

# RADIO PROPAGATION CHANNEL MODEL TUNING FOR 2G AND 3G COMMUNICATION

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## ABSTRACT

In this paper a tuned propagation model is introduced for 2G mobile communication which consist of building geometrically condition and 3G mobile communication which consist of urban, sub urban and rural geometrical condition. This model is designed for the mobile service communication vendors<sup>1</sup>. Using this propagation model it is easy to plot the coverage levels of 2G and 3G. Then it is able to get a decision about the area which needs the enhancement of mobile coverage. Mentum Planet network planning tool is used to implement this model. When doing drive test it was possible to get idea, which area doesn't consist of proper signal coverage and which place should be selected to build a tower to solve this problem but it is not technically acceptable and it is an overview. To prevent this situation technical solution is required. Tune a propagation model is the better solution for that. Implementing this model, it will help for marketing their telecommunication services and easy to identify the areas which have better signal coverage but not distributed the service. When planning a new tower and placement of antennas, authority can decide the configuration of the antenna. It will also further reduce the cost. The existing system is suitable for the whole geometric conditions so the accuracy level is at its minimum state, moreover model tuning errors can be occurred so the actual output will not produce but the proposed model has minimum errors than existing model. This system is introduced better formulation for tuning propagation model for 2G and 3G communication

**Keywords :** Propagation model, Mentum planet, network planning, EIRP, Drive Test

## 1 INTRODUCTION

Theoretically a tower propagates signals around 3 to 4 kilometers but it is not practicable because the geographical situations. This is the reason for building most of towers at town areas due to the scattering, diffraction and reflection losses. Although bunch of towers are built in

town areas most of customer complaints are rising regarding signal issues day by day. Users can not obtained better signal quality and the level due to geographical situation thus a better method is needed to obtain signal level with respect to geographical situation. Then the requirement of the new site or sector addition is needed for that area. This research study is tuning a more applicable model for a selected geographical area. Gampaha town, Malwana and Kanduboda have been selected to build up the model since there are lot of customer complaints in those areas.

Mentum Planet software is used for tuning the proposed propagation model. Although the vendor of the Mentum planet is given default tuned model, it is not relevant to the Sri Lankan geographical condition. There can be several differences in geographically so accurate model cannot be generated by using default model. The accurate tuning model has been done before several years ago in Gampaha and Malwana. But nowadays such model is not suitable because the selected cluster tower antenna were changed with 2G or 3G sector addition, Moreover due to geographical condition and number of consumer of the mobiles, the old tuned propagation model is not accurate and suitable today.

## 2 EXPERIMENTAL

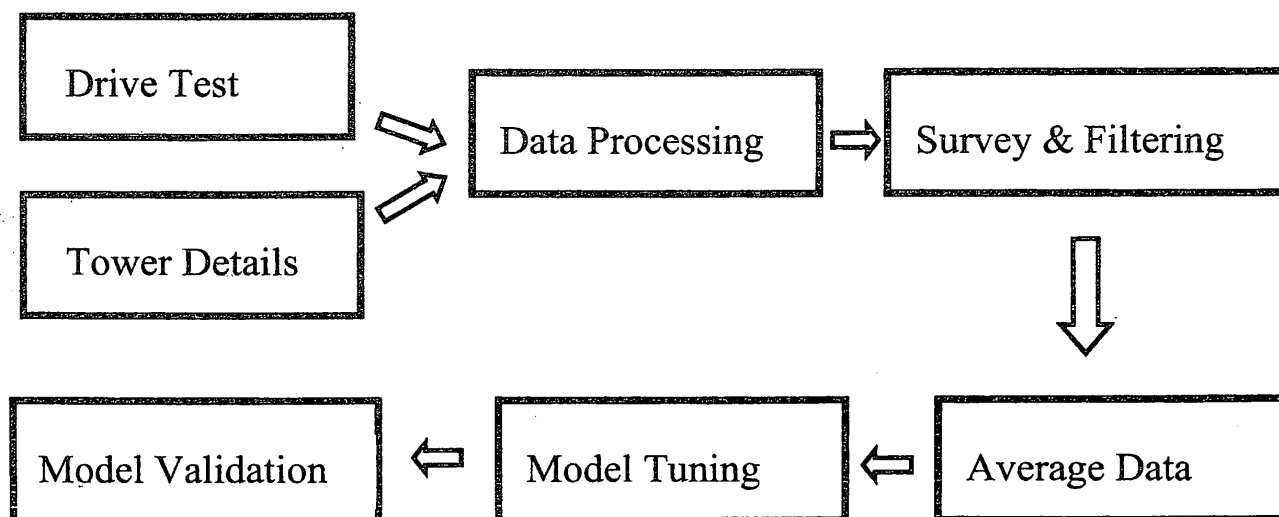


Figure 1 : Block Diagram of tuning procedure of proposed System

It is important to obtain the signal level, coordinate, frequency channel number and scrambling code of every position that received to the mobile when the mobile equipment is traveled. Here Nemo outdoor tool is used to gather signal level during each and every 2 milliseconds with the coordinate of mobile location. Radio frequency signal can be filtered according to their scrambling code and absolute radio frequency number (ARFCN) by using Nemo analyser<sup>2</sup>.

