

THE 12TH ANNUAL
IEEE CONSUMER COMMUNICATIONS &
NETWORKING CONFERENCE
January 11-14 • Las Vegas, Nevada USA



**On behalf of the IEEE CCNC 2015 Organizing committee,
it is my pleasure to welcome you to the Twelfth Annual
IEEE Consumer Communications and Networking Conference.**

Consumer communications and networking has never been more relevant or important. Connected devices, products, and services continue to rapidly evolve, as do the underlying protocols and infrastructures that support them. IEEE CCNC 2015 continues the tradition of emphasizing the future. We bring together academic theorists and industry practitioners to share the latest ideas and results—theory and practice—in the ever advancing convergence of communication and computing.

Led by Yacine Ghamri-Doudane and Mehmet Can Vuran, the IEEE CCNC 2015 Program Committee has put together a high quality, stimulating and comprehensive set of conference sessions, including technical paper presentations, keynotes from distinguished experts, panels, workshops, tutorials, and demonstrations. We are proud to welcome three high-caliber distinguished speakers from academia and industry who will be sharing their perspectives with us. For the opening keynote on Saturday morning, we are very pleased to present Moe Tanabian, VP at Samsung Research America and Lab Head for their Smart Things Innovations Lab. On Sunday morning, we are honored to present our second keynote speaker, Jon Peha, Full Professor at Carnegie Mellon University. Finally, we are happy to announce that our third keynote, scheduled for Sunday evening, will be given by Nirwan Ansari, Distinguished Professor of Electrical and Computer Engineering, New Jersey Institute of Technology.

Finally, my sincere thanks goes to the many people who've put in their time and dedication to making IEEE CCNC 2015 a success, including Yacine Ghamri-Doudane, Technical Program Chair; Mehmet Can Vuran, Technical Program Vice-Chair; Cedric Westphal, Industry Session Chair; Sidi – Mohammed Senouc, Work-in-Progress Chair; José Saldana, Publications Chair; Damla Turgut, Special Session Chair; Ilker Demirkol and Ertan Onur, Demonstrations Chairs; Berk Canberk, Tutorial Chair; and, JuanCarlos Cano and Cheng Li, Workshop Chairs. I'd also like to thank Rob Fish and Alex Gelman from the IEEE CCNC steering committee for their always timely and sage advice.

A very special thank you goes to Diane Williams, the IEEE CCNC 2015 conference manager, for handling all the details—large and small—involved in putting together this event.

We are looking forward to an exciting event and hope that you will find IEEE CCNC 2015 to be informative, enjoyable, and memorable. With your help, IEEE CCNC is always a great place to discuss innovation and network with colleagues.

Henry Holtzman

IEEE CCNC 2015 General Chair
Samsung Research America, USA



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On behalf of the Technical Program Committee, we warmly welcome you to Las Vegas for an exciting technical program offered by the 2015 IEEE Consumer Communications and Networking Conference (CCNC).

Overlapping the 2015 International Consumer Electronics Show (CES), IEEE CCNC was specifically organized by the IEEE Communications Society (ComSoc) to drive the development of global consumer electronics technologies that will one day provide access to information anytime, anywhere, regardless of time or location. The conference enjoys strong support and participation from the consumer electronics industry and provides a mutually beneficial mix of academic and industrial participation.

This year, we have expanded the technical scope of IEEE CCNC to include 10 tracks. They are:

- Cloud Services and Networking
- Consumer Communications and Networking Standards
- Green Communications and Computing
- Mobile and IoT Devices and Platforms
- Network Gaming
- Security, Privacy and Content Protection
- Smart Spaces and IoT Networking
- Social, P2P and Multimedia Networking, Services and Applications
- Wireless Communications
- Wireless Networking and Mobility

We are pleased to report a strong technical program with exceptional quality. IEEE CCNC 2015 Main Program has received 248 submissions. Lead by a TPC Chair, a TPC Vice Chair, and 14 Track Chairs, 204 reviewers are recruited to provide a rigorous double-blind review. Each paper has thus received at least 3 independent reviews (846 reviews total). These reviews served as the basis to select 92 papers for presentation (37% acceptance rate). In addition, 52 papers have been selected to present in the work-in-progress sessions, 33 as mini-conference oral presentations and 19 as poster presentations.

