

## ABSTRACT

The work contains 81 pages, 18 figures, 8 tables and 51 sources have been used.

**Goal:** explore the potential of massive MIMO to improve the overall network EE.

**Research object:** building an energy efficient mobile network using massive MIMO systems.

**Subject of study:** energy efficiency of massive MIMO systems.

In this paper, we analyzed the technology of massive MIMO, as one of the components of the future standard for next-generation energy efficient and high-speed systems of mobile communication. The essence of the concept of energy efficiency is highlighted, investigated the effect of multi-antenna BS and a large number of UEs on EE, electricity consumption in the circuit, comparison of CP with different signal processing schemes, build the optimal network model for achieving maximum energy efficiency.

A numerical example was used to demonstrate how a cellular network should be designed for maximal EE. The results show that a Massive MIMO setup, wherein a large number of antennas (in the order of a hundred) is used to serve many tens of UEs, is the EE-optimal solution, even using contemporary circuit technology.

**Keywords:** massive MIMO, energy efficiency, throughput, circuit power consumption.