

Frequency Offset Estimation and Cell Search Algorithms for OFDMA Based Mobile WiMAX

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Abstract—Frequency offset estimation is an important issue in digital transceiver design, especially for coherent wireless transmission such as in WiMAX systems based on the IEEE 802.16e orthogonal frequency-division multiple access (OFDMA) due to inherited frequency and timing offset problems which contribute to the loss of the transmitted data. To overcome these problems, the transmitter and receiver must be well synchronized. In WiMAX systems, the downlink synchronization involves synchronization of carrier frequency and timing as well as identification of the preamble index. This paper introduces synchronization algorithms for frequency offset estimation and cell search. The performance of these algorithms was tested using simulation under adaptive white Gaussian noise and fading channel for different values of signal to noise ratio. Simulation provided accurate results and the frequency offset in the received frame was successfully estimated.

Keywords—Carrier frequency, Cell search, Mobile WiMAX, Orthogonal frequency-division multiplexing (OFDM), Synchronization; Wireless metropolitan area network (WMAN)



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