GCN
GLOBAL
COMMUNICATIONS
NEWSLETTER

August 2016
ISSN 2374-1082

CHAPTER REPORT

IEEE North Jersey Section Recognizes Society Members Awardees

By Amit Patel, IEEE North Jersey Section Communications Society Chapter Chair

At the IEEE North Jersey Section's Annual Awards Reception, held May 1, 2016 at the Birchwood Manor, Whippany, New Jersey, USA, several section Communications Society members were recognized for their outstanding contributions.

The reception honors numerous local members from different technical society chapters and committees for their achievements. Awardees and their guests celebrate many different accolades covering section, regional, international, and society awards as well as Fellow grade elevations.

The section had the pleasure of recognizing three of its Communications Society members this year. The honorees were for a Fellow elevation, a Society prize, and IEEE Region 1 recognition.

The IEEE North Jersey Section is very active and has numerous opportunities for both members and visitors to attend meetings on both technical and professional topics. For a listing of local meetings, events, conferences, and publicity coverage, visit the IEEE North Jersey Section website at: http://sites.ieee.org/northjersey/.

Emad Farag is LTE Modem Software Technical Manager at Nokia–Bell Labs in Murray Hill, New Jersey, USA. He received his Ph.D. from the University of Waterloo in 1997, and his Master of Science from Ain Shams University in 1994. Prior to his time at Bell Labs he was a research assistant professor at the University of Waterloo. He is also currently a volunteer with the North Jersey Section, and he chairs the Instrumentation Measurement Society Chapter.

Emad Farag (left) receives the IEEE Region 1 Award from Adriaan van Wijngaarden (right), Chairman, IEEE North Jersey Section..

Thomas Marzetta

Osvaldo Simeone

With more than 18 years at Nokia he has authored many patents and he has held roles of increasing responsibility managing numerous engineers on different teams. He was received the IEEE Region 1 Technological Innovation Award for outstanding leadership and significant innovations in wireless modem architectures.

Thomas Marzetta is the originator of Massive MIMO, the most promising technology available to address the ever increasing demand for wireless throughput. He is group leader of Large Scale Antenna Systems at Nokia–Bell Labs, and co-head of their FutureX Massive MIMO project.

Dr. Marzetta received a Ph.D. and B.S. in electrical engineering from Massachusetts Institute of Technology in 1978 and 1972, respectively, and the M.S. in systems engineering from the University of Pennsylvania in 1973. In 1995 he joined Bell Labs, where he served as the director of the Communications and Statistical Sciences Department within the former Math Center.

He received the 2015 IEEE Communications Society Stephan O. Rice Prize for the paper co-authored with Hien Quoc Ngo and Erik G. Larsson entitled "Energy and Spectral Efficiency of Very Large Multiuser MIMO Systems," published in the *IEEE Transactions on Communications*, vol. 61, no. 4, pp. 1436-1449, April 2013.

Osvaldo Simeone received the M.Sc. degree (with honors) and the Ph.D. degree in information engineering from Politecni-

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CONFERENCE REPORT

Highlights of Internet of Things (IoT) Conferences in Silicon Valley

By Alan J Weissberger, IEEE Sr. Life Member and GCN NA Correspondent, USA

With extraordinary potential, impact, and influence, the Internet of Things (IoT) promises to be a big revenue generator and improve efficiencies for many different industries and companies. Gartner Group has forecast "$1.9 trillion value-add IoT revenue across industry sectors in 2020." Also from Gartner: "IoT endpoints will grow at a 31.7 percent CAGR from 2013 through 2020, reaching an installed base of 20.8 billion units."

While IoT is one of the hottest tech topics trending now, it is marked by tremendous hype, confusion, and chaos. This article reviews three recent IoT conferences in Santa Clara, CA (the center of Silicon Valley) that were aimed at cutting though the confusion, enumerating the challenges and opportunities, and discussing the current status of the IoT.

2016 IEEE Tech Industry Summit – June 6-7, 2016

This IEEE conference focused on the different IoT challenge areas that are of concern to various industries, such as: power/energy, aviation/transportation, automotive, industrial control, medical, and wearables.

