radiated emissions, conducted emissions, radiated immunity, fast transient, ESD, etc.

#### Huntsville

Glenn Shelby, Chapter Chair, reports that the Huntsville Chapter has set the



The Hong Kong Chapter enjoys a tour of the radiated emission test facilities of the Hong Kong Productivity Council (HKPC).

2007 meeting schedule and has held two monthly technical meetings since the winter break in November/December. A Chapter record was set with thirteen presentation topics submitted for the four available monthly technical meetings this year. The topics included printed circuit board (PCB) design, the new European Union EMC Directive, aerospace and military EMC, electromagnetic field simulation, and EMC design topics using ferrites, shielding, transient protection, attenuating materials, and gaskets. A record number of Chapter members voted to select the 2007 presentations in a hotly contested race. Chapter members chose two presentations on PCB design, one on Military/Aerospace EMI requirements, and one on ferrites. The Chapter also plans to host an EMC Society Distinguished Lecturer in September. The 2007 presentations were kicked off on January 18 at ADTRAN with Doug Parker of ADTRAN presenting "Printed Circuit Board (PCB) Techniques Aimed at Minimizing Radio Frequency (RF) Emissions." The talk was well attended



The Hong Kong Chapter tours the radiated immunity test facilities of HKPC.



Huntsville January meeting sponsor Michael Lehmann provides an overview of Intertek corporate capabilities.



Huntsville Chapter Chair Glenn Shelby presenting the January Chapter business meeting charts to a full house.



Huntsville Chapter Secretary Tim Travis, speaker Dr. Brett Robinson, and Dustin Thornton (from left) are busy networking before the March meeting.



Doug Parker presenting his talk on PCB design at the Huntsville January meeting.



Huntsville Chapter member Hansel Cornutt makes a point during the March business meeting.

with 54 Chapter members and guests present. Intertek ETL SEMKO, represented by Mr. Michael Lehmann, sponsored the delicious buffet meal. Mr. Parker explained the mechanisms that create radiated emissions in PCBs while focusing on methods and tools for reducing or eliminating those emissions. He placed heavy emphasis on practical solutions that can be applied in the early design phase. The Chapter welcomed several new guests for this meeting. The second monthly technical meeting was held March 8 at ADTRAN with Dr. Brett Robinson of EMI Solutions presenting "Simplified Methodologies for Controlling EMI/EMC on Circuit Card Assemblies." Attending were 56 members and guests. ERC Incorporated, represented by Mr. Tim Travis, sponsored the pizza buffet enjoyed by all. Dr. Robinson's talk covered PCB layout, routing, grounding, and EMI suppression filters. The Chapter is grateful for Dr. Robinson's traveling from California to Huntsville to share his expertise and experience with us. The Chapter was blessed to have our Chapter angel Colin Brench and his wife Bonnie at the March meeting. Colin and Bonnie made a special effort to stop in Huntsville on their way to the EMC Society Board of Directors meeting. Colin presented information about EMC 2007 and encouraged everyone to attend the Symposium in Hawaii this summer. The Huntsville



Huntsville Chapter Angel Colin Brench showcasing EMC 2007 in Hawaii during the March meeting.



Dr. Brett Robinson explaining PCB layout and routing during the Huntsville March meeting.



It's 7:30am and the Milwaukee Chapter is set up and ready for Dr. Jerse.



It's now 8:30am and 147 Milwaukee Chapter attendees are on time and ready for Dr. Jerse.

Chapter has enjoyed continued success in its Chapter functions. Planning for future events including Huntsville EMC 2008 (April 2008) is underway. Remember to check out Huntsville EMC Chapter happenings at the Chapter website: http://ewh.ieee.org/r3/huntsville/emc/.

