Prediction of the Effect of Nigeria Building Materials, Structures and conditions on Indoor Propagation of VHF Radio Wave

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keywords: Very High Frequency, Building Materials, Structures , Indoor, Propagation,   Losses

Radio wave propagation prediction is a fundamental prerequisite for planning, analysis and optimization of radio networks. Coverage analysis, interference estimation, channel and power allocation rely on propagation predictions. It has been suggested that changes in construction methods and materials in particular with regard to thermal insulation, are having a detrimental impact on indoor radio coverage. Hence, this research work focus on the losses experienced by VHF radio signal as it enters buildings and the impact of different building materials, structures and conditions that are peculiar to Nigeria on these losses.

In this research work signal measurement were taken at different locations inside different types of buildings such as Offices, Lecture Halls, Hostel rooms, Residential apartments and Worship centers under different buildings indoor properties and conditions. A VHF 60Watts FM transmitter was placed outside the buildings for transmitting VHF signal at a frequency of 99.9MHz in to each building, and indoor losses were measured under different building materials, structures and conditions. GSP -730 Spectrum Analyzer ranging from 150KHz -3GHz was used to receive the transmitted signal at a frequency of 99.9MHz in different positions under different conditions.

The results show variations in signal strength at different indoor positions depending on the building indoor materials, structures and conditions with a mean losses of 97 dB at indoor corners and 94.0 dB at the indoor centers, while a mean loss of 95.82dB was measured when the windows and the doors were opened and 96.32dB when the windows and the doors were closed . Further analysis also show that the losses were indoor materials, structural properties and transmitting frequency dependence.

The predicted results on the effect of building materials , structures and conditions on VHF indoor propagation losses will enhance the development of accurate model for indoor propagation of VHF radio wave and improve the quality of indoor network if properly utilized.