Keynote speakers included Ken Caviasca from Intel, who discussed IoT Technologies, and Phil Kelly, Chief Scientist at Energous, who delivered a keynote on IoT Wearables. Key use cases, adoption patterns, and techno-socio-economic challenges were discussed, along with security (which continues to be the number one challenge for most IoT applications).

There was an informative presentation on "The Transformative Role of IoT on the Future of Education," and a lively panel focused on venture capital and the IoT areas that are attracting investments. Not surprisingly, most investments are in start-ups that are building IoT software platforms that run in the cloud, or in big data that analyzes data collected by "things."

A panel on an IEEE standard for an IoT architectural framework provided an overview of that ongoing work in progress. The architectural framework defined in the P2413 IEEE standard is intended to promote cross-domain interaction, aid system interoperability and functional compatibility, and fuel the growth of the IoT market. The adoption of a unified approach to the development of IoT systems will reduce industry fragmentation and create a critical mass of stakeholders around the world. The architectural framework for IoT provides a reference model that defines relationships among various IoT verticals (e.g., transportation, healthcare, etc.) and common architecture elements. It also provides a blueprint for data abstraction and the quality "quadruple" trust that includes protection, security, privacy, and safety." Also, this standard provides a reference architecture that builds upon the reference model. The reference architecture covers the definition of basic architectural building blocks and their ability to be integrated into multi-tiered systems.

Internet of Things Developers Conference – May 25-26, 2016

This conference and trade show focused specifically on the IoT product developer with in-depth technical presentations and panel sessions. Hands-on demonstrations helped attendees learn about a vendor's IoT platform.

Maarten Bron of Underwriters Laboratories presented a very refreshing session on IoT security. Bron stated that "as our connected society continues to expand, we are rapidly approaching the practical limits of classical IT security certification. Since nobody certifies the Internet, we must make sure that the Internet of Things becomes a reliable and trustworthy place to be in." There were two key takeaways:

- IoT security should be as foolproof as an unpickable lock.
- Each vendor's IoT security capabilities should be STAR rated, by either an independent certification agency or the vendor, after executing several (to be defined) test procedures.

One of the more interesting panel sessions was titled "Sorting Through the Myriad of IoT Connectivity Options." This included both wireless LANs and new narrow bandwidth wireless WANs. These are often referred to as NB-IoT and/or LPWA (or LPWA). There are many choices here, but the main ones are:

- LTE Category 1, M1, M2 (Verizon, many other LTE operators).
- LoRa WAN (Orange, SK Telecom).
- SIGFOX (new 2G type of wireless WAN being deployed in France, Belgium, the U.S., etc.).
- Wi-Fi HaLow™ (WiFi Alliance designation for products incorporating IEEE 802.11ah technology operating <1GHz).

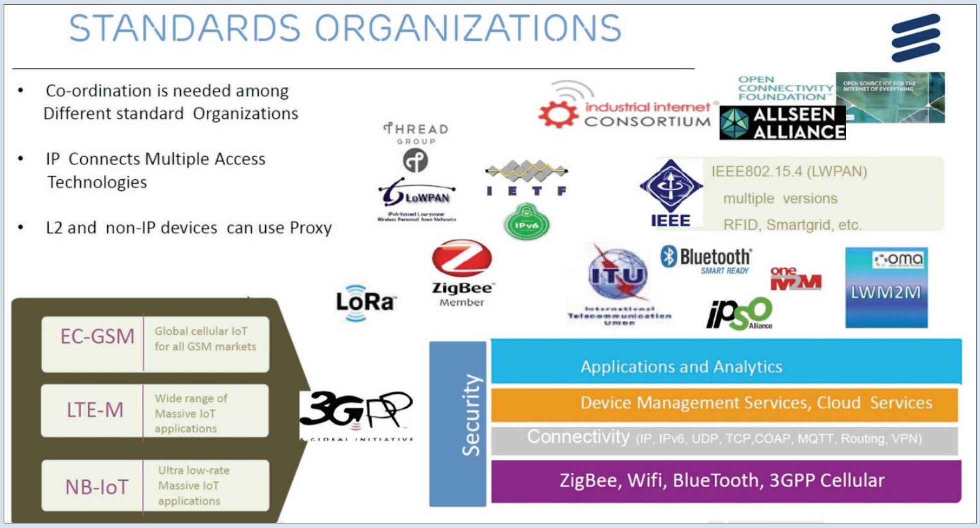
Needless to say, there are a plethora of standards bodies and forums working on new connectivity standards or tweaking existing standards for IoT applications. This is illustrated in the figure below, courtesy of Ericsson.