During the main conference (Jan. 10-11, 2015, Saturday to Sunday), IEEE CCNC 2015 attendees will be addressed by three world class scientist/practitioner, that we are delighted to have as keynote speakers:

- Moe Tanabian, VP, Samsung; Lab Head, Smart Things Innovations Lab
- Jon Peha, Full Professor, Carnegie Mellon University
- Nirwan Ansari, Distinguished Professor, New Jersey Institute of Technology

In addition to that, the accepted papers will be presented in four parallel sessions with two oral sessions in the morning and three additional oral sessions in the afternoon. A panel on "Converging around Big Data and the Consumer" will be presented the morning of Saturday, Jan. 10, 2015. It will be followed by an industry session, comprising 5 industrial oral presentations. We have designed the program considering the diversified background of IEEE CCNC audience, so that you can always find a high quality talk of your interest at any given time, be it a high quality paper presentation or a panel. In addition, a one hour demo session is held each afternoon after lunch to showcase a selection of exciting leading edge consumer communication demos, some of which will be presented at the Consumer Electronics Show (CES) at IEEE booth. Poster presentations will also be showcased in parallel with demos.

The day before the main conference (Friday, Jan. 9, 2015) and the day after the main conference (Monday, Jan. 12, 2015) IEEE CCNC 2015 will have seven tutorials shared by world experts. IEEE CCNC 2015 will also present three co-located workshops (15 accepted papers in total), which are:

- Cloud-assisted Context-Aware Networks and Cognitive Networks (CCAN 2015)
- Recent Advances in WBANs Design and Deployment for Real-time and Healthcare Applications (RA-WERHA 2015)
- Vehicular Networking and Intelligent Transportation Systems (VENITS 2015)

All this would not have been possible without the tremendous efforts of volunteers organising the technical tracks, workshops, tutorials, panels and demos; and the many TPC members and reviewers that provide the input for the papers in IEEE CCNC 2015. Most notably, we would like to thank the Track Chairs: Dr. Khaled Boussetta, University of Paris 13 and INRIA; Dr. Periklis Chatzimisios, Alexander TEI of Thessaloniki; Dr. Floriano De Rango, University of Calabria; Dr. Ben Falchuk, Applied Communication Sciences; Prof. Can Koksak, The Ohio State University; Dr. Marie-Jose Montpetit, MIT Media Laboratory; Dr. Enrico Natalizio, Université de Technologie de Compiègne; Prof. Claudio Palazzi, University of Padua; Prof. Dario Pompili, Rutgers University; Dr. R Prasad, Delft University of Technology; Prof. Gregor Schiele, University of Duisburg-Essen; Dr. Stefano Secci, University Pierre et Marie Curie - Paris 6; Prof. A. Selcuk Uluogac, Florida International University; Dr. Linda Jiang Xie, University of North Carolina at Charlotte. Industry Session Chair: Cedric Westphal, Huawei



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Innovation Center; Work in Progress Chair: Sidi-Mohammed Senouci, University of Burgundy; Publications Chair: José Saldana, University of Zaragoza; Special Session Chair: Damla Turgut, Central Florida University; Demonstrations Chairs: Ilker Demirkol, Universitat Politècnica de Catalunya; Ertan Onur, Middle East Technical University; Tutorial Chair: Berk Canberk, Istanbul Technical University. We would also like to thank the Workshop Chairs: Juan-Carlos Cano, Polytechnic University of Valencia; Cheng Li, Memorial University of Newfoundland; as well as the workshop organizers.

A very special thank you goes to the Conference General Chair Henry Holtzman, Samsung, for his leadership and the Steering Committee Chair Rob Fish for his support of the organization committee to make IEEE CCNC 2015 a success. I would also like to express sincere thanks and gratitude to Diane Williams, who as the Conference Manager has done a tremendous detailed job supporting the conference as a whole. Finally, we would also like to thank our patron: Samsung at Diamond level.

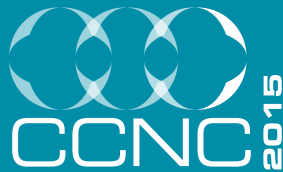
I hope that you will enjoy our high-quality technical program; and will take advantage of the opportunities to learn about the latest research findings and the state-of-the-art consumer communications and networking technologies. Hopefully, you will have a chance to see old friends and make new ones; and will have an opportunity to discuss exciting new ideas with your colleagues. Please also enjoy the excellent food and shows in the evening in the special city of Las Vegas!

