Global
Communications
Newsletter
January 2011

Five-Day Virtual Intensive Course on Wireless Communications Engineering

By Xavier Fernando, Ryerson University, Canada, on behalf of the IEEE Communications Society Education Board

Wireless Communication Engineering Technologies (WCET) certification for practicing wireless communications engineering professionals is gaining widespread popularity and recognition. It is internationally seen as a flagship qualification for wireless professionals, due mainly to its vendor neutrality and trans-national scope. Industry participation at all stages of the development process has ensured that the certification examination is focused on job-related knowledge and skills. WCET-qualified professionals are able to clearly demonstrate their practical knowledge and are increasingly getting better visibility, leading to career advancement.

Several training aids have been developed by ComSoc directed towards improving practitioners' knowledge in wireless communications. The book "Guide to the Wireless Engineering Body of Knowledge" (WEBOK) was written by industry experts to provide a comprehensive overview of current wireless engineering technology; its many references direct the reader to original sources of in-depth knowledge in the field. The authors and editors of the WEBOK were selected from a worldwide call after a thorough screening.

A three-day "in person" or five-day "virtual" (webcast) "boot camp" style intensive training covering the breadth of wireless communications technology has been under development for some time. This intensive course was envisioned as a complement to other training and online tutorials that focus on specific technical areas and topics. The intended audience is composed of practicing engineers in various wireless engineering disciplines. The course was designed to be particularly suited for those who work in a specific, perhaps rather narrow, aspect of wireless communications, since one primary goal was to provide a comprehensive overview of overall wireless system design and implementation, and of the operation of wireless networks. Although intended as offering broad training in wireless communications to any and all practitioners, the course was also anticipated to be helpful for candidates considering seeking WCET certification, since it would address all seven technical areas covered by the WCET examination.

It is important to note that, although these intensive courses would cover material likely to be tested in the WCET exam, this training was never intended to specifically prepare the attendees for the exam itself. Keeping this in mind, those who worked on developing the course content (including WEBOK authors) and the instructors were purposely kept separate from any involvement in the creation of WCET exam questions or the construction of the exam.

The first online intensive course was successfully organized during September 20-24, 2010. This five-day course began with a review of Fundamental Knowledge in wireless communication technologies. Then a detailed discussion on RF Engineering, Propagations and Antennas was presented. Subsequently, the topics of Wireless Access Technologies, Network and Service Architectures, Network Management and Security, Facilities Infrastructure, and Agreements, Standards, and Policies also were covered. 76 wireless communications professionals from 15 countries in five continents registered for this course.

The course materials were developed after issuing a worldwide call for developers. The course content was partly drawn from the WEBOK, and parallels the various chapters in the book. However, more than 400 detailed PowerPoint slides were created and the instructors each developed their own notes for use in presenting the material. Participants had ample time to ask questions, which were broadcast over the web to all participants, along with the answers from the instructors. Attendees were encouraged to join the online WCET group formed on LinkedIn as a professional network, as a way to follow up with their questions and discussions. All registered students had access to the presented course material (PowerPoint slides and audio) for seven days after the live event. CEUs were offered to course participants who applied for them and who completed a short survey. The response has been overwhelmingly positive, with attendees rating the course good or excellent, well organized, and definitely increasing their practical knowledge of wireless communications. Several participants suggested minor changes that they felt would make the course even more useful; these suggestions will be appropriately considered in the forthcoming offerings of this course, both in person and on line.

Indeed a second offering of the virtual intensive course is planned for the week of January 17-21, 2011. The ComSoc Training website, www.comsoc.org/training, has more details on this presentation, including a link to register. The September offering was actually oversubscribed, so wireless professionals who are interested in taking this course are encouraged to register early!

The author acknowledges the contribution of Rolf Frantz, who gratefully edited the article.