IoT World – May 10-12, 2016

This was the largest IoT conference in the world with more than 10,100 registered attendees, as well as the biggest IoT trade show in terms of exhibit space. Every square inch of the Santa Clara Convention Center was packed with exhibits and vendor presentation or showcase areas.

IoT industry verticals like smart homes, connected cars, wearables (fitness trackers, medical monitors, etc.), industrial IoT, manufacturing/factory floor, smart building/smart cities, were all represented on the show floor, conference sessions, and vision theater. There were also sessions and exhibits on IoT security, IoT cloud, big data/analytics, smart cities, wearables, and many other hot topics broadly related to IoT.

The main theme of the May 10 executive keynotes, "Disrupt, Innovate, and Monetize," with new business models, improved productivity and other benefits, greatly added to the hype, while providing little or no substance to resolve the critical issues that have plagued IoT since the name was coined (replacing M2M communications).



STANDARDS ORGANIZATIONS

- Co-ordination is needed among Different standard Organizations
- IP Connects Multiple Access Technologies
- L2 and non-IP devices can use Proxy

IEEE802.15.4 (LWPAN)
multiple versions
RFID, Smartgrid, etc.

EC-GSM Global cellular IoT for all GSM markets
LTE-M Wide range of Massive IoT applications
NB-IoT Ultra low-rate Massive IoT applications

Security
Applications and Analytics
Device Management Services, Cloud Services
Connectivity (IP, IPv6, UDP, TCP,COAP, MQTT, Routing, VPN)
ZigBee, Wifi, BlueTooth, 3GPP Cellular

industrial internet CONSORTIUM
OPEN CONNECTIVITY FOUNDATION
OPEN SOURCE IOT FOR THE INTERNET OF EVERYTHING
ALLSEEN ALLIANCE
THREAD GROUP
6LoWPAN
IETF
IPv6
IEEE
ZigBee Member
LoRa
ITU
International Telecommunication Union
Bluetooth SMART READY
one M2M
IPSO Alliance
oma
LWM2M
3GPP
GLOBAL INITIATIVE

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CHAPTER REPORT

Activities of the IEEE ComSoc Kerala Chapter

By Sreevas Sahasranamam, Secretary of the IEEE Communications Society Kerala Chapter

Internet of Things (IoT) Workshop

The IEEE Communications Society (ComSoc) Kerala Section chapter organized a one day workshop on the contemporary and interdisciplinary engineering topic Internet of Things (IoT) on 10 December 2015 in Trivandrum. This event was co-organized with the third edition of the International Conference on Recent Advances in Computational Systems (RAICS) 2015. This workshop was supported by $US800 in funding from the Region 10 ComSoc Chapter. The event was attended by 40 people, which included a mix of students, academics, and industry professionals.

The event started at 9:30 am with a welcome speech by R. Ananthalakshmi Ammal, the ComSoc Kerala Section Chair. The workshop led by Dr. Srikanth (Chief Knowledge Officer, Nanocell Networks) was scheduled into four modules. The first module provided an overview of IoT applications and current trends in IoT. The second module discussed the technologies enabling IoT, such as sensors and actuators, wireless, IoT platforms, big data, and cloud. In the first half of the afternoon session, real time demos of IoT applications such as remote home monitoring and automated moisture control for soil were demonstrated by Mr. Vignesh Pai (Senior Technical Trainer, Nanocell Networks). The final session focused on protocols and standards of IoT applications.

Distinguished Lecture Program

The IEEE Communications Society Kerala Section organized two Distinguished Lecture Programs (DLPs) during the month of March 2016 on the topic "Cooperative Service Management in the Healthcare Sector: Emerging Trends and Future challenges." The first session was held on 30 March 2016 at the CDAC Trivandrum from 5:30 to 6.30 pm, with participation of approximately 35 people. The second session was held on 31 March 2016 at the Rajagiri School of Engineering and Technology (RSET), Kochi from 12 noon to 1.00 pm, with participation of more than 50 people. The sessions were presented by Professor Pradeep Ray from the University of New South Wales, Australia. Professor Ray is also the Director of the WHO Collaborating Centre on eHealth. His talk extensively discussed the role of technology in e-health and m-health initiatives, and its impact on rural areas. The sessions were organized in collaboration with the IEEE Engineering in Medicine and Biology Society (EMBS) and the IEEE Society on Social Implications of Technology (SSIT).

