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An analytical model for CDMA downlink rate optimization taking into account uplink coverage restrictions

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Abstract

This paper models and analyzes downlink and uplink power assignment in code division multiple access (CDMA) mobile networks. By discretizing the area into small segments, the power requirements are characterized via a matrix representation that separates user and system characteristics. We obtain a closed-form analytical expression of the so-called Perron–Frobenius eigenvalue of that matrix, which provides a quick assessment of the feasibility of the power assignment for each distribution of calls over the segments. Our results allow for a fast evaluation of outage and blocking probabilities. The result also enables a quick evaluation of feasibility that may be used for capacity allocation. Our combined downlink and uplink feasibility model is applied to determine maximal system throughput in terms of downlink rates.

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