Coverage Estimation of GSM System Considering Spectral Efficiency, Interference and Cell-Sectoring

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A thesis report presented in partial fulfillment of the requirements for the degree of Bachelor of Science in Electronics and Telecommunication Engineering

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APPROVAL

This thesis titled "Coverage Estimation of GSM System Considering Spectral Efficiency, Interference and Cell-Sectoring" submitted by Afsana Nadia Nova, Jannatul Hossain Khan and Syeda Ireen Sultana to the Department of Electronics and Telecommunication Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Electronics and Telecommunication Engineering and approved as to its style and contents. The presentation was held on December 27, 2010.

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We hereby declare that, this thesis has been done by us under the supervision of Dr. Subrata Kumer Aditya, Professor & chairman, Department of Applied Physics, Electronics & Communication Engineering, University of Dhaka and the co-supervision of Md. Shamsul Arefin, Lecturer, Department of Electronics and Telecommunication Engineering, Daffodil International University. We also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

In this work, the capacity and coverage area of GSM system have been studied. Channel capacity estimation considering spectral efficiency, system capacity estimation considering interference, cell sectoring, cell splitting, microcell zone concept and power control also been studied. MATLAB 6.5.0.180913a Release 13 has been used for simulation and performance evaluation of capacity and coverage in GSM system.

A simple Microsoft Excel tool for GSM Link budget calculation has been formulated. Path loss for uplink and downlink has been calculated using Link Calculator software considering 3-sector antenna. Different areas such as urban, sub-urban and rural areas have been considered for this purpose. RF coverage planning has been also done to improve the capacity.

Effect of MS antenna height, BS antenna height and effect of output power of BS have been studied for different areas. Analysis reveals that coverage area improves significantly considering spectral efficiency, interference and cell sectoring.

As an example, Google Earth 4.3 and Radio Works software have been used to estimate the coverage area for a particular area. A 3D coverage map has been formulated using this result.

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