Professor Pradeep Ray during his Distinguished Lecture Tour.

College of Engineering Trivandrum ComSoc Student Branch Chapter

The ComSoc Student Branch at the College of Engineering Trivandrum conducted a ham radio event involving Morse code

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CHAPTER REPORT

From the Republic of Macedonia Chapter: Another Successful FutureComNet Edition

By Vladimir Atanasovski, IEEE R. Macedonia ComSoc Chapter Chair

FutureComNet is an annual conference organized by the Institute of Telecommunications at the Faculty of Electrical Engineering and Information Technologies in Skopje. The main idea is to celebrate the World Telecommunications and Information Society Day (WTISD), on 17 May. Moreover, this year (2016) marks two noteworthy milestones: the 100th anniversary of the birth of Claude Shannon, and the 60th anniversary of the birth of Nikola Tesla. Therefore, the IEEE R. Macedonia ComSoc chapter decided to support FutureComNet 2016 in order to celebrate these important milestones and increase the visibility of the chapter and its wider dissemination. Prof. Liljana Gavrilovska is the General Chair of FutureComNet 2016 and the past president of the IEEE R. Macedonia ComSoc chapter; the current president, associstae professor Vladimir Atanasovski, was involved in the organizing committee of FutureComNet 2016.

FutureComNet celebrated the 100th anniversary of Claude Shannon's birth.

FutureComNet featured several talks from academia and industry, as well as round table discussion on hot topics.

The FutureComNet conference gathers local and regional experts to give plenary talks and organize round table sessions on hot topics such as 5G, SDN, virtualization, Over-The-Top (OTT) services, IoT, etc. Previous editions featured speakers such as professor Ian Akyildiz from Georgia Tech, the CTO of Deutsche Telekom in Macedonia, etc. This year (2016), the conference was organized for the third time under the motto "Internet-of-Things: The Great Disruption," and was focused on standardization in IoT and IoT practical use-cases. There were plenary talks from Dr. Srdjan Krco (DunavNet company, Serbia), Peter Statev (Bulgaria), a representative from Huawei Macedonia, and several talks from academia and industry in Macedonia on practically realized use-cases of the IoT paradigm. Also, there was a short exhibition showcasing the life and the work of Claude Shannon and Nikola Tesla through videos and posters. More info can be found at

http://tk.feit.ukim.edu.mk/ITK_workshop_2016/.

IoT Conferences/*Continued from page 2*

The Executive Keynotes (often sponsored talks) were from Hitachi, SAP, ADT, Microsoft, Silver Springs Networks, HP Enterprise, Schneider Electric, and JCI. One standout was the HP Enterprise announcement of their Universal IoT Platform.

The new functionality in the HP Enterprise Universal IoT Platform was said to be a driving force in building the infrastructure that will enable and sustain the growth of IoT. The HPE universal IoT platform is aligned with the oneM2M industry standard and is designed to be industry and vendor-agnostic, enabling IoT operators to simultaneously manage heterogeneous sets of sensors, operate vertical applications on machine-to-machine (M2M) devices, as well as process, analyze, and monetize collected data in a single secure cloud platform.

The HPE Universal IoT Platform provides increased support for long range, low power connectivity, ensuring that LoRa® and SIGFOX deployments can be supported alongside other connectivity protocols, including cellular, radio, Wi-Fi, and Bluetooth.

In a May 11 technical session titled "Navigating the IoT Connectivity Landscape," Alex Kengen of Dialog Semiconductor stated that there's a "sea of confusion" when it comes to IoT connectivity standards for LANs and PANs, such as WiFi, Bluetooth, ZigBee, Thread, and DECT ULE. That confusion also extends to new IoT WANs, as described in the IoT developers conference above.

