



**The University of New South Wales**  
**Faculty of Engineering**  
**School of Electrical Engineering & Telecommunications**

**Distinguished Lecture**

**The Road towards 4G: SC-FDMA For Future  
Broadband Wireless Communications**

**Khaled Ben Letaief**

*Chair Professor and IEEE Fellow*

*Dean of Engineering, Hong Kong University of Science & Technology*

*Vice-President, IEEE Communications Society*



**Date: 19 April 2010, Monday**

**Time: 2:30 p.m. – 3:30 p.m.**

**Venue: G3, Electrical Engineering Building**

**Abstracts**

In recent years, there have been significant efforts related to the development of 4G wireless technologies. The two access technologies that are expected to meet the requirements ITU's 4G IMT-Advanced requirements include Long Term Evolution (LTE) Advanced and 802.16m WiMAX. For both of these competing technologies, OFDMA was chosen as the multiple-access scheme for the Downlink. It is well known, however, that OFDMA is sensitive to carrier frequency offsets (CFOs) resulting from Doppler effects and/or from the misalignment between transmit and receive oscillators. In such cases, the orthogonality among the subcarriers is destroyed and inter-carrier interference (ICI) along with multiuser interference (MUI) is generated in Uplink OFDMA. Single carrier frequency division multiple access (SC-FDMA) is an alternative protocol to OFDMA. It has similar performance and essentially the same overall complexity as OFDMA while having a lower peak-to-average transmit power ratio or PAPR than OFDMA. Due to this property, SC-FDMA has been adopted as the uplink multiple access scheme in LTE up-coming cellular system under consideration by 3GPP. In this talk, we will describe the evolution of wireless systems towards 4G as well as the major requirements and challenges of the next-generation wireless systems. We will then consider the use of SC-FDMA for future broadband wireless communications. In particular, the effect of CFO on the performance on Uplink SC-FDMA systems will be investigated and appropriate compensation techniques will be presented.

**Professor Letaief** received the Ph.D. Degrees in Electrical Engineering from Purdue University, USA in 1990. From 1990 to 1993, he was a faculty member at the University of Melbourne, Australia. Since 1993, he has been with HKUST where he is currently the Dean of Engineering.

Dr. Letaief is an acknowledged authority in the area of wireless and mobile communications. He served as consultants for different organizations and is the founding Editor-in-Chief of the prestigious IEEE Transactions on Wireless Communications. He has served on the editorial board of other influential journals including the IEEE Journal on Selected Areas in Communications - Wireless Series (as Editor-in-Chief). He has been involved in organizing a number of major international conferences and events. These include serving as the General Co-Chair of the 2007 IEEE Wireless Communications and Networking Conference, WCNC'07, in Hong Kong; Technical Program Co-Chair of the 2008 IEEE International Conference on Communication, ICC'08 in Beijing; and Vice General Chair of the 2010 IEEE International Conference on Communication, ICC'10, in Cape Town.

He served as an elected member of the IEEE Communications Society Board of Governors and IEEE Distinguished lecturer. He also served as the Chair of the IEEE Communications Society Technical Committee on Wireless Communications and Chair of the 2008 IEEE Technical Activities/Member and Geographic Activities Visits Program. He is currently serving as member of both the IEEE Communications Society and IEEE Vehicular Technology Society Fellow Evaluation Committees, member of the IEEE Technical Activities Board/PSPB Products & Services Committee.

He is the recipient of many distinguished awards including the 2007 IEEE Communications Society Publications Exemplary Award, 8 Best Paper Awards with the latest being the prestigious 2009 IEEE Marconi Prize Paper Award in Wireless Communications, as well as, the Michael G. Gale Medal for Distinguished Teaching (Highest university-wide teaching award at HKUST). Dr. Letaief is a Fellow of IEEE and Vice-President of the IEEE Communications Society.

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**ALL ARE WELCOME**

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**For ENQUIRIES: Dr. Wei Zhang (Ph: 9385 4033)**