ABSTRACT

Enhanced mobile broadband (eMBB), ultra-reliable low-latency communication (URLLC), and massive machine-type communication (mMTC) are three main services on 5G networks. Each service has different requirements for peak data rates, latency, and reliability. The problem in implementation is how the service can obtain the necessary resources without sacrificing its respective performance or retaining the utility of the existing resources. Therefore, a resource allocation mechanism is needed that allows resource sharing for different types of services.

eMBB services require high data rates, while URLLC requires very low latency but high reliability, and meanwhile, mMTC needs minimum power to save battery life. When two or more services are combined on the same network infrastructure, optimum resource allocation is required. Algorithms commonly used to optimize resource allocation on 4G, may be used on 5G, such as round robin, proportional fair, and sum-rate maximization.

In this thesis, we study resource allocation algorithms for a combination of heterogeneous services: eMBB, URLLC, and mMTC, and propose the algorithm that has the best performance for multi-service slicing. We focus on sum-rate optimization, which is done to maximize the data sum-rate of services while maintaining the minimum latency and high reliability of URLLC. The performances of this sum-rate maximization are compared to the performances of the baseline algorithms: round robin, and proportional fair methods. The research is carried out by formulating problems, algorithm design, numerical simulation, and performance analysis: data sum-rate, average sum-rate, and spectral efficiency.

Based on numerical simulation results, the sum-rate maximization optimization algorithm achieves better performance compared to round robin and proportional fair in data sum-rate, average data sum-rate, and spectral efficiency performance matrices.

Keyword: *5G, resource allocation, eMBB, URLLC, mMTC, sum-rate maximization*