IEEE ComSoc Santa Clara Valley (SCV) Chapter Meeting on "40/100 Gigabit Ethernet – Market Needs, Applications, and Standards"

By Alan J. Weissberger, Chair of the ComSoc SCV Chapter, USA

At its October 13, 2010 meeting, IEEE ComSocSCV was most fortunate to have three subject matter experts present and discuss 40G/100G Ethernet- the first dual speed IEEE 802.3 Ethernet standard. The market drivers, targeted applications, architectecture and overview of the the recently ratified IEEE 802.3ba standard, and the important PHY layer were all explored in detail. A lively panel discussion followed the three presentations, In addtion to pre-planned questions from the moderator (ComSocSCV Emerging Applications Director Prasanta De), there were many relevent questions from the audience. Of the 74 meeting attendees, 52 were IEEE members.

The presentation slides, together with the program of next technical meetings and other information, are available online at the ComSocSCV web site www.comsocscv.org.

Presentation Highlights

Ethernet's Next Evolution – 40GbE and 100GbE by John D'Ambrosia of Force10 Networks. The IEEE 802.3ba standard was ratified on June 17, 2010 after several years of hard work. What drove the market need for this standard? According to John D'Ambrosia, the "bandwidth explosion" has created bottlenecks eveywhere. In particular, Increased number of users, faster access rates and methods, new video based services have created the need for higher speeds in the core network. Mr D'Ambrosia stated, "IEEE 802.3ba standard for 40G/ 100G Ethernet will eliminate these bottlenecks by providing a robust, scalable architecture for meeting current bandwidth requirements and laying a solid foundation for future Ethernet speed increases." John sees 40G/ 100G Ethernet as an enabler of many new network architectures and high bandwidth/ low latencey applications.

Three such core networks were seen as likely candidates for higher speed Ethernet penetration: campus/ enterprise, data center, and service provider networks John showed many illustrative graphs that corroborated the need for higher speeds in each of these application areas. The "Many Roles and Options for Ethernet Interconnects (in the Data Center)," "Ethernet 802.3 Umbrella," and "Looking Ahead - Growing the 40GbE / 100GbE Family" charts were especially enlightening. We were surprised to learn of the breadth and depth of the 40G/100G Ethernet standard, which can be used to reduce the number of links for: Chip-to-Chip / Modules, Backplane, Twin Ax, Twisted Pair (Data Center), MMF, SMF. This also improves energy efficiency according to Mr. D'Ambrosia.

Looking Beyond 100GbE, John noted that the industry is being challenged on two fronts: Low cost, high density 100GbE and the Next Rate of Ethernet (?). To be sure, the IEEE 802.3ba Task Force co-operated with ITU-T Study Group 15 to ensure the new 40G/ 100G Ethernet rates are transportable over optical transport networks (i.e. the OTN), Mr. Ambrosia identified the key higher speed market drivers as Data Centers, Internet Exchanges, Carrier's Optical Backbone Networks. The other two speakers also speculated about higher speed Ethernet (see below).

The IEEE Std 802.3ba-2010 40Gb/s and 100Gb/s Architecture by Ilango Ganga of Intel Corp. Mr. Ganga presented an Overview of the IEEE 802.3ba standard, which has the following characteristics:

- Addresses the needs of computing, network aggregation and core networking applications
- Uses a Common architecture for both 40 Gb/s and 100 Gb/s Ethernet
- Uses IEEE 802.3 Ethernet MAC frame format
- The architecture is flexible and scalable
- Leverages existing 10 Gb/s technology where possible
- Defines physical layer technologies for backplane, copper cable assembly and optical fiber medium

Ilango identified two future standards related to IEEE Std 802.3ba:

- IEEE P802.3bg task force is developing a std for 40 Gb/s serial single mode fiber PMD
- 100 Gb/s backplane and copper cable assemblies Call For Interest scheduled for Nov'10

Physical Layer (PCS/PMA) Overview by Mark Gustlin of Cisco Systems. Mr. Gustin explained the all important PHY layer, which is the heart of the 802.3ba standard. The two key PHY sublayers are the PCS = Physical Coding Sublayer and the PMA = Physical Medium Attachment.

- The PCS performs the following functions: Delineates Ethernet frames. Supports the transport of fault information. Provides the data transitions which are needed for clock recovery on SerDes and optical interfaces. It bonds multiple lanes together through a striping/distribution mechanism. Supports data reassembly in the receive PCS - even in the face of significant parallel skew and with multiple multiplexing locations.
- The PMA performs the following functions: Bit level multiplexing from M lanes to N lanes. Clock recovery, clock generation and data drivers. Loopbacks and test pattern generation and detection.

