

# Client Cooperation Technique Evaluation for Modern Broadband Wireless Networks

**Sergey Andreev**  
Tampere University of Technology  
Finland  
Email: sergey.andreev@tut.fi

**Olga Galinina**  
Speech Technology Center  
Russia  
Email: olga.galinina@gmail.com

**Andrey Turlikov**  
St. Petersburg State University  
of Aerospace Instrumentation  
Russia  
Email: turlikov@vu.spb.ru

## Abstract

Wireless spectrum is a natural resource that cannot be replenished. As such, the need for its effective use introduces the problem of spectral efficiency. On the other hand, energy efficiency is also becoming increasingly important primarily for small form factor mobile devices due to the growing gap between the available and the required battery capacity, which is demanded by the ubiquitous multimedia applications.

As more clients need to share the same spectrum for broadband multimedia communications and cellular networks move toward aggressive full-frequency reuse scenarios, the performance of modern wireless networks is heavily impaired by interference. Since wireless is broadcast, the transmission of one client interferes with that of neighboring clients and consequently reduces energy efficiency. However, clients can gain in energy efficiency, if cooperation among neighboring clients is allowed.

In this work we conduct analytical performance evaluation of the simplest, but nonetheless realistic client cooperation model for modern broadband wireless networks, such as IEEE 802.16m and LTE-Advanced. This model appears to be the first of its kind and indicates significant promise for the entire research area. It is expected that the novel model and its extensions will become of significant importance toward further development of wireless communication technologies. It is primarily intended for, but not limited to, cellular operators, telecommunications research companies, cellular equipment vendors and mobile software companies.