

# Estimation and Study of Electromagnetic Radiation levels from Mobile Towers

Sushanth K J, Raghu N, Nithin

**Abstract**— The Radiations effects are caused from very high frequency with low power and extremely low frequency with high power. High frequency are mainly used for communication towersto communicate from one point of world to another point. In recent development in communication system has increased the installation of towers at various places to provide good coverage for users, this emits harmful radiations. This paper deals with very high frequency with low power measurement of Electromagnetic field (EMF) radiation levels and its effects. The Emission of radiated electrons from mobile towers causes many effects on human beings. The objective of this work is to measure and study the radiation levels of mobile towers using HF59B TM device

**Index Terms**— Electromagnetic Fields, Mobile Towers, Radio Frequency, HF59B TM, NFASoft

## I. INTRODUCTION

In recent years in telecom sector has witnessed rapid growth in wireless communication system such as Mobile communication, AM and FM, TV transmission, Bluetooth, Wi-Fi, Wimax etc.. Among these communication system mobile communication as more adverse health effects on living beings [6, 9].

The mobile towers are placed at the ground level and on the roof top of the buildings. The mobile transmitter's consumes power to transmit electromagnetic waves from one place to another to give connectivity, while transmitting these waves emit electromagnetic radiation to the surroundings, which causes many effects on human beings [2].

Mobile towers operates at frequency of 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz which includes both CDMA and GSM technologies, power density for a mobile towers  $9.2W/m^2$  is allotted form a government agencies in india [1]. Earlier days only 2G is operating, nowadays 3G network has entered in few cities and 4G in future network is also expected. In recent days researchers are speaking about soil pollution, air pollution, noise pollution, but electromagnetic radiation pollution is also a major one as indicated by some researchers and there is no much awareness about the effects of electromagnetic radiation pollution on human beings, plants, animals.

The People who are living and working near or around the mobile towers do not have any information about the health

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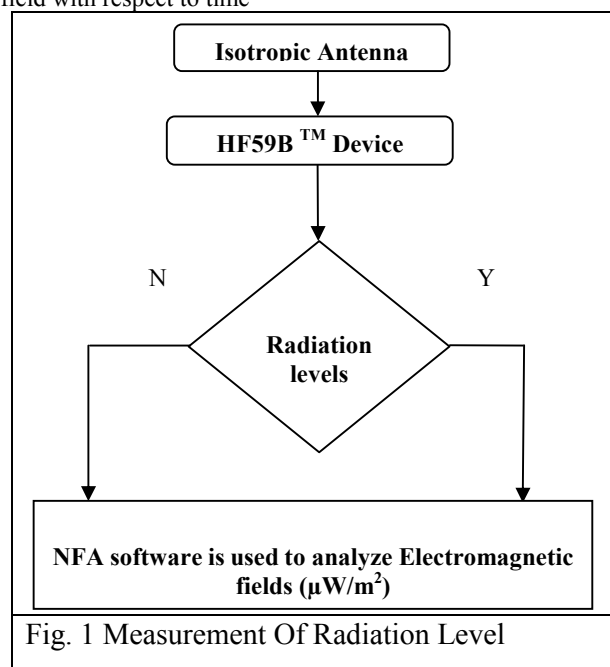
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hazards due to these radiations, when there is minimum distance between human beings and mobile towers, such areas are subjected to high potential hazards of EMF radiation, because the distance is inversely proportional to magnetic and electric field and it causes diseases like cancer, brain tumour [6, 7], daily headaches, depression, anxiety, phobia, hostility, chest pain, reduce in sperm count, digestive disorders, DNA damage [1,2] .

Electromagnetic radiation frequencies ranging from extremely low frequency (ELF) with high power to extremely high frequency (EHF) with low power which has adverse effect on human beings, animals and plants. This paper deals with high frequency with low power measurement of radiation levels and its effects. The radiation levels of electromagnetic fields were measured in and around the region 1 school of engineering and technology campus which has 324 acres landmass with less density of people and it is located near to kanakpura Region 2 was at menarva circle which as high density of people located in Bangalore.