Yacine Ghamri-Doudane

IEEE CCNC 2015 TPC Chair
University of La Rochelle, France

Mehmet Can Vuran

IEEE CCNC 2015 TPC Vice Chair
University of Nebraska–Lincoln, USA



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Network Gaming Chair

Khaled Boussetta, Univeristy Paris 13 and INRIA, France

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Industrial Program Chair

Cedric Westphal, Huawei Innovation Center, USA

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Juan Carlos Cano, Polytechnic University of Valencia, Spain

Special Session Chair

Damla Turgut, Central Florida University, USA

Work in Progress Chair

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Ertan Onur, Middle East Technical University, Turkey

Tutorial Chair

Berk Canberk, Istanbul Technical University, Turkey

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H.Yeom, Seoul Nat'l University, Korea
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K. Zheng, Beijing University, China
L.Zhou, Nanjing University, China

Cloud Services and Networking

Track Chair: Stefano Secci, UPMC, France

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Luis Miguel Contreras, Telefonica I+D, Spain
Luis Henrique Costa, UFRJ, Brazil
Thierry Coupaye, Orange Labs, France
Andrzej Duda, Grenoble Institute of Technology, France
Nelson Fonseca, University Campinas, Brazil
Stefano Giordano, University Pisa, Italy
Lisandro Granville, Federal University of Rio Grande do Sul, Brazil
Toru Hasegawa, KDDI Labs., Japan
Volker Hilt, Bell Labs/Alcatel-Lucent, USA

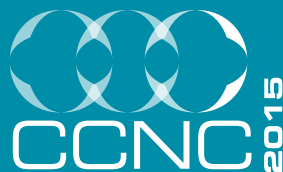
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Green Communications and Computing

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Hocine Ameur, Technology University of Troyes, France
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SeungSeob Lee, Yonsei University, Korea
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Guangjie Han, Hohai University, China
Agapi Mesodiakaki, Universitat Politècnica de Catalunya, Spain
Noriyuki Kushiro, Kyushu Institute of Technology, Japan
Zhen Liu, Beijing Jiaotong University, China



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Smart Spaces and IoT Networking

Track Chair: Enrico Natalizio, Université de Technologie de Compiègne, France

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Martin Bauer, NEC Laboratories Europe, Germany
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Ranjan Dasgupta, Tata Consultancy Services Ltd, India
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Jörg Hähner, University of Augsburg, Germany
Ali Hazmi, Tampere University of Technology, Finland
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Bin Liu, Samsung Research America, USA

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Arbia Riahi, Military Academy of Tunisia, Tunisia
Giuseppe Ruggeri, University Mediterranea of Reggio Calabria, Italy
Jose Santa, University Centre of Defence at the Spanish Air Force Academy, Spain
Thouraya Toukabri, Orange Labs, France
Anna Maria Vegni, University of Roma Tre, Italy

Security, Privacy and Content Protection Track

Track Chair: A. Selcuk Ulugac, Florida International University

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Danfeng Yao, Virginia Tech, USA
Apurva Mohan, Honeywell Inc, USA
Alptekin Kupcu, Koc University, Turkey
Zhipeng Chai, Georgia State University
Joe Benin, United States Coast Guard Academy, USA
Daisuke Mashima, Fujitsu Laboratories of America, USA
Ming Li, Utah State University, USA
Gyan Ranjan, University of Minnesota, Twin Cities, USA
Harald Baier, Hochschule Darmstadt / CASED, Germany
Wen Tao Zhu, Chinese Academy of Sciences, China
Rolf Oppliger, eSECURITY Technologies, Switzerland
Mahendra Talasila, University of North Texas, USA
Ashutosh Dutta, Mobility & Cloud Security, AT&T, USA
George Macon, Georgia Tech Research Institute, USA

Sara Foresti, Università degli Studi di Milano, Italy
Stéphane Betgé-Brezetz, Alcatel-Lucent Bell Labs, France
David Formby, Georgia Tech, USA
Richard Chow, Intel, USA
Xiaojing Liao, Georgia Tech, USA
Aaron Goldman, Georgia Tech, USA
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Michele Nogueira, Federal University of Paraná, Brazil
Shouling Ji, Georgia Tech, USA
Jose A. Onieva, University of Malaga, Spain
Ana Lucila Sandoval Orozco, Universidad Complutense de Madrid, Spain

Network Gaming

Chair: Khaled Boussetta, University Paris 13 and INRIA, France

Maha Abdallah, Pierre and Marie Curie University, France
Nadjib Achir, University of Paris 13, France
Dewan Ahmed, University of North Carolina at Charlotte, USA
Nadjib Aitsaadi, University of Paris-Est Creteil, France
Khaled Boussetta, University of Paris 13, France
Janick Edinger, University of Mannheim, Germany
Abdenour El Rhalibi, Liverpool John Moores University, UK
Herman Engelbrecht, Stellenbosch University, South Africa
Jörg Hähner, University of Augsburg, Germany
Joaquin Keller, Orange Labs, France