Mark drilled down to detail important multi-lane PHY functions of transmit data striping and receiver data alignment. These mechanisms are necessary because all 40G/ 100G Ethernet PMDs have multiple physical paths or "lanes." These are either multiple fibers, coax cables, wavelengths or backplane traces. Module interfaces are also multiple lanes, which are not always the same number of lanes as the PMD interface. Therefore the PCS must support a mechanism to distribute data to multiple lanes on the transmit side, and then reassemble the data in the face of skew on the receiver side before passing up to the MAC sublayer.

Mark also touched on the topic of a higher speed for Ethernet. He speculated that the next higher speed might be 400 Gb/s, or even 1Tb/s? Mr. Gustin opined that it was too early to tell. He noted that the IEEE 802.3ba architecture is designed to be scaleable. In the future, it can support higher data rates by increasing the bandwidth per PCS lane and the number of PCS lanes. He suggested that for 400 Gb/s, the architecture could be 16 lanes @25 Gb/s for example, with the same block distribution and alignment marker methodology. Mark summed up by reminding us that the 40G/100G Ethernet standard supports an evolution of optics and electrical interfaces (for example, a new Single-mode PMD will not need a change to the PCS), and that the same architecture (sublayers and interface between them) can support future faster Ethernet speeds.

Panel Discussion/Audience Q and A Session

The ensuing panel session covered 40G/ 100G Ethernet market segments, applications (data center, Internet exchanges, WAN aggregation on the backbone, campus/enterprise, etc),competing technologies (e.g. Infiniband for the data center), timing of implementations (e.g. on servers, switches, network controllers. There were also a few technical questions

(Continued on Newsletter page 4)

The IEEE Branch Office Re-locates in Singapore

By Fanny Su and Ewell Tan, IEEE Singapore

Since 1995, the Communications Society has used the IEEE branch office in Singapore to support its members, customers and volunteers in the Asia Pacific. Shortly after, the office was included into the Charter of the ComSoc Asia Pacific Board (APB) and its role expanded to provide support services to its' Director and its' committee activities.

On the 1st Nov 2010, IEEE announced its relocation of its branch office to Solaris@Fusionopolis. A ribbon cutting and unveiling of the IEEE signage was organized for the afternoon event celebrating the occasion.

The re-location to Singapore's science and engineering research hub will enable IEEE to collaborate with the Agency for Science, Technology and Research (A*STAR), and the Singapore Economic Development Board (EDB), on world-class scientific research in biomedical sciences, physical sciences and engineering in Singapore.

A*STAR also took the opportunity to honor 3 of its technologists for winning IEEE awards; David Townsend for 2010 IEEE Medal for Innovations in Healthcare Technology, Dim-Lee Kwong for 2011 IEEE Frederik Philips Award and Tony Quek for IEEE GLOBECOM 2010 Best Paper and Gold Best Paper Awards.

Helene Fung, a long time IEEE volunteer joins the branch office in Singapore as Senior Strategic Planning Manager under Corporate Activities. IEEE Staff Fanny Su and Ewell Tan will continue to provide support services to the Communications Society, the ComSoc APB Director and its committees, AP ComSoc Chapters and its members.

The office continues to serve as the coordinating and information centre for ComSoc volunteers the Asia Pacific, and to provide continuity during the transition period of handing over of responsibilities of the AP Board Directorship and its officers from one committee to the next. Over the years, we have coordinated an increasing no. of ComSoc Distinguished Lecture Tours to the Asia Pacific region to stimulate more local Chapter activities. We also monitor Chapter activities and encourage them to publicize for member recruitment and retention. Technological advances in web applications in recent years, has empowered our members, customers and volunteers and enabled them to complete transactions, retrieve information and network with their peers. We strive to support and complement these new online services. IEEE membership in the Asia Pacific continues to grow, and our office will be looking to leverage membership growth opportunities and to provide greater visibility for the Communications Society in 2011.

