



CHINACOM 2010 Tutorial Submission Form

- Tutorial Title: Cognitive Radio Networks
- Subject Area: Wireless Communications and Wireless Networks
- Duration: full-day v half-day (preferred)
- Tutorial Abstract (no more than 100 words): Cognitive radio based on software defined radio has been considered as a key technology in future wireless communications, which fundamentally enhances the radio spectral efficiency. However, cognitive radio is not only a physical layer transmission technology, but also provides intellectual challenges to further transport packets from cognitive radios via cooperative networking to form cognitive radio networks. The final goal is to support the overall networking efficiency at given radio spectrum bandwidth for better user end-to-end QoS. This tutorial gives a complete comprehensive introduction to audience, including state-of-the-art wireless communications and natures, spectrum sensing for cognitive radio “network”, cooperative networking, cognitive/cooperative medium access control, network layer design issues of cognitive/cooperative radio networks, trust and security in heterogeneous cooperative wireless networks, theoretical limitations, price & strategy for operators and users, global regulations, and applications to emerging wireless standards such as 3GPP LTE-A.
- Tutorial Outline:
 - Fundamentals of Wireless Communications and Wireless Networks
 - Elements of Mobile Communication Networks
 - Co-existence Networks
 - Software Defined Radio
 - Re-configurable Wireless Networks
 - Cognitive Radio Networks
 - Cognitive Radios
 - Cognitive Radio Networks
 - Terminal Architecture of CRN
 - Cooperative Communications and Networks
 - Introductory Cooperative Communication
 - Cooperative Relay Networks
 - Opportunistic Communications
 - Spectrum Sensing
 - Basic Sensing Techniques
 - Distributed and Cooperative Sensing
 - Sensing for OFDMA Systems
 - CRN Tomography
 - Medium Access Control
 - Carrier Sense Protocols in Cognitive/Cooperative Radio Networks
 - Multi-channel and Spectrum Aware MAC for CRN
 - Cross-Layer Design with Adaptive Modulation and Coding

- Trusted and Secure Cognitive and Cooperative Radio Networking
- Network Layer Design
 - Self-Organized Routing in Multi-hop Cognitive Radio Networks
 - Radio Resource Allocation and Interference Control of CRN
 - Error Control of CRN
 - QoS Control of CRN
 - Random Networks
- Information Theory of Cognitive Radios and Networks
- Spectrum Management
 - Spectrum Sharing
 - Spectrum Pricing
 - International Regulations
 - Applications to Real Systems

Note: The contents will be the update version of the book “Cognitive Radio Networks” authored by the speaker, Wiley, 2009, and most update papers. This book has granted its “simplified Chinese” translation.

- Speaker’s tutorial experience in international conferences: The speaker conducted 10+ tutorials in ICC, PIMRC, VTC, etc. IEEE conferences in the subjects of “Wireless Local Area Networks”, “IMT-2000”, “Wireless Broadband Communications”, and “Cognitive and Cooperative Wireless Networks”, an typical number of audience in the range of 30-60 persons. This tutorial is new to introduce this state-of-the-art subject that is critical to future wireless communications and networks. The earlier version of this tutorial was presented at ICC 2008 and Globecom 2009, each with around 30 attendees.
- Speaker’s Name (First Middle LAST): Kwang-Cheng CHEN
 - Position/Affiliation:
Distinguished Professor and Director
Graduate Institute of Communication Engineering
National Taiwan University
 - Address: 1, Sec. 4, Roosevelt Road, Taipei, Taiwan 106
 - Phone: +886 2 3366 3568 Fax: +886 2 2368 3824
 - Email: chenkc@cc.ee.ntu.edu.tw
 - IEEE Membership/Grade: Fellow

Speaker’s Biography (no more than 300 words): Kwang-Cheng Chen received B.S. from the National Taiwan University in 1983, M.S. and Ph.D from the University of Maryland, College Park, United States, in 1987 and 1989, all in electrical engineering. From 1987 to 1991, Dr. Chen worked with SSE, COMSAT, and IBM Thomas J. Watson Research Center in mobile communication networks. During 1991 to 1998, he was with the Department of Electrical Engineering, National Tsing Hua University, Hsinchu, Taiwan, ROC. Since 1998, Dr. Chen has been a Professor at the Graduate Institute of Communication Engineering, National Taiwan University, Taipei, Taiwan, ROC, and has been appointed as the *Distinguished Professor* and *Irving T. Ho Chair Professor* 20007-8. He was a visiting scientist with Hewlett-Packard Laboratories in California USA during 1997 and a Guest Professor at the Delft University of Technology, Netherlands, 1998, Aalborg University, Denmark 2008. Dr. Chen was adjunctly appointed by the Executive Yuan Science and Technology Advisory Group to plan Taiwan’s communication and networking technologies during 1998-2002, and was also appointed by the Ministry of Transportation and Communications as a member of Telecommunication Commentary Board from 2001 to 2006. Dr. Chen actively involves the technical organization of numerous leading IEEE conferences, including as the Technical Program Committee Chair of *1996 IEEE International Symposium on Personal Indoor Mobile Radio Communications*, TPC co-chair for IEEE Globecom 2002, General co-chair for 2007 IEEE Mobile

WiMAX Symposium in Orlando, USA, 2009 IEEE Mobile WiMAX Symposium in Napa Valley, USA, and General co-chair for IEEE 2010 Spring Vehicular Technology Conference. He has served editorship with the following prestigious international journals: *IEEE Transaction on Communications*, *IEEE Communications Letters*, *IEEE Communication Surveys*, *IEEE Personal Communications Magazine*, *International Journal of Wireless Information Networks*, *IEEE Journal on Selected Area in Communications*, *ACM/Blatzer Journal on Wireless Networks*, *Wireless Personal Communications*, *Wireless Communications and Mobile Computing*, *Frontier of Communication and Information Theory*, etc. He has been a voting member for IEEE 802.11 (wireless LANs), IEEE 802.15 (Wireless Personal Area Networks), IEEE 802.14 (HFC modem), IEEE 802.16 (Wireless Broadband Access) international standard working groups, and participating US TIA45.5 CDMA Cellular standard, ETSI SMG2 cellular standard, and ITU-R TG8/1 IMT-2000 (3G) standard, and is Vice Chair WWRF SIG3 2006-2007. He has authored and co-authored 200+ technical papers and 18 granted US patents. Dr. Chen was elected as an *IEEE Fellow* in 2006 (for the contributions in wireless local area networks and wireless broadband communications, through Communications Society), one of Ten *Outstanding Young Engineers* in 1994, one of *Ten Outstanding Young Persons* (the most prestigious achievement award for people under age 40 in Taiwan) in 1996, *NSC Excellent Research Award* in 2000, *ISI Citation Classic Award* for high-impact research in 2001, *Outstanding Engineering Professor* in 2002, and listed in the 15th edition *Marquis Who's Who in the World* in 1998 and *Who's Who in Industry* in 1999, and was the IEEE Communication Society Asia Pacific Board Director during 2002-2003. Dr. Chen's research interests include wireless communications and broadband access networks.

Book Publications:

- K.C. Chen, R. De Marca (ed.), *Mobile WiMAX*, IEEE-Wiley, 2008.
- K.C. Chen, *Principles of Communications*, River, 2009.
- K.C. Chen, R. Prasad, *Cognitive Radio Networks*, Wiley, 2009.

•