Christian Krupitzer, University of Mannheim
Dario Maggiorini, University of Milano, Italy
Gustavo Marfia, Università di Bologna, Italy
Wei Tsang Ooi, National University of Singapore, Singapore
Claudio Palazzi, University of Padua, Italy
Laura Ricci, University of Pisa, Italy
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Sebastian VanSyckel, University of Mannheim, Germany



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TECHNICAL PROGRAM COMMITTEES

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Claudio Palazzi, UNIPD, Italy

Maha Abdallah, Pierre and Marie Curie University
Alessandro Amoroso, University of Bologna, Italy
Alessandro Bassi, Bassi Consulting, France
Luca Bedogni, University of Bologna, Italy
Wafa Ben Jaballah, University of Bordeaux, France
Matteo Ciman, University of Padua, Italy
Ranjan Dasgupta, Tata Consultancy Services Ltd, India
Abdenmour El Rhalibi, Liverpool John Moores University, UK
Maria Fazio, University of Messina, Italy
Stefano Ferretti, University of Bologna, Italy

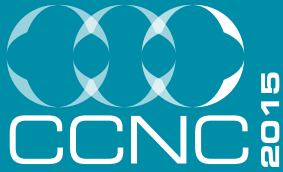
Marco Furini, University of Modena and Reggio Emilia, Italy
Ombretta Gaggi, University of Padua, Italy
Sergey Gorlatch, University of Munster, Germany
Kalman Graffi, Heinrich Heine University Düsseldorf, Germany
ProUmberto Grandi, Université Toulouse 1 Capitole, France
Emmanuel Lochin, University of Toulouse – ISAE, France
Dario Maggiorini, University of Milano, Italy
Gustavo Marfia, Università di Bologna, Italy
Silvia Mirri, University of Bologna, Italy

Wireless Networking and Mobility

Track Chair: Linda Xie, UNCC, USA

Angelos Antonopoulos, Telecommunications Technological Centre of Catalonia (CTTC), Spain
Liang Zhou, Nanjing University of Posts and Telecommunications, P.R. China
Michele Nogueira, Federal University of Paraná, Brazil
Alexey Vinel, Halmstad University, Sweden
Chuan Heng Foh, University of Surrey, United Kingdom
Andrzej Duda, Grenoble Institute of Technology, France
Hangquan Shan, Zhejiang University, P.R. China
Giacomo Verticale, Politecnico di Milano, Italy
Jörg Hähner, University of Augsburg, Germany
Ranjan Dasgupta, Tata Consultancy Services Ltd, India
Bong Jun Choi, The State University of New York (SUNY) Korea, Korea
Xin Jin, The University of Hong Kong, USA
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Yun Liao, Peking University, P.R. China
Thomas Little, Boston University, USA
Maode Ma, Nanyang Technological University, Singapore
Satyajayant Misra, New Mexico State University, USA
Kaoru Ota, Muroran Institute of Technology, Japan
Kyung-Joon Park, DGIST, Korea
Joel Rodrigues, Instituto de Telecomunicações, University of Beira Interior, Portugal
Kefeng Tan, Qualcomm Atheros, USA
Shaojie Tang, University of Texas at Dallas, USA
Preetha Thulasiraman, Naval Postgraduate School, USA
Yibo Xue, Tsinghua University, P.R. China
Qian Zhang, InterDigital, USA
Mingxin Zhou, Peking University, P.R. China
Thouraya Toukabri, Orange Labs, France

