



ΔΙΑΛΕΞΗ

" Low Complexity Transceiver Designs for Wireless Communication Systems with Large-scale Antenna Arrays "

Christos Tsinos

Research Associate, Interdisciplinary Centre for Security,
Reliability and Trust (SnT), University of Luxembourg

Περίληψη – Abstract

In recent years, there is interest in wireless communication systems based on antenna arrays equipped with large number of elements capable of providing significant improvements in spectral efficiency, reliability and coverage. Furthermore, such systems, enable the communication in the so-called millimeter wave (mmWave) band (30-300GHz) which also attracted a lot of academic and industrial interest recently since it offers a large number of heavily under-utilized spectrum areas. The mmWave band may offer bandwidth almost 200 times greater than the existing cellular systems which are packed in frequencies less than 3 GHz. Nevertheless, the transmissions via the latter band suffer from severe propagation loss, penetration loss and rain fading compared to signals in lower frequencies. Thus, a large array structure is more than necessary in order to provide a viable transceiver solution. For those reasons, transceivers based on large-scale antenna arrays are foreseen as the key components in fifth-generation wireless communication systems.

While the design of fully digital transceivers for Multiple Input-Multiple Output (MIMO) systems based on a small number of antenna elements is a quite mature field, such solutions cannot be applied when the MIMO systems involve large-scale antenna arrays due to the high demands in hardware complexity and power consumption. This is the case since a fully digital transceiver requires one Radio Frequency (RF) chain per employed antenna. Each RF chain includes a number of different electronic elements among which are Digital-to-Analog/Analog-to-Digital converters that have high requirements in hardware and power consumption. To that end, the aim of this talk is to present low-complexity transceiver solutions that are based on hybrid analog / digital or purely analog architectures and show their efficiency compared to fully digital solutions when applied in large scale antenna systems.

[Christos Tsinos](#) received the Diploma degree in computer engineering and informatics, the MSc and the PhD degree in signal processing and communication systems and the MSc in applied mathematics from the University of Patras, Greece, in 2006, 2008, 2013 and 2014, respectively. From August 2014 to June 2015 he was a Postdoctoral Researcher at University of Patras. Since July 2015 he joined as a Research Associate the Interdisciplinary Centre for Security, Reliability and Trust (SnT), University of Luxembourg, Luxembourg. He is involved or was involved in the past in a number of different R&D projects funded by

national and/or EU funds. He is currently the PI of R&D Project ECLECTIC (Energy and Complexity EffiCienT millimeter-wave Large-Array Communications), funded under FNR CORE Framework. His current research interests include signal processing for mmWave, massive MIMO, cognitive radio and satellite communications, hyperspectral image processing and machine learning for communications and signal processing, as well. Dr. Tsinos is a member of the Technical Chamber of Greece.

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