## II. METHODOLOGY

The procedure followed to measure Electromagnetic fields in-terms of power density ( $\mu W/m^2$ ) for radio frequency which is emitted from the mobile towers [8]. The available radio frequency (RF) signals from 50 Hz to more than 2 kHz in free space were collected by using isotropic antenna. The radiation level present in the radio frequency signals is loaded to the HF59B<sup>TM</sup> device. This is analyzed using NFA software. NFAsoft visualise the log file in terms of electromagnetic field with respect to time



III. MEASUREMENTS SETUP

To measure the radiation levels of mobile tower, a measurement setup consisting of HF59B <sup>TM</sup> device and isotropic antenna is used to receive the maximum radiation signals available in free space which are emitted from mobile towers in all the directions. The measurement of radiation setup as shown below:

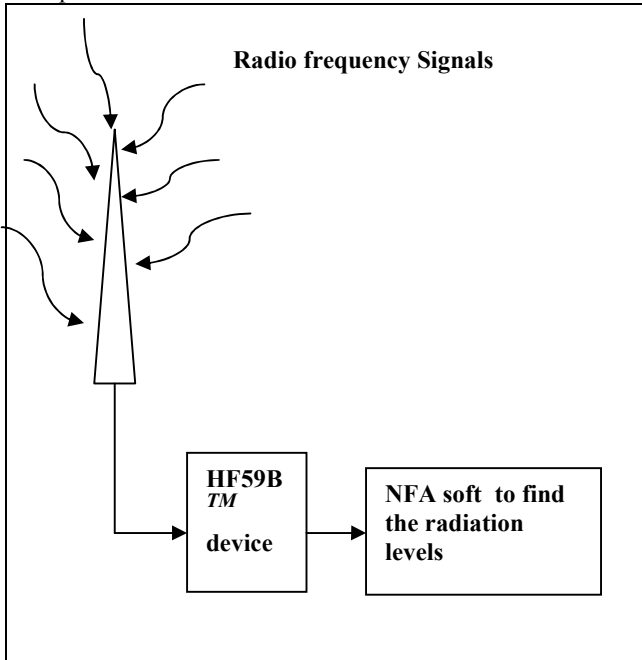


Fig. 2 Experimental Setup To Measure Radiation Levels



Fig. 3 Hf59b <sup>TM</sup> Device Used To Measure Radiation Levels

IV. EXPOSURE TO MOBILE TOWER RADIATION

Radiation emission from mobile towers has a direct impact on human life while causing biological effects which are as shown below

1. The exposure of high level radiation cause cancer like liver cancer, lung cancer, stomach cancer and ovarian cancer [1, 3, 7].
2. Exposure increases which causes Brain Tumors[5].
3. For normal exposure it causes Excessive Sleeplessness, Tiredness, Lack of concentration[4], skin problem, headache, muscle pain [6].
4. Even damage to the DNA of human body has been reported in some cases [7].

We are constantly exposes some level of radiations as EHV lines, Substation, Mobile towers are near to our vicinity, causes some biological effects on human beings are shown above. These effects can be avoided by less exposure of radiation intensity areas with distance as given below [1, 8].

TABLE 1		
SAFE DISTANCE		
Sl. No.	Number of multiple antennas	Building/Structure distance from the antenna, mtrs
1	2	35
2	4	45
3	6	55

V. RESULTS AND ANALYSIS

Telecom regulatory authority of india guidelines and the reference levels of a public exposure to the mobile towers are 0.45 W/m<sup>2</sup> for 900MHz and 0.92 W/m<sup>2</sup> for 1800 MHz field public exposure limits [1, 2]. The radiation emission from mobile towers has ground clearance to avoid the effects on living bodies but telecom sector is not given awareness about clearance. Some researchers predicted that 35 meter should be minimum distance[1,8].

In this case study the average electromagnetic field level is 27 μW/m<sup>2</sup> is observed and plotted in graph as shown below fig [5]. In the fig [4] shows the radiation level in all frequency range. In the fig [6] shows the electromagnetic field radiation level which is greater than 2 kHz is measured from a mobile tower located at school of engineering and technology at the distance of 100 feet from the device to mobile tower. In the fig [7] shows that the measurement started along with the global position system receiver which indicates the path of measurement.





