Throughput Analysis of TDD/CDMA Uplink Systems

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ABSTRACT

The interference time ratio and multiple access interference from both base stations (BSs) and mobile stations (MSs) are analyzed for TDD/CDMA uplink systems, and the uplink throughput is evaluated according to a required outage probability. Only the path loss and shadowing effect in the mobile radio channel are considered in our investigating, while the effect of multi-path fading is assumed to be compensated by signal processing and channel coding. In regarding to the interference time ratio, we find that the interference time ratio increases as the cell radius increases for the interfering BSs. For the interfering MSs, the interference time ratio increases as the distance between the MS and the interfered BS decreases. In regarding to the capacity loss due to the cell size, for a 50% down-link cell coverage, when the cell radius increases from 100 m to 5,000 m and 10,000 m, the capacity loss is 45.1% and 87% respectively. For a 85% down-link cell, the loss is 37.5% and 93.7% respectively. While for a 95% down-link cell, the loss is 53.8% and 92.3% respectively. We find that the capacity loss increases as the cell radius and the cell coverage increase. Therefore it is a better choice to deploy TDD/CDMA systems in the micro-cells. Because the BSs tend to transmit more power for a higher downlink cell coverage, the associate interference also increased, and the capacity decreases accordingly. As a result, the downlink power control should be used to reduce the BSs transmitted power.

Keywords : TDD/CDMA ; interference time ratio ; outage probability ; capacity ; cell coverage

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