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Infrared Radiation Zone and Mobole Tower Mapping

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Abstract: ***The present study shows the mapping of mobile towers of Sahaspur block in Dehradun District of Uttarakhand State. It also shows the analysis of network area coverage and Impact of Infrared radiations in human life. The mobile tower location has been identifiedusing GPS. For the mapping of mobile towers GIS Software has used.***

Keywords: GIS, RS, mapping, radiation, mobile tower.

I. INTRODUCTION

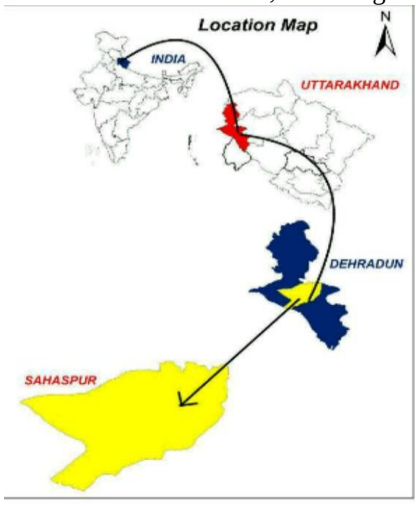
Dehradun is located at an altitude of 640 meters (2100 ft) above sea level. It is a state in the northern part of India. It is located on the foothills of Shivalik Range. Dehradun lies between 29°58' and 31°2' 30" north latitudes and 77°34' 45" and 78°18' 30" east longitudes. The district is situated in the north-west corner of the State. Sahaspur is a Block in Dehradun District of Uttarakhand State, India shown in Figure 1. It is bounded by Vikasnagar Tehsil towards North, Kalsi Tehsil towards North, Poanta Sahib Tehsil towards west, Dehradun Tehsil towards East. Dehradun City, Mussoorie City, Nahan City are the nearby Cities to SahaspurSahaspur summer highest day temperature is in between 21° C to 38°. Average temperatures of January is 8° C, February is 11 ° C , March is 17 ° C , April is 21 ° C , May is 26 ° C .

This study is aimed to know location of all mobile towers of different companies such as BSNL, AIRTEL, TATA INDICOM, RELIANCE, UNINOR with elevation pattern of the city and to understand the availability of network coverage by their buffer zone to identify the network shadow zone and to suggest the construction of new towers for the further improvement of the network coverage of the city. This is also aimed to analyse the impact of Infrared radiation Zone due to mobile towers on human life.

GPS is used to collect the ground truth control points of different industries in SAHASPUR block. Arc GIS 9.3 software was used for area mapping and for composition and generation of maps. ERDAS Imagine is applied in sub setting and mosaicking and for database preparation Microsoft Office is used.

II. MAPPING OF MOBILE TOWERS

The study has been done through remote sensing approach using satellite images [1] of LISS-III to identify and locate mobile towers, settlements and road network. Ground information or Ground Control Points has been collected from the study area using GPS which are shown below in tabular form. After collecting the all information the database was created with the help of Microsoft excel. ERDAS image processing and Arc GIS software were used to demark the location of mobile towers. GPS points were converted in required format through ERDAS Imagine software by coordinate calculator. Converted points added in Arc GIS software, and using various tools, map has been composed.



Map1. Location map of Sahaspur block

Figure 1: Location map of Sahaspur block

For mobile towers mapping, visual interpretation technique was used to mapping total mobile tower area as a polygon layer in SAHASPUR block. Integration GIS and GPS for the preparation of quick maps and plans have described in this study. More than 50 waypoint which ware collected from the study area of mobile towers in SAHASPUR block. Figure 2 shows the locations of mobile tower in Sahaspur Block.