#### Japan

IEEE EMC Society Japan Chapter Chair, Professor Youji Kotsuka, on behalf of the Japan Chapter takes great pleasure in welcoming the members of IEEE EMC Society to Japan in 2009. The 2009 International Symposium on Electromagnetic Compatibility (EMC'09/Kyoto) will be held in April from 14 to 17, 2009 in Kyoto International Conference Center. This symposium will be held under the auspices of IEICE EMCJ Society and IEEE EMC Society Japan/Sendai Chapter. We would like to cordially invite you to EMC'09/Kyoto during the beautiful cherry blossom season.

#### Milwaukee

Record high temperatures in Southeast Wisconsin brought out a record attendance for the 2007 EMC Seminar hosted by the Milwaukee EMC Chapter. This is the sixth year this seminar has been hosted and this year's featured presenter was Dr. Tom Jerse from "The Citadel." A record 155 paid attendees gathered for a day long tutorial on "Emissions – How to Identify, Measure and Suppress in Printed Circuit Boards and Cabling." Joining the seminar were 18 exhibitors with tabletop displays. In all, 191 were served lunch. The success of this seminar may be best presented by the unsolicited comments from a few of the 144

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Pictured are the Milwaukee Chapter's 2007 EMC Seminar Hosts: Dr. Tom "Big Cheese" Jerse and Jim Blaha, EMC Chapter Chair (right).



Roy Henning (left) of Criticare Medical Systems points out his needs to Ryan Bares of EMC Haefely.



Steve Davidson (left) of Hamilton-Sundstrand listening to Tom Eichelberger's AR Worldwide sales pitch.



Mike Caruso (left) of ETS-Lindgren and Tony Grebner of John Deere enjoying the morning break.



Spring is just around the corner at Milwaukee's 2007 EMC Seminar.



Larry Hause (left), Milwaukee EMBS Chapter Chair, and Andrea Spellman of Underwriters Laboratories.



Dr. Robert Strangeway (left) of the Milwaukee School of Engineering and fellow MSOE instructor Jim Blaha.



Johnson Controls engineers Darrell Beauchamp and Dave Ullerberg (inner left and right) receiving the size and fit demo from Fair-Rite representatives Paul Zdanowicz (far left) and Chuck Atwater (far right), also known as, "If it fits, then use it."

returned seminar surveys. They include ... "Very good seminar, look forward to next year" and "I was very happy with the presenter. He was excellent, as were his demos. This seminar was an excellent value." Another commented ... "Excellent Practical Information." One attendee's comment best summarizes the day's events... "Dr. Jerse gave an excellent, simple way to see how to design with EMC in mind. I understood more of his presentation than some heavy math laden others. I will always keep in mind where my currents flow." Based on the responses from the surveys, 141 out of 144 responded that they would again attend a seminar in 2008. Plans are already being developed. Enjoy the pictorial review of the Milwaukee 2007 EMC Seminar. The 2007 EMC Seminar again fulfills the Goal of the Milwaukee EMC Chapter: To offer local educational seminars with World Renowned Educators in the Field of EMC, allowing engineering management to have available to their staff a low cost continuing educational program with a high return on educational value.





*Steve Katuszonek (left) of Magnetek offering Jim Blaha to break early and have a few.* 



Your 2007 EMC Seminar Committee of Jim Blaha, Dr. Tom Jerse, Teresa White and Don Koller (from left) of Rockwell Automation.



Ping Lee of Rockwell Automation dressed and ready for EMC 2007. Gail Tews of GE Healthcare and Ken Boston (from left) of LS Research enjoying Mr. Lee's company and stories.



Completing his first EMC Seminar in Milwaukee is Mr. Alkesh Patel of Hamilton-Sundstrand. Mr. Patel is the IAS Chapter Chair in the IEEE Rockford Section.



Michael Hopkins of Key Tek presenting a talk on "Pulsed EMI Phenomena" to the Oregon and SW Washington Chapter in January.



Bill Moyer of HP presented a lecture on Coplanar Waveguides at the Oregon and SW Washington Chapter meeting in March.

