WiMAX System Evaluation in Real Propagation Environment

As the demand for high-speed wireless broadband services rapidly increases, the IEEE 802.16 standard defines a wireless broadband access technology called WiMax. The specifications for medium access control (MAC) and physical (PHY) layers are defined in the standard. A critical part of the MAC layer specification is packet scheduling, which resolves the bandwidth allocation and service order of the subscriber stations. Although the 802.16 standard suggests the main principles in designing QoS architecture to support different types of broadband services, scheduling algorithms for uplink and downlink traffics are left to researchers and manufacturers to design and implement. While there have been many studies on design and evaluation of different scheduling algorithms in WiMAX networks, there are not too many comprehensive studies for evaluation and comparison of different scheduling algorithms in WiMAX networks. Furthermore, the channel propagation models used in the simulations are too simplistic or optimized, which may drop the credibility of the research study. Evaluating the performance of scheduling algorithms under a realistic channel condition thus becomes one of the most important tasks in the realization of large scale WiMAX networks.

This project aims to conduct a comprehensive performance study in point to multipoint, OFDM-based WiMAX networks under a unified platform, with a high-accuracy channel propagation model based on the ray tracing technique, which is able to produce a site-specific channel prediction. A number of representative scheduling algorithms is modified and implemented in NS2 for this study, and performances are evaluated in terms of system throughput, ability to meet QoS requirements for each type of service and fairness to different service classes.

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