Project Details: NAeG/14-15/00040

Project id -	NAeG/14-15/00040
Name of The Project	Automated Mapping and Facility Management of Consumer Fixed Access, Consumer Mobilty and Transmission Networks of Telecom Services Using GIS
Category of Award Applying for	Innovative use of GIS Technology in eGovernance
Date of Launch	02-07-2012
Summary/Objective of the project	The use of RS and GIS in telecommunications started with applications for automated mapping and facilities management. Automated mapping produces digital maps and facility management provides digital inventories of facilities. The network complexity together with non-availability of data does make life miserable for managers and engineers of telecom systems. Hence Remote sensing and GIS study will help in gaining visibility to the planning issues faced by the telecommunication infrastructure. Capability to access, manage, and analyze a large quantities of information can be critical to customer service as well as facilitating the future growth and competitiveness of the utility. The modern techniques like the remote sensing, RS, the geographical information system and the global positioning system offers a great hope for the research and development aspects of the industry. The importance of sound cellular network design is apparent to many engineers engaged in improving the quality of wireless communication services especially since mobile data services have entered the mass market. In addition, the assured stability of networks is of unprecedented value for these new services. To serve an increasing number of users, requires an increasing number of base stations. Thus, operators must carefully plan the deployment and configurations of radio base stations to support voice and data traffic at a level of quality expected by customers. Deployment of 2G, 3G and other wireless communication system, predictions of signal strength and propagation coverage area are vital aspects in the design of wireless communication networks. Wireless communication has developed into one of the most exciting technologies of the last century since its invention in 1897, as the radio telegram. In the recent past, mobile phones have become an integral part of peoples lives. High expectations of mobile communications-faster roll out, improved line quality and wider area coverage-have forced leading service providers to improve the quality of their service through better network planning. The quality of the service relies on the signal strength available at the users location. The signal originates from a network of antennas situated at strategic locations across the landscape. However, to work out the best network of antennas over a large area is difficult and is dependent on numerous factors, which include land cover, terrain undulations, building heights, geology and geomorphology. There are a variety of models created by electrical engineers in the past decades to analyse telecom site deployment and design for cellular networks, but none of the models were considered a final solution because each technique has some particular limitation in its application. Cellular network design is becoming more and more important since the network quality is highly dependent on the distribution of base stations. To design a cellular network for a particular region efficiently and accurately, the site suitability is an important determination. The primary operations in the telecommunication network industry include network site identification and planning, signal strength measurements with coverage estimation for the expansion of system. The mathematical algorithms used for prediction are generally known as propagation models. Model tuning is a process in which a theoretical propagation model is trained with the help of measured data. The aim is to get the predicted field strength as close as possible to the measured field strength. The current project evaluates the capabilities of satellite remote sensing technology for planning the locations of mobile communication infrastructure and estimating the signal strength with more accurate design of the coverage of modern cellular network systems. The methodology also comprises of developing suitable spatial modeling in a Geographic Information System environment
Beneficiary of the project	In the present study, a planning strategy for establishing a network of towers for the purpose of mobile communications using remote sensing and GIS is demonstrated. The primary operations in the telecommunication network industry include network site identification and planning, signal strength measurements with coverage estimation for the expansion of system. The study clearly demonstrates that the satellite data could be utilised for planning a suitable network of towers for telecom applications. Predictions of signal strength and propagation coverage area are vital aspects

in the design of wireless communication networks. The aim is to get the predicted field strength as close as possible to the measured field strength. This research work attempts to model the localized environmental features and then use them to tune the propagation model for optimal predictions. Radio transmission in a mobile communication system often takes place over irregular terrain. The terrain profile of a particular area needs to be taken into account for estimating the path loss. The terrain profile may vary from a simple curved earth profile to a highly curved mountainous profile. In this research work, different path loss models for macro cells such as Hata Okumura model, Cost 231 model and ECC-33 model are analyzed and compared. A propagation model is proposed by modifying Hata Okumura model and it is implemented and its parameters are compared with experimental values. Based on all these correction factors for each point of measurement, the Okumura-Hata model was modified to account for clutter and terrain using Satellite data and GIS technology. The technological advancement in the filed of geoinformatics has helped to understand the terrain conditions in a better way for designing the mobile towers.

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Supporting documents:-	Award Specific Form Self Certification by the Project Head