Closing Comments and Concerns

•We wonder how "universal" the HP and other IoT platforms really are and what truly differentiates them from more than 350 other IoT platforms that have been announced.

•Connectivity is a critical issue for multi-vendor interoperability IoT PANs, LANs, and WANs. However, it is just the first step for IoT interoperability and may *not* be IP based (e.g., a different packet format and addressing is used by ZigBee). Many other protocol related issues are still unresolved, including: message format above the transport layer, authentication, security protocols and counter-measures, failover/protection/restoration, OAM&P, etc.

•There needs to be much more discussion on how much of the "thing" data, control, and status signals should be sent to (or from) the Internet vs. being handled by a local access controller. Of course, there will likely *not* be any local controller for heavy industrial equipment in the field or a cargo container moving through the ocean. But what about a connected home, car, or factory floor?

•Security and privacy remain huge challenges for IoT. That has remained the case with little observable progress over the past six years.

GCN GLOBAL COMMUNICATIONS NEWSLETTER

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IEEE ComSoc™ IEEE Communications Society

www.comsoc.org/gcn
ISSN 2374-1082

North Jersey Section/*Continued from page 1*

co di Milano, Milan, Italy, in 2001 and 2005, respectively. He is currently with the Center for Wireless Communications and Signal Processing Research (CWCSPR), New Jersey Institute of Technology (NJIT), Newark, NJ, where he is an associate professor. His research interests are in wireless communications, information theory, optimization, and machine learning.

In July 2015 he received the IEEE Communication Society Best Tutorial Paper Award for the paper "Multi-Cell MIMO Cooperative Networks: A New Look at Interference," published in *IEEE Journal on Selected Areas in Communications* in Dec. 2010. While on sabbatical at Imperial College, London in late 2015, he was elevated to IEEE Fellow for contributions to cooperative cellular systems and cognitive radio networks.

Kerala Chapter/*Continued from page 3*

practice. An interactive session was first conducted with members of a ham radio club at the Kerala State Science and Technology Museum, Thiruvananthapuram on 21 July 2015.

The event started with a welcome speech from the ComSoc student branch chair. This was followed by a session by Joseph Daniel, who is a member of the Radio Amateur Society of Ananthapuri (RASA). He discussed the basics of ham radio, Morse code, and the relevance of ham radio in the modern world where a variety of communication options are available.

A live demonstration was carried out and we were able to contact a ham operator living in Attingal. Fifteen students participated in the session, including those who appeared for the examination on 31 July 2015. The session was concluded with a vote of thanks by the secretary of the ComSoc Student Branch at the College of Engineering Trivandrum.

The ham radio examination was conducted at the Kerala State Science and Technology Museum PMG on 31 July 2015. Seventeen students from the College of Engineering Trivandrum attended the examination, and all of them successfully passed the examination.

Vimal Jyothi Engineering College (VJEC) ComSoc Student Branch Chapter

World Environment Day: The IEEE ComSoc Student Branch Chapter celebrated World Environmental Day at VJEC on 5 June 2015 by conducting a session on the topic "Electronic Waste" for third semester electronics and communication students. They also planted approximately 50 trees on the campus.

Industry Interaction Session: The Industry Relation Committee of the IEEE Malabar Subsection, in association with the ComSoc Student Branch Chapter at VJEC, conducted an industry interaction session on 3 August 2015. The inaugural session started at 9:30 am. Mr. Jayesh George, an assistant professor in the Electronics and Communication Engineering (ECE) Department, delivered the welcome speech. The session was then handed over to our featured guest, Mr. Mahesh Ravi Varma, who is senior digital design engineer at Texas Instruments. His talk focused on robotics, embedded design, signal processing, and entrepreneurship. More than 60 students attended the session.

Project Competition: The ComSoc Student Branch Chapter organized a project competition for the students in Electronics and Communication Engineering (ECE) Department. Students who had a new idea were invited to participate in the event. Approximately 10 teams registered for the event. A project exhibition was conducted and prizes were distributed.

Seminar Competition: The ComSoc Student Branch organized a seminar competition for seventh semester ECE students on 28 August 2015. Ten teams participated in the competition, in which each one of them presented seminars on a topic. Prof. Roshini (head of the ECE Department) distributed the prizes.