Performance Analysis of TD-WCDMA Wireless System in City Street Microcells

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ABSTRACT

This study investigates the multiple access interference (MAI), the interference time ratio and capacity issues for cross-shape and rectangular-shape microcells of a TD-WCDMA system is deployed in urban area having rectilinear streets. Moreover, we introduce a guard time to prevent the situation that the mobile station (MS) simultaneously transmits and receives data, where a TD-WCDMA frame is composed of fifteen transmission and one receiving time slots. In the downlink direction, since the MSs are uniformly distributed within a cell, the interference is varied with their locations. We take two points at the cell boundary that are severely interfered to analyze the interference. We analyze system capacity based on the outage probability. Only the path loss and shadowing effect are considered in channel modeling, the effect of multi-path fading is assumed to be equalized by signal processing or compensated by channel coding. We use a blocking probability of 2% to evaluate the system capacity and performance. For the case of an interfered MS located at boundary between two cross-shape microcells and the path loss break-distance which is smaller or bigger than the radius of radio-wave coverage of the microcell, the system can support 35 and 31 users, respectively. For the case of an interfered MS located at boundary between two rectangular-shape microcells and the path loss break-distance which is smaller or bigger than the radius of radio-wave coverage of the microcell, the system can support 32 and 29 users, respectively. According to aforementioned results, it is known that when the MS is located in a cross-shape microcell, the interference from neighbor cells is the smallest. The maximum system capacity is occurred when the path loss break-distance is smaller than the radius of radio-wave coverage of the microcell. Therefore, the system capacity of a TD-WCDMA microcell is affected by the path loss and shadowing effect.

Keywords : TD-WCDMA ; proportion of interfering time ; cutting off rate of communication ; capacity, cell's radius ; efficiency

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