#### Oregon and SW Washington

The Oregon and SW Washington Chapter of the EMC Society has had an informative winter season. In January, the speaker was Michael Hopkins, Manager of the KeyTek Customer Technical Center, who has over 25 years of experience in ESD, EFT, high-energy surge and other pulsed EMI phenomena. His presentation was on "EMC Immunity Compliance, Tests vs. Reality." ESD tests are required at 4 KV, and typical measured values are 2 kV up to 10 KV. Testing for Electrical Fast Transients are required at 4KV, but this level is seldom seen except in heavy industrial or substation environments. High Energy Surge testing is done at 2 KV, 1 KA, and this is a more interesting area with more measurements in varied environments. As an example, near Tampa, Florida in July, 2000, there were 33,800 cloud to ground lightning strikes, and 82% were less than 30 kA, 940 were between 30 KA and 60 KA, 92 were 60 KA to 100

KA, and seven were greater than 150 KA. For the February meeting, Gary Fenical from Laird Technologies, Instrument Specialties Division, was the speaker. Mr. Fenical's presentation topic was on the new EU EMC Directive. Gary has over 20 years of experience in designing EMI gaskets, shielded enclosures and solving EMI problems. There are significant changes in the new EMC Directive, which was originally published in 1989 and became mandatory in 1996. A new version, 2004/108/EC, has been published to better define processes, ensure a uniform application from country to country and to change the rules for fixed installations. These are a combination of devices assembled for permanent usage at a predefined location. The devices in a fixed installation do not need the CE marking on them, but the whole installation must meet the EMC requirements. The EC members also are increasing market surveillance activities to find units that do not meet the requirements.



Gary Fenical from Laird Technologies gave a presentation on the "New EMC Directive" at the Oregon and SW Washington Chapter's February meeting.



Henry Benitez presenting a \$10,000 check to Oregon Chapter members who worked on the 2006 International Symposium on EMC.

In March, Bill Moyer, Chapter Chairman, gave a very relevant talk on the "Application of Coplanar Waveguides to Produce Two Layer PCA's That Meet EMC Requirements." Bill, a NARTE Certified engineer, has worked for Martin-Marietta, Boeing, Westinghouse, and Qualcomm on low earth satellites, and now is at HP in Vancouver, Washington. In the eternal quest of the EMC engineer to lower costs while simultaneously keeping upper management out of legal trouble, Bill has developed a program of design and simulation that creates constant impedance coplanar waveguides (a surface trace with ground traces on each side) that allow high speed signals to be routed on a very low cost two layer PCB without power and ground planes. This technology has been employed on some HP printers, and development of simulation tools is proceeding to increase accuracy. At the March meeting, Henry Benitez presented a \$10,000 check to the Chapter for



Gary Fenical of Laird Technologies explains the details of Europe's new EMC Directive to the Phoenix Chapter.



Harry Gaul (left) presents Mike Oliver of MAJR Products with an Arizona Highways calendar on behalf of the Phoenix Chapter.

their efforts in sponsoring the 2006 IEEE International Symposium on EMC in Portland, Oregon. This was the most successful EMC Symposium financially in IEEE EMC Society history.

#### Phoenix

Officer elections were held at the December meeting for Chapter Chairman, Vice Chair, Secretary and Treasurer.

Because of the overwhelming number of volunteers and nominees, Harry Gaul, Glen Gassaway and Daryl Gerke continue to be the Chapter officers! Jim Dykema was elected as the new Chapter treasurer. The featured speaker in December was Mr. Gary Fenical, of Laird Technologies, where he is an EMC Technical Sales Representative and has been with the firm for 23 years. Mr. Fenical has authored many articles on EMC Requirements for Medical Devices, Mutual **Recognition Agreements and Guidelines** to meet the essential requirements of the EMC Directive. Mr. Fenical's presentation was on the new EMC Directive that was adopted at the end of 2004. This new Directive will replace the old Directive 89/336/EEC within three years (from 20 July 2007). The mandatory application of the new directive is 20 July 2009. Mr. Fenical's presentation was

