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MULTI-RATE DS-CDMA WITH ANFIS-ASSISTED POWER CONTROL FOR WIRELESS MULTIMEDIA COMMUNICATIONS

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Abstract. *Emerging multimedia communications have introduced a scenario in which services with different quality of service (QoS) requirements and variable transmission rates coexist. It has been suggested in the literature that transmitter power control is a feasible approach to fulfilling the scenario. This paper presents a new application of an adaptive network-based fuzzy inference system (ANFIS) to power control in a multi-rate multimedia direct-sequence code-division multiple-access (DS-CDMA) system. By using fuzzy inference and taking advantage of the on-line learning ability of adaptive networks, the proposed ANFIS-assisted power control scheme precisely predicts the tendency for channel variations and thus compensates the effect of signal fading in advance. Simulation results show that the ANFIS-assisted power control scheme significantly decreases the probability of unsuccessful transmission and of outage while achieving a higher average transmission rate.*

Keywords: Adaptive networks, Code-division multiple-access (CDMA), Multi-rate, Multimedia, Fuzzy inference, Power control

1. **Introduction.** Rapid increases in the demands for wireless multimedia communications and the limited spectrum resources that have been allocated to wireless communications in the international telecommunication standards show that spectrum resource management remains an important topic in the near and distant future. In wireless multimedia communications, an efficient spectrum or radio resource management is of primary importance because of the increasing demand [1-5]. Generally, the main allocation decisions in radio resource management are concerned with the assignment of waveforms ("channels") and with the transmitter power. Conventional orthogonal waveform allocations, such as frequency-division multiple access (FDMA) and time-division multiple access (TDMA), do not efficiently deal with multimedia services. Recently, considerable research has been devoted to non-orthogonal waveform allocations, such as code-division multiple access (CDMA) and its advanced variants [6-9].