Selected area towers should be arranged to a group in Mentum planet and filtered data set should be inserted to the group. The data consists of signal level, coordinate, frequency channel number and scrambling code then data processing portion should be done. In this stage tower parameters should be included and data should be filtered according to geometric condition of the selected area. If there is unwanted geometric condition it should be removed. Filtered data should be averaged in this stage. Rayleigh fading is removed in this session. Then model tuning process is done. System requires each geometrically clutter heights and weighted values. Finally model validation should be checked<sup>3</sup>.

### 3 RESULT AND DISCUSSION

The vendor of the Mentum planet provide a propagation model to satisfy geometric condition of their country but it is not 100% accurate to geometric condition of Sri Lanka. This fact can be verified from the figure 2:(a) which indicate default model for 3G communication provides by vendor. It can be seen on drive test data obtained for the area concerned is not coincide with the default model that provides by the vendor. The drive test data is coincide with the proposed model and it can be seen on figure 2:(b). The proposed system is more accurated when the drive test data and proposed system are coincided.

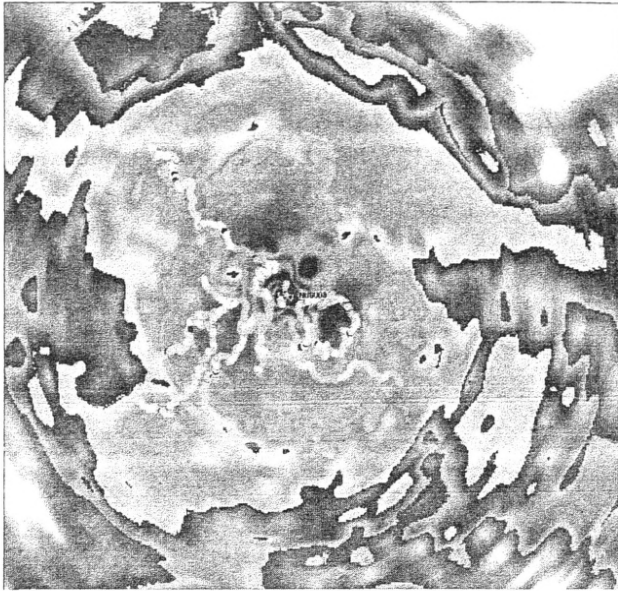


Figure 2:(a) Default Model for 3G communication

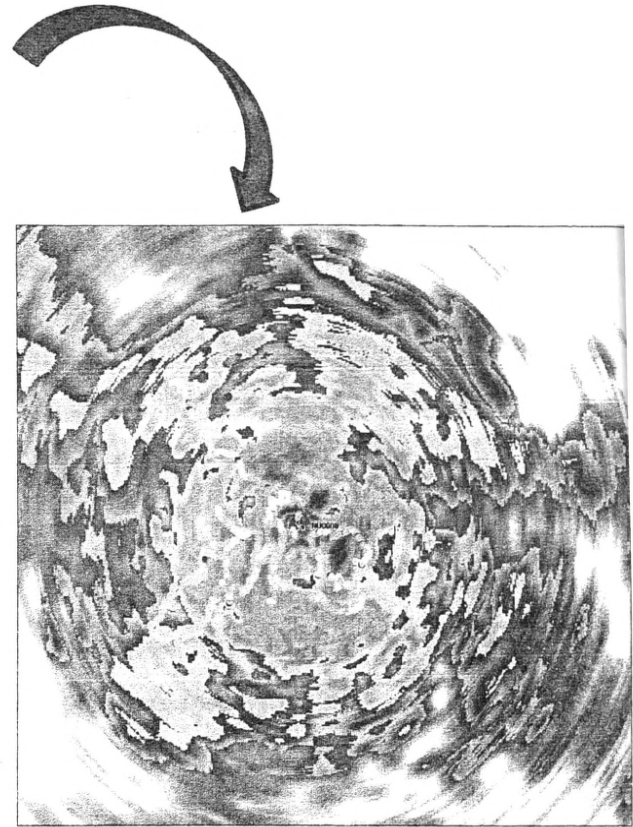


Figure 2:(b) Proposed Model for 3G communication

#### 4 CONCLUSION

The proposed tuned model is very useful for the new tower planning to obtain the coverage area. Service provider can do the prediction before implementing a tower. It is hard to find the values when assigning the weights and heights of the geometric parameters during the tuning model. Travelling each and every road was a challenge and it will be a reason to loss data but travelled every possible routes. The model will be introduced to the service provider in near future.

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