

Wireless Network Optimization and Planning for WiMAX

This project focuses on network optimization and planning for broadband wireless networks with emphasis on WiMax utilizing advanced physical features such orthogonal frequency multiple access (OFDMA) and multiple input multiple output (MIMO) technologies. In addition to increasing the research portfolio of King Fahd University of Petroleum and Minerals (KFUPM) and the involved parties and building local expertise, the project aims to provide new algorithms and planning techniques that can be implemented by local broadband wireless operators and service providers within the Kingdom as part of the project's role in technology transfer for local industries.

To fulfill the mission of the project, the work requires the achievement of three main objectives. The first objective is to design and analyze an optimized opportunistic scheduling algorithm for OFDMA and MIMO systems. As part of this phase, the team will perform an information theoretic study of capacity scaling of quality of service-aware scheduling utilizing MIMO devices. This step is required to first identify the main factors in the optimization problem and set reference performance figures. Utilizing the outcomes of first objective, the second objective is to customize and evaluate the scheduling algorithms that can be implemented and deployed by local operators in the Kingdom with emphasis on WiMAX and future 4th generation systems such as Long Term Evolution (LTE). While the first two objectives target the optimized performance for a single service area or cell, the third objective serves to provide an optimization and planning mechanism across multiple cells. The team plans to design a software tool for planning and configuration of multiple cells in terms of frequency and scheduling parameters.

The main deliverable for the project are as follows: an optimized opportunistic based scheduling algorithm for operation over OFDMA and MIMO systems, a customized version of the algorithm that takes into account practical deployment details of WiMAX networks, and a tool for network resource planning and optimization. In addition, to building in-house expertise to training and providing consultations for local telecommunications providers, the project will result in possible publications and patents in the area of radio resource management for OFDMA and MIMO systems. Finally, the project is designed for the duration of 24 months with a total budget of 1,335,400 Saudi Riyals.