III. GPS LOCATIONS OF MOBILE TOWERS IN SAHASPUR BLOCK

Latitude	Longitude	Altitude	Type of Towers
30 19 46.4	77 56 20.1	596 m	Multiple
30 19 50.2	77 56 21.0	595 m	Reliance
30 19 54.3	77 56 31.1	596m	
30 19 54.3	77 56 31.1	596m	
30 19 54.3	77 52 14.2	530m	Vodafone
30 20 29.1	77 50 36.8	516m	Airtel- Idea - Vodafone
30 20 42.5	77 54 43.0	541m	Uninor
30 20 40.4	77 56 07.3	565m	
30 20 39.8	77 56 11.6	569m	Airtel - Reliance - BSNL
30 20 39.8	77 56 11.6	569m	Reliance
30 20 09.3	77 57 44.3	625m	TATA - Idea
30 20 09.3	77 57 44.3	625m	Aircel
30 20 10.5	77 57 49.0	618m	Reliance
30 20 10.5	77 57 49.0	618m	Airtel - Vodafone
30 20 07.4	77 57 23.6	608m	Airtel
30 20 02.0	77 56 10.6	569m	
30 21 10.0	78 00 34.9	679m	Vodafone - Airtel
30 19 39.0	77 59 38.1	618m	Idea
30 19 40.1	77 59 38.3	636m	Multiple
30 21 09.5	78 00 35.6	682m	BSNL - Idea
30 29 59.3	78 00 24.9	669m	Tata - Idea -Docomo
30 21 03.7	78 00 17.9	671m	Airtel
30 21 04.7	77 51 30.8	510m	Airtel -Idea
30 21 14.3	77 51 12.5	517m	Reliance
30 21 14.3	77 51 11.6	517m	Airtel - Idea -Uninor
30 21 14.3	77 51 11.7	525m	
30 21 35.1	77 50 52.6	525m	Airtel - Idea - Vodafone
30 21 44.0	77 50 44.1	525m	BSNL
30 22 06.6	77 51 39.2	532m	Aircel
30 22 24.4	77 51 31.5	536m	
30 21 37.4	77 50 49.5	510m	
30 21 32.3	77 51 11.2	511m	Multiple
30 21 32.3	77 51 11.2	511m	Multiple
30 21 27.0	77 51 10.5	513m	Multiple
30 21 27.0	77 51 10.5	513m	Multiple
30 21 36.6	77 52 52.5	534m	Airtel
30 21 41.9	77 52 28.5	538m	
30 23 28.9	77 53 22.3	604m	
30 23 47.8	77 54 47.1	659m	
30 23 48.1	77 55 03.8	682m	
30 24 44.3	77 58 18.7	830m	BSNL
30 22 12.4	77 59 44.4	703m	

30 22 14.3	77 50 03.7	497m	Airtel
30 23 40.5	77 48 20.8	469m	Tata - Uninor
30 23 40.5	77 48 20.8	469m	Airtel - Vodafone
30 23 40.5	77 48 20.8	469m	Idea
30 24 43.0	77 47 35.7	467m	Aircel
30 24 44.5	77 47 37.0	467m	BSNL
30 24 59.9	77 47 36.0	469m	Tata Indicom
30 25 00.1	77 47 31.2	469m	Airtel
30 26 19.1	77 47 25.3	482m	Idea - Airtel - Uninor
30 26 25.2	77 49 27.5	557m	Airtel
30 23 38.9	77 50 02.6	522m	Reliance
30 23 54.7	77 54 55.1	674m	BSNL
30 23 17.0	77 56 34.7	691m	Idea - Airtel - Vdafone - Reliance
30 23 16.0	77 56 37.9	689m	BSNL - Reliance - Vodafone
30 23 08.5	77 56 25.5	680m	
30 20 57.4	77 56 10.4	591m	Idea
30 19 50.3	77 57 42.0	609m	Idea
30 19 50.3	77 57 42.0	609m	Idea
30 19 43.6	77 57 07.4	601m	Airtel
30 19 43.6	77 57 07.4	601m	Idea
30 19 45.2	77 57 07.6	598m	BSNL
30 19 43.6	77 57 07.4	601m	Telephone Tower
30 18 21.7	77 57 25.0	590m	Idea - Airtel - Uninor
30 17 54.1	7755 50.4	564m	
30 17 51.6	77 55 43.6	568m	BSNL
30 18 50.9	77 54 06.7	558m	
30 18 35.8	77 58 47.6	606m	Airtel - Aircel
30 18 33.6	77 58 45.9	618m	Reliance
30 18 29.6	77 59 01.6	623m	
30 18 21.6	77 59 17.6	622m	
30 18 21.6	77 59 17.6	622m	
30 20 40.1	78 01 04.5	662m	BSNL
30 21 09.9	78 01 30.1	684m	BSNL
30 21 13.2	78 01 27.5	686m	Airtel - Idea
30 21 12.3	78 01 28.9	688m	Airtel
30 21 13.4	78 01 31.1	689m	Uninor
30 22'17.6	78 03 40.2	789m	Multiple
30 23 49.7	78 04 37.9	870m	Airtel - Uninor
30 23 49.7	78 04 37.9	870m	Multiple
30 24 20.7	78 04 30.2	961m	Multiple
30 25 15.6	78 04 30.2	1300m	BSNL
30 25 15.6	78 04 30.2	1300m	Multiple
30 27 25.5	78 04 38.9	1971m	BSNL
30 27 19.3	78 04 43.8	2035m	Reliance
30 24 44.7	78 04 51.4	1105m	Multiple
30 24 09.5	78 05 10.8	971m	Airtel
30 23 32.4	78 05 33.3	934m	Airtel
30 23 32.4	78 05 33.3	934m	Uninor

