

## **Joint Optimization of User-Experience and Energy-Efficiency**

### **In Wireless Multimedia Broadcast**

#### **Abstract:**

This paper presents a novel cross-layer optimization framework to improve the quality of user experience (QoE) and energy efficiency of the heterogeneous wireless multimedia broadcast receivers. This joint optimization is achieved by grouping the users based on their device capabilities and estimated channel conditions experienced by them and broadcasting adaptive content to these groups. The adaptive multimedia content is obtained by using scalable video coding (SVC) with optimal source encoding parameters resulted from an innovative cooperative game. Energy saving at user terminals results from using a layer-aware time slicing approach in the transmission stage. A trade-off between energy saving and QoE is observed, and is incorporated in the definition of a utility function of the players in the formulated heterogeneous user composition and physical channel aware game. An adaptive modulation and coding scheme is also optimally incorporated in order to maximize the reception quality of the broadcast receivers, while maximizing the network broadcast capacity. Compared to the conventional broadcast schemes, the proposed framework shows an appreciable improvement in QoE levels for all users, while achieving higher energy-savings for the energy constrained users.