TEXAS A&M UNIVERSITY at QATAR

The Electrical and Computer Engineering Program presents

Timing and Frequency Synchronization in OFDM Systems

Qasim Mahmood Chaudhari

Wednesday, 9 March. 2011, 12.30–1.30 p.m.

Lecture Hall 144

light lunch will be served

Orthogonal Frequency Division Multiplexing (OFDM) is the key enabling technology for most current high data-rate wireless communication systems. The primary advantage of OFDM over conventional schemes is that it converts a wideband channel into parallel narrowband subchannels allowing relatively simple channel estimation and frequency domain equalization. It is as an effective technique for coping with channel impairments like multipath propagation and inter-symbol interference (ISI) by making use of an appropriate cyclic prefix.
One of the major drawbacks of OFDM is that it is more sensitive to synchronization errors than its single carrier counterparts. The performance of OFDM systems is particularly dependent on the carrier frequency offset (CFO) and timing synchronization error. The frequency mismatch between transmitter and receiver causes loss of orthogonality among the subcarriers giving rise to inter-carrier interference (ICI) which results in SNR loss of the useful signal. Incorrect symbol timing brings signals from adjacent frames into the target frame resulting in severe ISI. Therefore, synchronization is of vital importance to OFDM systems. Synchronization techniques for OFDM systems are generally based on data-aided and non data-aided (or blind) techniques. Data-aided techniques employ the transmission of training symbols with a known structure while blind estimation algorithms exclusively utilize the statistical properties of the transmitted signal particularly the cyclic prefix. In this talk, we will discuss some major and recent results for achieving timing and frequency synchronization in OFDM systems.

Qasim Mahmood Chaudhari received his BE from National University of Sciences and Technology in 2001, MS from University of Southern California in 2004 and PhD from Texas A&M University in 2008, all in Electrical Engineering. He has worked for Qualcomm Inc., San Diego in 2005/06 as an Interim Engineering Intern and Communications Enabling Technologies, Islamabad in 2001/02 as a Design Engineer. Currently he is an Assistant Professor in the Department of Electronics Engineering at Iqra University, Islamabad. His areas of expertise are communication receiver design, estimation and detection theory, and synchronization in wireless networks.

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