Management of Cell Traffic Congestion in Mobile Base Stations For Mobile Phones Using An Artificial Neural Network

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ABSTRACT

Growth of cellular communication in Kenya began in the mid 1990's. The growth between 1995 to 1999 was slow and steady and did not particularly cause strain on the existing wireless hardware, particularly the mobile base stations and the existing antennas. Since 1999 there has been a sudden exponential growth of mobile subscribers from about 15000 subscribers in June 1999 to nearly 9,000,000 subscribers in 2008. The growth of mobile subscribers has been mainly attributed to the increased growth of the Kenyan economy, reduced cost of wireless equipment and the high rates of literacy in this country. Although the growth of mobile subscribers has been good for the country, the exponential aspect of the growth has brought difficulties due to the strain of existing mobile telephony hardware. One of the most prominent indicators of this problem has been the regular over-congestion of traffic in mobile base stations.

The system currently used to avert congestion of traffic in mobile base stations is called handoff. Handoff is very important in transferring a mobile subscriber from one base station to another if the mobile subscriber is moving through the system. However, handoff has not been very efficient in managing traffic congestion in mobile base stations. This is due to three reasons; Firstly to effect it requires a certain amount of power. Secondly the process is performed at the time of averting congestion, hence making it cumbersome. Thirdly the process is not efficient in distributing the load equally among geographically adjacent mobile base stations.

This thesis presents an alternative way of averting congestion by the use of an intelligent traffic distribution system based on neural networks. The intelligent system will act on a cluster of ten geographically adjacent mobile base stations. The system has then been trained to recognize load patterns for the ten base stations using a pattern recognition neural network for random patterned

inputs. After the training the system has gone through, further training using backpropagation to enable pre-distribution of mobile signal inputs evenly among the ten mobile base stations will be done.

The system has been designed and trained using C++ and then simulated by MATLAB. The results show improved efficiency in adapting to any pattern of random load and intelligently distributing the load evenly among a cluster of mobile base stations as compared to the handoff system.