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a summary of a series of presentations that he attended in Brussels in February 2005. He was one of only a handful of US attendees, and therefore provided us with valuable insight into the impact of the new directive. The new approach directive stresses meeting the essential requirements through the use of harmonized standards. The use of Technical Construction Files is removed from the new directive. A manufacturer may choose to use harmonized standards (generally preferred) or may choose to use a technical file approach. The new directive was a result of the 1998 SLIM report, which was the output of a panel of experts who advised the member states to clarify the original directive's scope and definitions, and to better define the essential requirements. One of the most important regulatory changes is how fixed installations are handled. No longer do all of the individual apparatus contained in fixed installations need to comply with the directive, as long as the fixed installation itself meets the essential requirements. Often this can be accomplished through the use of a technical file, which must be kept with the person responsible for the fixed installation and at the disposal of the national authorities. As the apparatus are imported, they must be clearly marked that they are part of the fixed installation in order to clear customs. Exceptions to the new directive include R&TTE (radio and telecom equipment), aeronautical equipment, and amateur radio equipment. It is also important to note that the harmonized standards have not changed as a result of the new directive and they must be applied within their scope. Full responsibility of compliance is placed on the manufacturer or importer (in fact, it always has been), but the new directive mandatory does require not competent/notified body involvement if harmonized standards are not used. Generally, the new directive provides legislative changes only, and will not immediately affect most manufacturers or importers into the EU member states. However, it is very important to understand the upcoming changes of the European EMC directive so we can all be prepared. Our thanks to Gary Fenical for a very informative lecture! At the February meeting, Michael J. Oliver of MAJR Products Corporation spoke on "Shielding Design and Theory." Mr. Oliver is Vice President of Electrical/EMC Engi-

neering at MAJR Products Corporation. He currently serves as Chairman of the newly formed Pittsburgh EMC Chapter, Vice Chairman of the SAE AE4 Electromagnetic Compatibility Committee, and member of the IEEE EMC Standards Advisory Coordination Committee (SACCom). Mr. Oliver started the presentation by reviewing EMC fundamentals, including basic definitions of EMC terminology. He mentioned a very interesting Georgia State University web site at http://hyperphysics.phyastr.gsu.edu/hbase/hframe.html, which has an excellent glossary of electromagnetic and other physical terms. He pointed out the distinctions between Differential Mode versus Common Mode noise interference generation, and potential mitigation methods for each (including shielding). He mentioned that common mode interference is generally more predominant. He also discussed plane wave versus E-field and H-field shielding, and provided equations for each. A good rule of thumb dictates that material type dominates shielding effectiveness below 10 MHz and holes or apertures dominate shielding above 10 MHz. He also mentioned how partial shields may not oper-



ate as intended since they can actually increase emissions on the 'unshielded' side. Mr. Oliver then discussed the MIL-DTL-83528 shielding test method, and recommended that non-conductive bolts or fasteners should be used when making this measurement. He also mentioned that beryllium-copper makes an excellent shielding material, but care should be used in instances where RoHS compliance is mandatory. According to Mr. Oliver, 2% beryllium is generally considered acceptable. Mr. Oliver then explained concepts of aperture shielding. For slot apertures, shielding can be estimated by the equation  $SE = 20 \log (Lambda/2L)$ , where L is the longest dimension of the slot. Hole aperture shielding can generally be estimated by  $SE = 40 \log (Lamb$ da/2L). If multiple apertures are present, shielding loss is proportional to 20 log N, where N is the number of apertures within Lambda/2. MAJR Products Corporation has an excellent Excel-based design tool to assist with shielding calculations at their website: http://www.majr.com/. Regarding honeycomb vent panels, a 4:1 thickness to width ratio is considered ideal. Remember that nickel or tin plating is important to reduce the effect of 'glue lines' in the honeycomb material.

