

Abstract:

As we progress towards the fifth generation (5G) of wireless networks, the bit-per-joule energy efficiency (EE) metric becomes an important design criterion because it allows for practically affordable energy consumption levels. In this regard, one of the key technology enablers for 5G is the recently proposed massive multiple-input multiple-output (MIMO) technology. Limited literature is currently available on techniques to extract large energy efficiency gains from massive MIMO networks.

In this talk, we focus on developing an energy efficiency perspective for massive MIMO systems. The first part motivates the need for energy efficiency in 5G and explains why massive MIMO is a promising technology enabler. We also look at new opportunities arising in “hybrid massive MIMO systems”, wherein massive MIMO operates alongside other emerging 5G technologies. In the second part, we investigate resource allocation for energy-efficient uplink operations in massive MIMO systems. Three communication resources, namely, the number of Base Station antennas, pilot power, and data power are optimized for energy efficiency. A novel solution approach based on fractional programming and convex-concave procedure is proposed. Simulation results render few interesting guidelines for network designers. For example, using higher pilot power than data power can improve the system energy efficiency, particularly in the high SNR regime. Also, the optimal number of active Base Station antennas increases with the power budget in the low-budget regime and vice versa when power budget is high.

Speaker Bio:

K. N. R. Surya Vara Prasad is a Ph.D. student in Electrical and Computer Engineering at the University of British Columbia (UBC), Vancouver, Canada. He has obtained the Masters in Applied Sciences ([M.A.Sc.](#)) degree in Electrical and Computer Engineering from UBC Vancouver, in Feb. 2016, and his B.Tech degree in Electrical Engineering from the Indian Institute of Technology (IIT) Bhubaneswar, India, in 2012. From 2012 to 2014, Surya worked as a Researcher in Wireless Communications at TCS R&D Ltd., Bangalore, India. Surya's current research focus is on resource allocation, distributed optimization, and applications of machine learning in wireless communication networks. He was a recipient of the “Best Demo & Exhibits Award” at IEEE COMSNETS 2014.