



---

# Intra and inter-body cognitive communication system

Ali Ibraheem, Taeyoung Yang, Majid Manteghi

## Abstract:

Summary form only given. Improving health care, while managing and reducing costs, requires a more efficient health care system. Adopting smart health-monitoring sensors, in- or on-body, will play a key role in successfully addressing the challenges. Currently, smart health-monitoring sensors and medical devices exist in implantable, ingestible, and wearable forms. On the other hand, artificial organs, such as artificial hearts and limbs, are now becoming a reality to replace unhealthy organs. Together all these devices are about to transform the medical care that once was either unimaginable or was categorized as a science fiction. Given their expected abundance and large number utilization in the future health care, it is imperative that these devices to wirelessly communicate to each other with utmost reliability, security, and efficiency both in power consumption and spectrum utilization. In addition, the coming paradigm shift in spectrum sharing and management calls for a robust cognitive wireless system that is aware of its spectral environment, learns from the environment, and adapts in real-time to its operating parameters with respect to its changing environment and mission objectives. We propose an intra and inter-body cognitive communication system that will be the next generation of body area network to respond to these demands. The proposed cognitive communication system will allow implanted and internal devices to communicate securely and seamlessly with on body medical devices for future healthcare applications. We envision that the intra and inter-body cognitive communication systems will enable a cost-effective in-home medical care by reducing number of admissions and readmissions to a hospital. As the first step, we considered the human body as a sophisticated inhomogeneous lossy communication channel, using extremely small antennas in near-field and far-field regimes. Some preliminary results for the inter-body communication channel characterization will be presented. Challenges and requirements for the intra and inter-body cognitive communication system will also be discussed.

## Published In:

Radio Science Meeting (Joint with AP-S Symposium), 2014 USNC-URSI , NULL , 298-298