Reliable Multicasting for MBMS Traffic over WiMAX Channels

Abstract
Applications of cooperative multicast communication techniques for emerging broadband multimedia services, such as Internet Protocol TV (IPTV), over WiMAX air interface have an important and attractive feature of reducing the network resource consumption, by broadcasting the data once to multiple users (e.g., TV channel group members) simultaneously independently of their number, using a common shared downlink channel. But users distributed around the cell face different channel conditions due to fading, user location, mobility, and other related characteristics. Several schemes were reported in the literature that attempt to introduce cooperative multicasting reliably and efficiently, some of which utilize subscribers with good-channel as relay agents (RA) to provide coverage for subscribers with bad-channel but fail to consider the huge amount of energy consumed in the process. In this thesis, we propose energy-efficient cooperative multicasting schemes by properly selecting RAs based on their location, channel condition and coverage. By exploiting the channel state information (CSI) and the location based service (LBS) techniques, protocol based on nearest neighbor, transmission distance and subscriber-subscriber interlink instantaneous CSI were proposed and implemented in order to achieve much improvement in the system performance. The number of RAs was varied in accordance to channel conditions and treated on a frame-per-frame basis. This approach considerably reduces the amount of energy consumed as proven by analysis and simulation models, providing a lower cost coverage solution with no dereliction in achieving high throughput for all group members.