30 23 21.4	78 05 34.0	919m	Reliance
30 23 17.8	78 05 28.5	894m	Multiple
30 23 05.7	78 05 19.9	882m	Multiple
30 23 04.5	78 05 19.3	880m	Multiple
30 21 46.5	78 04 03.0	780m	Multiple
30 21 46.5	78 04 03.0	780m	Uninor
30 21 46.5	78 04 03.0	780m	Airtel
30 21 46.5	78 04 03.0	780m	Idea
30 21 43.1	78 04 04.7	745m	Airtel
30 26 41.2	78 03 12.9	780m	Multiple
30 19 18.1	78 00 28.2	642m	BSNL
30 19 27.0	78 00 23.3	644m	Reliance
30 19 35.3	78 00 19.3	640m	Airtel
30 19 41.1	77 59 38.1	630m	BSNL
30 19 27.0	78 00 23.3	644m	Airtel
30 19 42.3	77 59 37.0	632m	Reliance
30 19 40.2	78 00 20.7	651m	Airtel
30 19 17.9	78 00 12.1	711m	Reliance
30 19 18.8	78 00 12.5	682m	Reliance
30 19 21.4	78 00 16.2	632m	Reliance
30 19 26.3	78 00 17.1	641m	Idea

Wireless communication requires efficient network planning of cellular mobile communication. The primary operations in the telecommunication network industry include network site identification and planning signal strength measurement with coverage estimation for the expansion of system. In Sahaspur block there are 106 fixed tower of BSNL, AIRTEL , VODAFONE, IDEA, AIRCEL, UNINOR, RELIANCE.

The mobile tower mapping of Sahaspur block is shown in Map 2 .The information about the Mobil-towers is shown in Table 1. In this study the waypoints which were collected from the area were overlapped on the Satellite image and mobile tower area maps are prepared by visual mapping method.

IV. ADVANTAGES AND DISADVANTAGES OF CELL TOWERS

Cell phone technology is advantageous due to its mobility, low price communication, emergency use, accessibility. Cell phone technology bring revolution to the telecommunication scenario in India. Due to its several advantages, cell phone technology has grown exponentially in the last decade. Currently, there are more than 50 crore cell phone users and nearly 4.4 lakh cell phone towers to meet the communication demand. The numbers of cell phones and cell towers are increasing without giving due respect to its disadvantages. All over the world, people have been debating about associated health risk due to radiation from cell phone and cell tower. Radiation effects are divided into thermal and non-thermal effects. Thermal effects are similar to that of cooking in the microwave oven. Non-thermal effects are not well defined but it has been reported that non- thermal effects are 3 to 4 times more harmful than thermal effects.

A cell phone transmits 1 to 2 Watt of power in the frequency range of 824 - 849 MHz (CDMA), 890 - 915 MHz (GSM900) and 1710 – 1780 MHz (GSM1800). A cell phone has a SAR (Specific Absorption Rate) rating. In USA, SAR limit for cell phones is 1.6W/Kg which is actually for 6 minutes per day usage. It has a safety margin of 3 to 4, so a person should not use cell phone for more than 18 to 24 minutes per day. This information is not commonly known to the people in India, so crores of people use cell phones for more than an hour per day without realizing its associated health hazards[4].

Cell tower antennas transmit in the frequency range [3] of 869 - 894 MHz (CDMA), 935 - 960 MHz (GSM900) and 1810 – 1880 MHz (GSM1800). Also, 3G has been deployed in a few cities, in which base station antenna transmits in the frequency range of 2110 – 2170 MHz. Mobile phone operators divide a region in large number of cells, and each cell is divided into number of sectors. The base stations are normally configured to transmit different signals into each of these sectors. In general, there may be three sectors with equal angular coverage of 120 degrees in the horizontal direction as this is a convenient way to divide a hexagonal cell. If number of users is distributed unevenly in the surrounding area, then the sectors may be uneven. These base stations are normally connected to directional antennas that are mounted on the roofs of buildings or on free-standing masts. The antennas may have electrical or mechanical down-tilt, so that the signals are directed towards ground level.

