Electrical & Computer ENGINEERING

SEMINAR

THURSDAY
DECEMBER 14, 2006

Scaife Hall Auditorium
Room 125

4:30 p.m.
Refreshments—4:00 p.m.

Extending the Capacity Limits of Wireless Communications Using a Single Transceiver

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Dr. Antonis Kalis received his Phd from university of Patras. He then joined as Assistant Professor at Athens Information Technology. He is also Adjunct Professor at Carnegie Mellon University. His interests are in Smart Antenna Systems, Wireless Communications, Ad-Hoc and sensor networks and Embedded Radio Communication systems.
He received the Chester Sall award for the best paper published in 2000 in Transactions in Communications. He is the Vice Chair of CROWNCOM 2006 conference. He is involved in many other activities such as being a consultant of of Mr. John Rangos Sr., Rangos Investments, and published various journals such as “Grid-based Virtual Laboratory Experiments for a Graduate Course on Sensor Networks”, accepted by IEEE transactions for publication. He was the Local Chairman of SECURECOMMS 2005 Conference, TPC member of Mobiquitous 2005 Conference. He was also the Session Chairman in GLOBECOM 2004. He holds the membership of the Technical Chamber Of Greece, IEEE and AFCEA.

In recent years a great deal of effort and literature has been devoted in taking advantage of the properties of the wireless channel to increase the performance of wireless communications systems. These efforts have built upon the ground-breaking work of Telatar, Foschini and Gans, in defining the limits and capacity through wireless communication channels. Various diversity techniques as well as multiple-input multiple-output (MIMO) architectures have been employed, to achieve greater capacity or more robust error performance in diverse channel conditions. However, the cost of implementing multiple antenna structures with multiple RF chains and the large inter-element distances required to ensure the orthogonality of the system's input signals, makes MIMO systems technically difficult to implement for cost and size sensitive applications, such as mobile telephony and mobile computing. In our work we introduce a new perspective to the implementation of wireless systems with increased bandwidth efficiency. Unlike traditional spatial multiplexing techniques in MIMO systems, where additional information can be send through the wireless channel by feeding uncorrelated antenna elements with diverse bitstreams, we introduce the idea of convolving diverse bitstreams in orthogonal bases defined in the beamspace domain of the transmitting array far-field region. Using this
approach we show that we can increase the capacity of wireless communications using a single RF front end and compact antenna arrays.

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