Mr. Oliver recommended MIL-STD-1250 as a good resource for galvanic corrosion. Information on future meetings is available on the Phoenix EMC Chapter Web site at http://www.ewh.ieee.org/r6/phoenix/pho enixemc/.

#### **Rocky Mountain**

Meeting in Westminster (near Denver), the Rocky Mountain Chapter of the EMC Society (RMCEMC) continues to have a strong program on a wide variety of EMC related topics. On October 17, the Chapter had Ms. Nikki Shears (Denver FCC Branch Chief) and Mr. Jay Hockanson (FCC Field Agent) speak to the Chapter on 47CFR15 Subpart B enforcement. An extra highlight of the evening was a tour of one of their modern Mobile Digital Direction Finding (MDDF) vans. On December 13, we ended the year with a presentation by Dr. Robert Johnk (NIST) titled "Evaluation of the NASA Space Shuttle Endeavour Using Ultra-Wideband Measurement System." Dr. Johnk explained how his team made innovative use of an aircraft hangar to serve as a reverb chamber to test the Endeavor's shielding effectiveness. On February 27, the Rocky Mountain Chapter welcomed Ken Wyatt (Agilent Technologies) to present "Top Ten EMC Problems and Troubleshooting Techniques." He brought in an all-in-one EMC fix toolkit, shared real examples, demonstrated fixes on an analyzer, and provided solid troubleshooting processes. People stayed so late asking questions and looking at the displays that library security had to kick us out to the close down the library. Before Ken's presentation, the Chapter announced the newly elected slate of officers for the 2007 year: Monrad Monsen (Chairman), Larry Ernst (Vice Chairman) and Stefen Munford (Secretary). Then on April 12, the local 3M sales representative (also a member of the Chapter) flew in Dr. Jung-Ju Suh (3M Korea) to speak to the Chapter on "Sheet-Type Electromagnetic Noise-Absorbing Material Technology." He brought in a wide variety of sample RF noise-absorbing materials and showed how such materials have solved real-world EMC problems. 3M sponsored the meeting at a nice local hotel conference room and provided the participants with a nice spread of hors d'oeuvres. It was not a meeting to miss.

#### Seattle

Chapter Chair Pat André of André Consulting reports that Michael Hopkins addressed



The Rocky Mountain EMC Chapter is kept on the edge of their chairs as Mr. Ken Wyatt presents his material.



*Mr.* Tim McAuliffe (right) introduces the featured speaker Dr. Jung-Ju Suh of 3M Korea to the Rocky Mountain Chapter.



*Mr. Ken Wyatt of Agilent answers questions about display examples after the presentation.* 



The Seattle EMC Chapter members enjoy networking over a pizza dinner prior to the start of the January meeting.



The conference room at CKC Labs in Bothell provides a comfortable meeting location for the Seattle EMC Chapter.



Seattle Chapter members listen intently to the presentation by Michael Hopkins at the January meeting.

the Seattle Chapter in January 2007. The meeting was held at CKC Labs in Bothell, Washington. Mr. Hopkins brought information from many years in the industry, especially concerning electrostatic discharge testing and engineering. His experience across other areas of EMC test equipment and standards generated a great deal of discussion among those who eagerly listened. His discussion was well attended by a wide cross section of disciplines and interests. Mr. Hopkins is currently the Manager of the Customer Technical Center for the Thermo Fisher Scientific Lowell site, manufacturer of the KeyTek product lines. He has over 25 years experience with EMC and semiconductor ESD/Latch-up testers, standards and applications and his experience with manufacturers of electronic systems, products, and devices includes training in the proper use of ESD and other test instrumentation, and assisting in the evaluation of test results. Additionally, he is the author of several papers and articles on pulsed EMI phenomena, and has participated in numerous national and international seminars as author, speaker, and panelist. Mr. Hopkins is an active member of several committees developing standards for industry, including the ESD Association, IEC Technical Committees 77A and B for the development and maintenance of Basic EMC Standards (US Delegate to Maintenance Team 12 for all pulsed phenomena), IEEE/ANSI, SAE, and RTCA. He is a member of the IEEE and the EMC Society, and has been a speaker at