FIG. 4 POWER DENSITY LEVEL IN AND AROUND THE JAIN UNIVERSITY CAMPUS AT ALL FREQUENCY



FIG. 5 POWER DENSITY LEVEL LESS THAN 2kHz IN AND AROUND THE JAIN UNIVERSITY CAMPUS

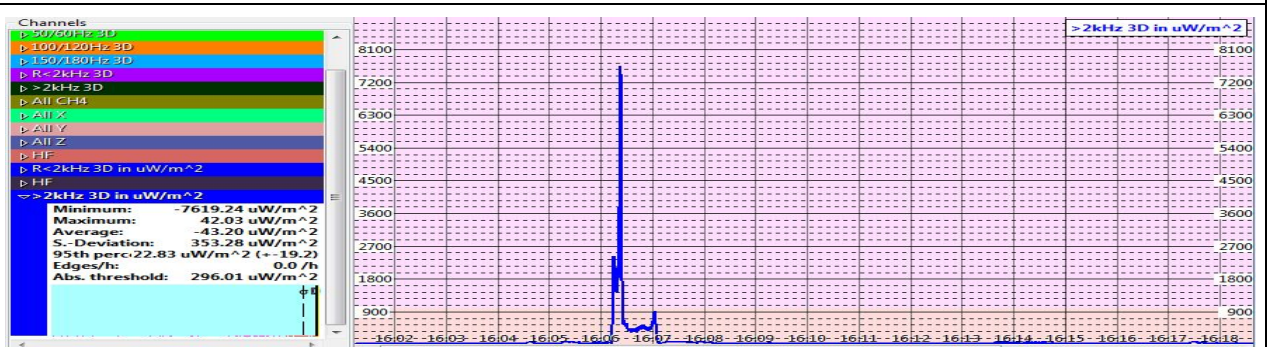


FIG. 6 POWER DENSITY LEVEL GREATER THAN 2kHz IN AND AROUND THE JAIN UNIVERSITY CAMPUS



FIG. 7 GPS TRACKING ALONG WITH MEASUREMENT

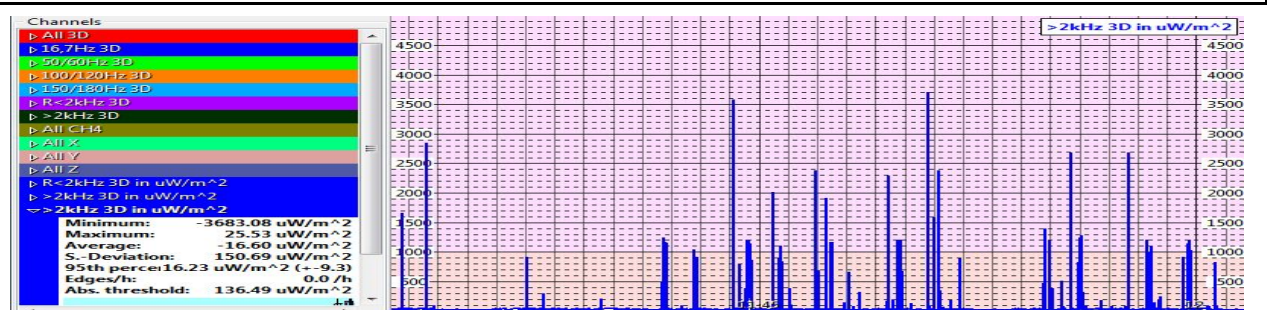


FIG. 8 POWER DENSITY LEVEL IN AND AROUND THE MENARVA CIRCLE AT ALL FREQUENCY



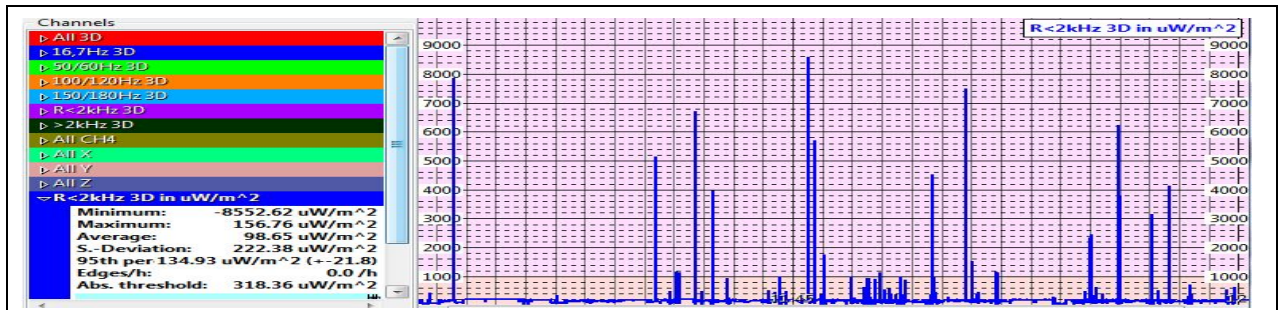


FIG. 9 POWER DENSITY LEVEL LESS THAN 2kHz IN AND AROUND THE MENARVA CIRCLE

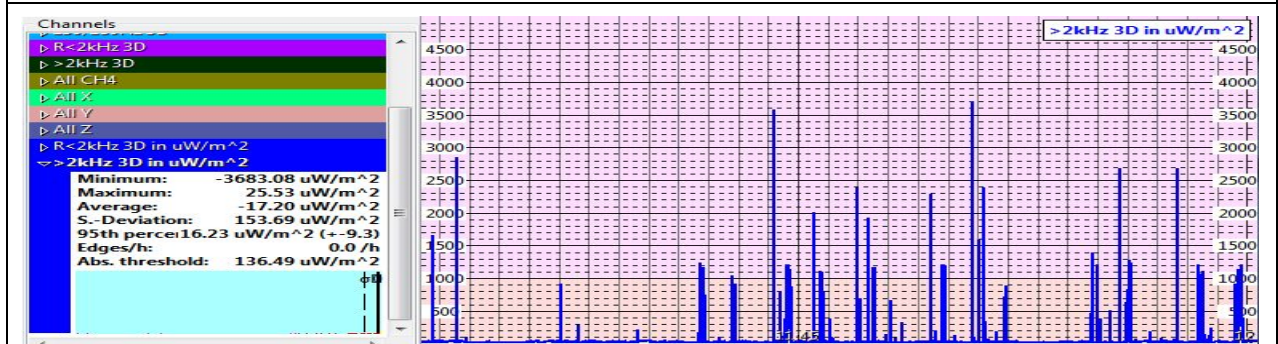


FIG. 10 POWER DENSITY LEVEL GREATER THAN 2kHz IN AND AROUND THE MENARVA CIRCLE

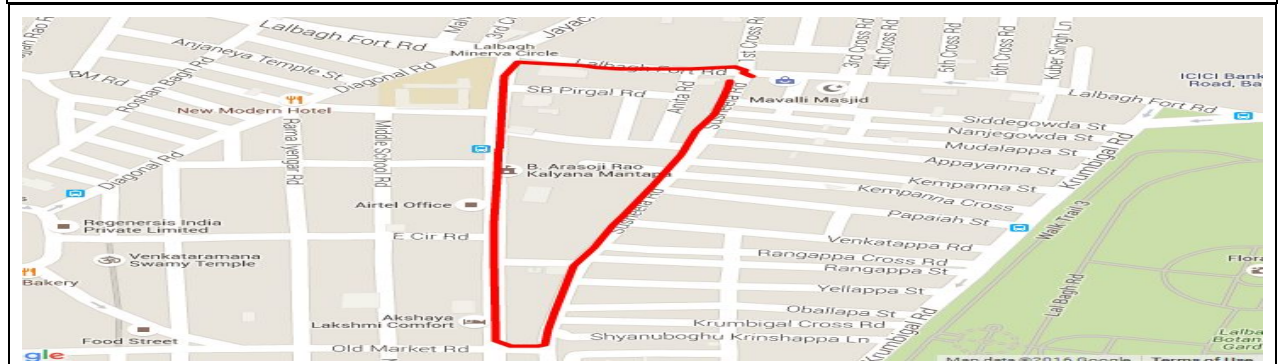


FIG. 11 GPS TRACKING ALONG WITH MEASUREMENT

CONCLUSION

The measurements show that in the immediate vicinity of mobile tower where people are habituated the levels of radiation show that the area is within safe limits in University campus and in menarva circle as higher radiation intensity, thus it may be concluded that the area in the vicinity of mobile tower is risky further closure approach is dangerous.

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REFERENCES

- [1] Telecom regulatory authority of India, "Effects of Electromagnetic Field Radiation from Mobile Towers and Handsets", 30th July 2014.
- [2] Girish Kumar, "Cell Tower Radiation", December 2010.
