UNIVERSITI TEKNOLOGI MARA

Fractional Frequency Reuse Interference Mitigation in LTE Femtocell Network

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In the name of God the Most Gracious, the Most Merciful. To Him we belong and all the praise and thanks are due. By only His will our efforts could ever be fruitful and our plans could ever be seen through. No matter how much knowledge we acquire, He remains the utmost knowing and before His name, none of the following deserving may show.

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ABSTRACT

The telecommunication technology is rapidly growth since decades ago. This is included the growth of mobile technology system of 1G, 2G , 3G and most recently 4G. This increment is due to the demand of customers required the high data rate, low latency, low installation and maintenance cost. Therefore, the use of the femtocell is an efficient way to improve coverage and quality of service while on the other hand the deployment cost is remained as extremely low. Femtocell is a low-power cell which can accommodate as the same transmission rate as macrocell. Long Term Evolution (LTE) system with femtocells overlays aim to improve better indoor voice and data coverage and additionally to extend network capacity. Due to short range communication distance, femtocells offer significantly better transmission signal as compared to current cellular device. This make high-quality voice communication and high data rate multimedia type of application possible in indoor environment. Small-size coverage also implies a reasonably accurate location capability without a sophisticated positioning protocol. However, interference problem between the femtocell and the macrocell decreases the system's capacity and as a result users throughput. In this paper it studies the interference mitigation techniques in femtocell networks and a dynamic mechanism that selects the optimal FFR scheme based on a custom metric, which is called user satisfaction. In detail, the proposed mechanism divides the cell into two regions, the inner and outer region, and selects the optimal size as well as the optimal frequency allocation between these regions with main target to maximize the user satisfaction metric. The proposed mechanism is evaluated through several simulation scenarios that incorporate users' mobility and its selected FFR scheme is compared with other frequency reuse schemes in order to highlight its performance.

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