*Ribbon cutting and celebration at the new IEEE AP office at Fusionopolis on 1 Nov., 2010. From left to right: Tony Quek, Principal Investigator and Senior Research Engineer of the Institute for Infocomm Research A*STAR; Dim-Lee Kwong, Executive Director of the Institute of Microelectronics A*STAR; Lim Chuan Poh, Chairman of A*STAR; Pedro Ray, IEEE President; James Prendergast, IEEE Executive Director; Low Teck Seng, Managing Director of A*STAR.*

The new office is currently undergoing renovation and outfitting. It is expected to be fully operational end January 2011. Do drop by to visit us at our new location: 1 Fusionopolis Walk, #04-07, South Tower, Solaris, Singapore 138628.

Activities of the Tomsk IEEE ComSoc Chapter in 2010

By Oleg Stukach, Tomsk Chapter Vice-Chair, Russia

Tomsk IEEE Chapter is part of the IEEE Russia Siberia Section and the IEEE Region 8 (Europe, Middle-East and Africa region). Chapter has been initially established in Tomsk after approval of the Russia Section on January 1, 2000. The Chapter is created as part of the following Societies: Electron Devices (ED), Antennas and Propagation (AP), Communications (COM), Microwave Theory and Techniques (MTT), Electromagnetic Compatibility (EMC).

Efforts to increase the level of IEEE activities in the Siberia and Far East regions of Russia are in progress. There has been significant progress in the last several years. A good example is the International Siberian Conference on Control and Communications SIBCON which was technically co-sponsored by IEEE, was attended by 300 participants from 8 countries. The unique opportunity to meet and to hear the views of different participants was of great value and an excellent forum for focusing on the many common technology issues.

In the first half of this year, the Tomsk Joint Chapter has held two technical meetings and we plan to hold another four meetings by the end of the year. In April, we presented seminar "Join the ComSoc" to our students and plan to extend this direction of our activity. This experience contributes to motivate us to continue working hard for the ComSoc community.

We really appreciate the opportunity of sharing ideas via the ComSoc hosting of our website http://chapters.comsoc.org/tomsk. It will encourage us to increase Tomsk Chapter member's activity as well as all Russian ComSoc members and expand our projects especially Web project "ComSoc in Russian" http://chapters.comsoc.org/tomsk/comsoc/comsoc.htm

Members of the Tomsk Chapter having dinner at the IEEE ComSoc SIBCON Conference (left to right: Igor Sychev, Irina Sycheva, Alexey Osovsky, Denis Kutuzov, Oleg Stukach).

Currently, the chapter programs are focused on three main aspects: an effort to increase membership by participation of scientists and students in IEEE activities, SIBINFO student paper contest, and co-operation in organizing international conferences covering various aspects of electronics, radar, communications etc. We are proud that Tomsk Chapter has

(Continued on Newsletter page 4)

2010 Celebrates the 30th Sister Society Agreement

By Roberto Saracco, Director - Sister Societies, IEEE Communications Society

In the last 10 years COMSOC has consistently sought to establish ties with other Societies with a local footprint. The reason for that is still valid today. COMSOC is a international organization providing a global reach and global perspective. It is to the benefit of all its members if this global reach can be complemented with a local focus. Indeed, many COMSOC members are also members of their local Society because there they can find the desired ties with their territory. The goal of setting up agreements with local Society is to extend this local view and perspective also to engineers living in a different area.

As the world shrinks it gets more and more interesting to share experiences among different realities understanding the local perspective. Additionally, COMSOC members are part of a mostly homogeneous community whilst local Societies very often include different branches of engineering, civil engineering, electronic engineering, ...

As communications becomes more and more pervasive, the possibility of being exposed to a varied world is increasingly important. During 2010 we have reached the 30 Sister Societies mark, an important figure, giving us a broad coverage of the world. We are still missing some parts of the world, like central Africa, an area that is likely, and hopefully, to see a significant evolution in the coming years, and Australia, but we are working on this. So expect some good news in 2011.