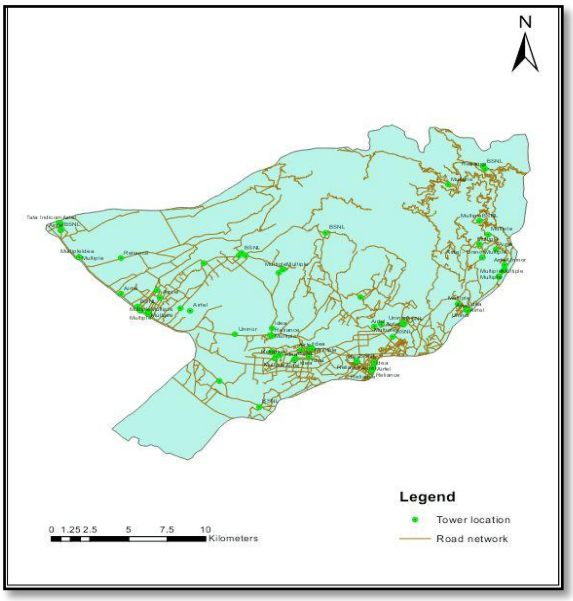


Figure2 : Point map of Sahaspur Block showing mobile Tower locations

A base station and its transmitting power are designed in such a way that mobile phone should be able to transmit and receive enough signal for proper communication up to a few kilometres. Majority of these towers are mounted near the residential and office buildings to provide good mobile phone coverage to the users. These cell towers transmit radiation 24x7, so people living within 10's of meters from the tower will receive 10,000 to 10,000,000 times stronger signal than required for mobile communication. In India, crores of people reside within these high radiation zones. Due to these high radiation zones people get suffer from various biological and non-biological issues like, blood brain barrier, risk to children and pregnant women, infertility, DNA damage, cancer risk, sleep disorder, gland tumor, melatonin reduction, E.N.T. problems and interference in other electromagnetic devices etc.

V. RADIATION FROM THE CELL TOWER

A GSM900 base station antenna transmits in the frequency range of 935 - 960 MHz. This frequency band of 25 MHz is divided into twenty sub-bands of 1.2 MHz, which are allocated to various operators [2]. There may be several carrier frequencies (1 to 5) allotted to one operator with upper limit of 6.2 MHz bandwidth. Each carrier frequency may transmit 10 to 20W of power. So, one operator may transmit 50 to 100W of power and there may be 3-4 operators on the same roof top or tower, thereby total transmitted power may be 200 to 400W. In addition, directional antennas are used, which typically may have a gain of around 17 dB (numeric value is 50), so effectively, several KW of power may be transmitted in the main beam direction.

The purpose of a cell tower [Fig. 3] is that mobile phone should receive adequate signal for its proper operation. A mobile phone shows full strength at -69 dBm input power and works satisfactorily in the received power range of -80 to -100 dBm. In comparison with -80 dBm level, the measured power level at R = 50m is at least 50 to 60 dB higher, which translates to 100,000 to 1,000,000 times stronger signal than a mobile phone requires. There are millions of people who live within 50m distance from cell towers and absorbing this radiation 24x7.

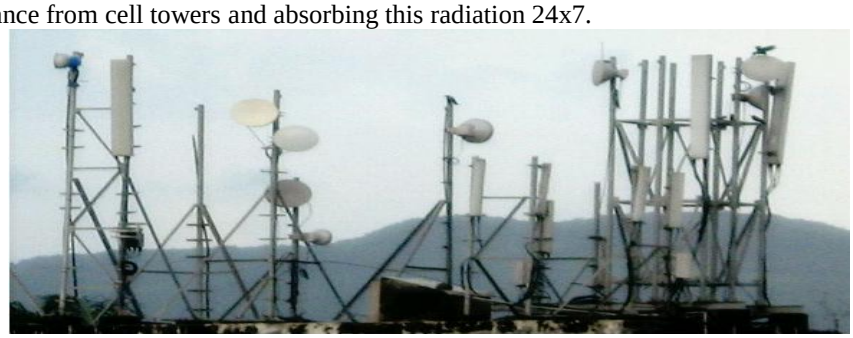


Fig.3 Cell Phone towers

VI. CONCLUSION

Mobile towers mapping of the defined area is done using GIS Software and GPS. By the analysis of ground this can be concluded that there has been no tower constructed in between Sudhowala and Mundowala and signals are very weak. It's better to construct towers in between Sudhowala and Mundowala to get better network for better facility. And for the Sake of human being the towers must be constructed with certain distance from settlements.Some other communication devices can also be mounted on the similar existing towers such as surveillance system, very high resolution camera for security and the planning of the people.

REFERENCES

[1] Abrams, M. J., Brown D. Lepley,L.,&Sadowski, R (1993), RemoteSensing for porphyry copper deposits in southern Arizona. Economic Geology, 78,591- 604.

[2] http://www.slideshare.net/nehakumar01/biological-effects-of-cell-tower-radiation-on-human-body-3460040

[3] ANSI-C95.1, 1982, American National Standards Institute. American national standard safety levels with respect to human exposure to radiofrequency electromagnetic fields, 300 kHz to 100 Ghz. New York: IEEE.

[4] https://www.facebook.com/pages/Mobile-Tower-Radiation-Effects/161329110581673