Kemal Akkaya, Florida International University, USA
George Amariuca, Iowa State University, USA
Edward Au, Marvell Semiconductor, Inc., USA
Armir Bujari, University of Padua, Italy
Prasad Callyam, University of Missouri-Columbia, USA
Jiannong Cao, Hong Kong Polytechnic Univ, Hong Kong
Xianghui Cao, Illinois Institute of Technology, USA
Yusun Chang, Southern Polytechnic State University, USA
Hui Chen, Virginia State University, USA
Ling-Jyh Chen, Academia Sinica, Taiwan
Zhuo Chen, InterDigital Communications, USA
Garth Crosby, Southern Illinois University Carbondale, USA
Haipeng Dai, Nanjing University, P.R. China
Ruiling Deng, Nanyang Technological University, Singapore
Mianxiong Dong, Muroran Institute of Technology, Japan
Domenico Ficara, Cisco Systems, Switzerland
Hacene Fouchal, Université de Reims Champagne-Ardenne, France
Visvasuresh Victor Govindaswamy, Concordia University, USA
Zhangyu Guan, State University of New York at Buffalo, USA
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Mohammad Hoque, East Tennessee State University, USA
Bo Ji, Temple University, USA
Linda Jiang Xie, University of North Carolina at Charlotte, USA
Huan Zhou, China Three Gorges University, P.R. China
Xiaobing Wu, Nanjing University, P.R. China
Pietro Manzoni, Universidad Politécnica de Valencia, Spain
Kan Zheng, Beijing University of Posts & Telecommunications, P.R. China
Jonathan Petit, University College Cork, Ireland
Jose Santa, University Centre of Defence at the Spanish Air Force Academy, Spain



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WORKSHOPS

Cheng Li, MUN, Canada

Juan Carlos Cano, Polytechnic University of Valencia, Spain

RA-WERHA 2015 Workshop

Soufiene Djahel, University College Dublin, Ireland
Rahim Kacimi, Paul Sabatier University, France
John Murphy, University College Dublin, Ireland

Technical Program co-Chairs:

Nikki Cranley, University College Dublin, Ireland
Amit Pande, University of California Davis, USA
Riadh Dhaou, INPT/ENSEEIH, France

TPC members:

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Nikos Komnino, City University London, UK
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Faouzi Kamoun, Zayed University, UAE
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Nadjib Ait Saadi, University of Paris-Est, France

Faycal Bouhafs, Liverpool John Moores University, UK
Erdal Oruklu, Illinois Institute of Technology, Chicago, USA
Lyes Khoukhi, University of Troyes, France
Hassine Moungra, University Paris Descartes, France
Thomas Zinner, University of Wuerzburg, Germany
Nafaâ Jabeur, German University of Technology in Oman (GUtech), Oman
Gabriel-Miro Muntean, Dublin City University, Ireland
Kashif Kifayat, Liverpool John Moores University, UK
Farid Nait-Abdesselam, University Paris Descartes, France
Zonghua Zhang, Institut Mines-Télécom/TELECOM Lille, France
Marco Furini, University of Modena and Reggio Emilia, Italy
Ombretta Gaggi, University of Padua, Italy
Sergey Gorlatch, University of Munster, Germany
Kalman Graffi, Heinrich Heine University Düsseldorf, Germany
ProUmberto Grandi, Université Toulouse 1 Capitole, France
Emmanuel Lochin, University of Toulouse – ISAE, France
Dario Maggiorini, University of Milano, Italy
Gustavo Marfia, Università di Bologna, Italy
Silvia Mirri, University of Bologna, Italy

IEEE- CCAN 2015

General Chairs:

Danda B. Rawat, Georgia Southern University, USA (db.rawat@ieee.org)
Ivan Stojmenovic, University of Ottawa, Canada (Unfortunately, Professor Stojmenovic passed away in November 2014)
Jaime Lloret Mauri, Polytechnic University of Valencia, Spain
Bhed Bahadur Bista, Iwate Prefectural University, Japan
Program Chairs:

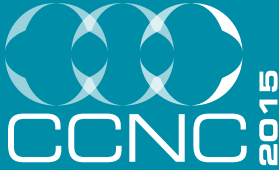
* Jaime Lloret Mauri, Polytechnic University of Valencia, Spain
* Danda B. Rawat, Georgia Southern University, USA

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* Sandra Sendra, Polytechnic University of Valencia, Spain
* Al-Sakib Khan Pathan, IIUM, Malaysia

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Sachin Shetty, Tennessee State University, USA
Gongjun Yan, University of Southern Indiana, USA
ChunSheng Xin, Old Dominion University, USA
Javier Aguiar, University of Valladolid, Spain
Carlos Baladron, University of Valladolid, Spain
Kayhan Zrar Ghafoor, Universiti Teknologi Malaysia, Malaysia
Sandra Sendra, Polytechnic University of Valencia, Spain
Joel Rodrigues, University of Beira Interior, Portugal
Chandra Bajracharya, Georgia Southern University, USA
Sofiane HAMRIOUI, Université des Sciences et de la Technologie Houari-Boumediene, Algeria
Jose M. Jimenez Herranz, Universidad Politécnica de Valencia, Spain
Amjad Mehmood, Kohat University of Science & Technology, Pakistany



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