

Green Communications: Energy saving for 5G handsets

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In this so called “green society”, energy consumption has now become an important design metric for wireless systems, which before was confined to the familiar energy ratings seen on electro domestic appliances. The carbon footprint resulting from mobile phone usage has seen an alarming increase in the last decade with the rise in mobile traffic, a trend which is set to continue in the future as we head towards the 5G era. This surge will increase the energy and cost of mobile communications to unprecedented levels, mandating mobile stakeholders to seek urgent solutions to the problem of reducing energy consumption in mobile networks. The ICT C2POWER and Eureka Celtic Green-T projects are prime examples of leading research on this area. Both initiatives are coordinated by the Instituto de Telecomunicações-Aveiro, aim to investigate two complementary techniques to improve energy efficiency at the mobile handset, these include: Cooperative technologies that allow nodes/devices in the near vicinity to form a collaborative group to assist in providing short-range connectivity allowing fast downloading services thereby reducing the connectivity time of the radio interface, the cost of cooperation is seen as a new business model to promote these services; and Cognitive techniques provides the network with in-built intelligence allowing the network/mobile to make intelligent decisions towards network selection and scanning leading towards significant energy savings. Key results include:

- Practical implementation of using short-range collaborative clusters in synergy with long-range devices to provide energy efficient connectivity and high-speed download.
- Game theory protocols for choosing the best available energy efficient cluster for connectivity and for promoting new business modes based on the cost of cooperation

- Going beyond traditional routing strategies by adopting energy efficient metrics.
 - Intelligent network and node scanning for reducing the mobile connectivity time and enabling high-speed download.
 - Intelligent vertical handovers to enable roaming between different mobile standards, that includes LTE and Femto cells.
 - Practical implementation of intelligent energy efficient handovers for multi-standard roaming
- These two technology agnostic approaches exploited in tandem have demonstrated energy savings as much as 50% at the mobile handset.