- [3] Amani Abd Elhamid Hamad Mohamad and Ashraf Gasim Elsid Abdalla, "Effects Of Electromagnetic Field Radiation From Mobile Towers", International Journal of Computer Engineering and Applications, Volume 09, Issue 11, Nov. 15.
- [4] Y.P.Singh and M.L.Chandna, "An Extensive Study & Impact of Radiation from Mobile Towers to Living Being",
- [5] International Journal of IT, Engineering and Applied Sciences Research (IJEASR), Volume 3, No. 3, March 2014.
- [6] Mohit Kaushal, Tanvir Singh and Amit Kumar, "Effects of Mobile Tower Radiations & Case Studies from different

- Countries Pertaining the Issue”, International Journal of Applied Engineering Research, Vol. 7 No.11, 2012.
- [7] Lalrinthara Pachuau and Zaihanzauva Pachuau, “ Study of Cell Tower Radiation and its Health Hazards on human body”, IOSR Journal of Applied Physics (IOSR-JAP), Volume 6, Janaury 2014.
- [8] Charu, Jugal Kishore, “Mobile towers and health hazards”, Global Journal Of Medicine And Public Health, Vol. 1, 2012.
- [9] Akanksha Jain, Kamal Jain, Ajay Gairola, “Mobile tower radiation– Affects, Assessments and Monitoring of IIT Roorkee Campus”, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Volume 3 Issue 7, July 2014.
- [10] S Sivani and D Sudarsanam, ” Impacts of radio-frequency electromagnetic field (RF-EMF) fromcell phone towers and wireless devices on biosystem and ecosystem – a review”, Biology and Medicine, 2012.