In these last two years we have managed to establish ties with organizations that are slightly different from the ones I have just presented, having a global (or regional) footprint or a complementary area of operation. Notably, we have established ties with EWI, the East West Institute that is addressing policy and political issues, with FITCE, the European Organizations clustering all European Telecommunications Associations also dealing with policy issues.

Having reached this milestone we are now looking to exploit what has been built over the years rather than focussing on further expanding the number of agreements (with the exception of Central Africa and Australia, as I previously mentioned). One concrete step that has been taken is the appointment of a liaison officer in Chapters co-located with each Sister Society and a COMSOC officer for each global Society. This should ensure more effective communications and better exploitation of the relationship.

Next years we will be establishing a metric to measure the effectiveness of each agreement, in terms of joint activities: co-sponsored conferences, exchange of lecturers, presentation at each other events, participation in each other events, number of members of one organization joining the other, publication of papers in each other's magazines and journals.

For more information: http://host.comsoc.org/sistersocieties/index.html

Global Communications Newsletter

www.comsoc.org/pubs/gcn

STEFANO BREGNI
Editor

Politecnico di Milano - Dept. of Electronics and Information
Piazza Leonardo da Vinci 32, 20133 MILANO MI, Italy
Ph.: +39-02-2399.3503 - Fax: +39-02-2399.3413
Email: bregni@elet.polimi.it, s.bregni@ieee.org

IEEE COMMUNICATIONS SOCIETY

KHALED B. LETAIEF, VICE-PRESIDENT CONFERENCES
SERGIO BENEDETTO, VICE-PRESIDENT MEMBER RELATIONS
JOSÉ-DAVID CELY, DIRECTOR OF LA REGION
GABE JAKOBSON, DIRECTOR OF NA REGION
TARIQ DURRANI, DIRECTOR OF EAME REGION
NAOAKI YAMANAKA, DIRECTOR OF AP REGION
ROBERTO SARACCO, DIRECTOR OF SISTER AND RELATED SOCIETIES

REGIONAL CORRESPONDENTS WHO CONTRIBUTED TO THIS ISSUE

NICOLAE OACA, ROMANIA (NICOLAE_OACA@YAHOO.COM)

A publication of the
IEEE Communications Society

SANTA CLARA VALLEY CHAP./*continued from page 2*

for clarification and research related to single lane high speed links. It was noted by this author that almost 10 years after standardization, servers in the data center only recently have included 10G Ethernet port interfaces while 10G Ethernet switches only now can switch multiple ports at wire-line rates. So how long will it take for 40G/ 100G Ethernet to be widely deployed in its targeted markets? The panelists concurred that more and more traffic is being aggregated onto 10G Ethernet links and that will drive the need for 40G Ethernet in the data center. Mark Gustin said, "100GE is needed today for uplinks in various layers of the network.". But the timing is uncertain. Higher speed uplinks on Ethernet switches, high performance data centers (e.g. Google), Internet exchanges, wide area network aggregation, and box to box communications were seen as the first real markets for 40G/ 100G Ethernet. Each market segment/ application area will evolve at its own pace, but for sure the 40G/ 100G Ethernet standard will be an enabler of all of them.

The final question was asked by former IEEE 802.3 Chair, Geoff Thompson. Geoff first noted that 40G/ 100 G Ethernet standard and all the higher speed Ethernet studies being worked in IEEE 802.3 are for the core enterprise or carrier backbone network. He then asked the panelists when would there be big enough technological advances in the access or edge network to enable higher speeds there, i,e, the on ramps/ off ranps to the core network. The panelists could not answer this question as it was too far from their areas of expertise. In particular, nothing was said about the very slow-to-improve telco wireline access network (DSL or fiber) and the need to build out fiber closer to the business and residential customers to achieve higher access rates. Nonetheless, the audience was very pleased to learn the 802.3ba architecture was scalable and seems to be future proof for higher speed Ethernet.

TOMSK CHAPTER/*continued from page 3*

been selected as one of the four winners of the 2010 Chapter Achievement Award. We will continue to make efforts to include our specialists in the scientific and educational process worldwide; and in this respect, count on further precious assistance of IEEE ComSoc.