numerous IEEE Section meetings nationwide. On January 24, the Chapter was invited to attend the meeting organized by the IEEE Engineering in Medicine and Biology Society (EMBS). The speaker was Professor Henry C. Lai, from the Department of Bioengineering, University of Washington, on the topic "Biological Effects of Non-ionizing Electromagnetic Fields." The meeting was held on the beautiful University of Washington campus located on Lake Washington in Seattle. Dr. Lai reviewed how the general population is exposed constantly to non-ionizing electromagnetic fields that are emitted by electrical appliances and, particularly, from cell phones. Can these fields cause biological and hazardous health effects? Research on this area was reviewed



and discussed. In addition, possible uses of non-ionizing electromagnetic fields for therapeutic purposes were discussed. It was a very well attended meeting which included a lively question and answer period following the presentation.

#### Singapore

Dr Liu En Xiao, Chapter Secretary, reports that the IEEE EMC Singapore Chapter has been active over the last quarter. On 7 March 2007, an IEEE EMC Distinguished Lecture A\*STAR-IHPC (Agency for Science, Technology and Research - Institute of High Performance Computing) Joint Workshop was organized at the IHPC Auditorium. This half-day workshop was jointly organized by the MTT/AP Chapter, EMC Chapter and A\*STAR-IHPC. It kicked off with an opening address by Dr. Raj Thampuran, the Executive Director of A\*STAR-IHPC, followed by four interesting technical talks given by Dr. Rüdiger Vahldieck, Swiss Federal Institute of Technology, Zurich, Switzerland; Dr. Li Er-Ping, IEEE Distinguished Lecture and Senior Scientist. A\*STAR-IHPC; Dr. Dirk Baumman and Dr. Klaus Krohne, both from the A\*STAR-IHPC, Singapore. Professor R. Vahldieck spoke on

"LTCC Based WLAN Frontends for Radio Over Fiber Systems," where he introduced the design of an LTCC-based wireless-transceiver with SM-fiber optical interface for RoF fiber applications and further pointed out that the presented approach enables full optical transceiving functionalities and eliminates the need for a light source to which results in a cost effective and power saving module. Dr. Li Er-Ping delivered a speech on "EMC and Signal Integrity in High-speed IC and Electronic Packaging" where he elaborated on the major signal integrity and power integrity issues in high-speed designs of electronic packaging including ICs. He also presented the recent research work carried out in his research group on system-level package modeling. Following Dr. Li's talk, Drs. Dirk Baumman and Klaus Krohne gave two specialized talks on the new development of the Finite-Volume Method. Approximately fifty engineers/scientists from local universities, research institutes, and industry attended the workshop. The attendees enjoyed the interaction with the four speakers during the Q & A and tea



be integrated into the base station, which results in a cost effective and power saving module. Dr. Li Er-Ping delivered a speech on "EMC and Signal Integrity in High-speed be integrated into the base station, power saving module. Dr. Li Er-Ping, Dr. Dirk Baumman, Dr. Klaus Krohne, and Professor Dr. Rüdiger Vahldieck (from left).

break sessions. In the afternoon of 26 March 2007, Mr. Paul Duxbury from Flomerics Ltd., UK gave a seminar entitled "The Applications of 3D Electromagnetic Modeling in the Design Process to Meet the EMC Requirements" again at the IHPC auditorium. His talk covered a wide range of applications, from shielding effectiveness, cable emissions, coupling and heat sinks. He also showed several examples on transitory EMC/I issues such as ESD, lightning and EMP. Over 40 people attended the seminar. The EMC Chapter would like to thank MED Technologies for sponsoring the refreshments. EMC

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