CELL PHONE/TOWER RADIATION HAZARDS & SOLUTIONS

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OUTLINE OF PRESENTATION

1. Cell Tower Statistics
2. Microwave Heating Principle
3. Radiation Pattern of Cell tower Antenna
4. EMF exposure Safety norms
5. Radiation measurements near cell towers
6. Review Biological effects
7. Solutions
Cell Phone and Tower Statistics in India

India Population – 1.2 billion

Mobile Towers – 5 lakh

Mobile subscribers – 900+ Million
Microwave radiation effects are classified as:

• Thermal

• **Non-thermal**

The current exposure safety standards are mainly based on the thermal effects, which are inadequate.

Non-thermal effects are several times more harmful than thermal effects.
Cell Phone - Ear Warming?

Have you ever noticed warm sensation in ear after using mobile phone for a long time?

Temp. of ear lobes increases by $1^\circ$C when cell phone is used for approx. 20 minutes.

Warm sensation/pain $>$ tinnitus $>$ irreversible hearing loss

All these effects lead to Ear Tumor

Tinnitus or “Ringxiety”- sensation of cell phone ring
A Cell phone transmits 1 to 2 Watts of power

SAR (Specific absorption rate) - Rate at which radiation is absorbed by human body, measured in watts per kg (W/kg).

In USA, max. SAR limit for cell phones is 1.6W/Kg which is for 6 minutes. 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 given to people in India.
Warning from Blackberry

BlackBerry device: keep the BlackBerry device at least 0.98 in. (25 mm) from your body when the BlackBerry device is transmitting. When using any data feature of the BlackBerry device, with or without a USB cable, hold the BlackBerry device at least 0.98 in. (25 mm) from your body. If you use a body-worn accessory not supplied by RIM when you carry the BlackBerry device, verify that the accessory does not contain metal and keep the BlackBerry device at least 0.98 in. (25 mm) from your body when the BlackBerry device is transmitting.

To reduce radio frequency (RF) exposure consider these safety guidelines:

- Use the BlackBerry device in areas where there is a strong wireless signal. The indicator that provides information about the strength of the wireless signal is located in the upper-right corner of the Home screen and displays five ascending bars. Three or more bars indicate a strong signal. A reduced signal display, which might occur in areas such as an underground parking structure or if you are traveling by train or car, might indicate increased power output from your BlackBerry device as it attempts to connect to a weak signal.

- Use hands-free operation if it is available and keep the BlackBerry device at least 0.98 in. (25 mm) from your body (including the abdomen of pregnant women and the lower abdomen of teenagers) when the BlackBerry device is turned on and connected to the wireless network. For more information about carrying your BlackBerry device, see the holster information in the "Additional safety guidelines" section of this document.

- Reduce the amount of time spent on calls.
Results of Re-evaluation of Interphone Study

INTERPHONE – WHO -10 years, 13 countries, largest (5,117 brain tumor cases), $25 million dollars to evaluate risk on brain tumors. **Conclusion** - no overall ↑ risk, but suggestions of ↑ glioma - heavy users & ipsilateral exposures

Re-evaluation - Risk underestimated by at least 25%

- For every 100 hours of use -26% ↑ risk of meningioma
- Initial 24% risk of glioma ↑to 55% over 10 years- regular users are taken as people who use it for 2hrs/month.
- Doubled - quadrupled brain tumor risk - heavy users (1/2 hour/day) over 8 to 10 years.
- Children, young adults– excluded. New study - Mobi-kids
WHO: Cell phone use can increase cancer risk

International Agency for Research on Cancer (IARC), a part of WHO designates cell phones as "possible human carcinogen" [Class 2B]

Found evidence of increase in glioma and acoustic neuroma brain cancer for mobile phone
Antennas on Cell tower transmit in the frequency range of:

- 869 - 890 MHz (CDMA)
- 935 - 960 MHz (GSM900)
- 1805 – 1880 MHz (GSM1800)
- 2110 – 2170 MHz (3G)
Cell Towers Installed in Mumbai
Radiation Pattern of Antenna

Horizontal plane

Beam is wide

Vertical plane

Main beam is narrow with secondary side lobes
People living within 50 to 300 meter radius are in the high radiation zone (dark blue) and are more prone to ill-effects of electromagnetic radiation.

Propagation of "main beam" from antenna mounted on a tower or roof top.

Power varies by $1/R^2$, where $R = \text{Distance from tower}$.
Six cancer cases in consecutive floors (5th, 6th, 7th, 8th and 10th) directly facing and at similar height as the mobile phone towers of four telecom companies placed on the roof of opposite building.
Power density $P_d$ at a distance $R$ is given by

$$P_d = \left( \frac{P_t \times G_t}{4\pi R^2} \right) \text{ Watt/m}^2$$

$P_t = \text{Transmitter power in Watts}$
$G_t = \text{Gain of transmitting antenna}$
$R = \text{Distance from the antenna in meters}$
## Power Density at distance from cell tower

For $P_t = 20$ W, $G_t = 17$ dB = 50

<table>
<thead>
<tr>
<th>Distance R (m)</th>
<th>$P_d$ (W/m$^2$)</th>
<th>$P_d$ (µW/m$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>79.6</td>
<td>79,600,000</td>
</tr>
<tr>
<td>3</td>
<td>8.84</td>
<td>8,840,000</td>
</tr>
<tr>
<td>5</td>
<td>3.18</td>
<td>3,180,000</td>
</tr>
<tr>
<td>10</td>
<td>0.796</td>
<td>796,000</td>
</tr>
<tr>
<td>50</td>
<td>0.0318</td>
<td>31,800</td>
</tr>
<tr>
<td>100</td>
<td>0.008</td>
<td>7,960</td>
</tr>
<tr>
<td>500</td>
<td>0.000318</td>
<td>318</td>
</tr>
</tbody>
</table>

Above values are for a **single carrier and a single operator.**
Power Density for multiple carriers and operators

For $P_t = 20$ W, $G_t = 17$ dB = 50
No. of carriers = 5, No. of operators = 3

<table>
<thead>
<tr>
<th>Distance R $(m)$</th>
<th>$P_d$ $(W/m^2)$</th>
<th>$P_d$ $(\mu W/m^2)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1194.0</td>
<td>1194,000,000</td>
</tr>
<tr>
<td>3</td>
<td>126.0</td>
<td>126,000,000</td>
</tr>
<tr>
<td>5</td>
<td>47.7</td>
<td>47,700,000</td>
</tr>
<tr>
<td>10</td>
<td>11.94</td>
<td>11,940,000</td>
</tr>
<tr>
<td>50</td>
<td>0.477</td>
<td>477,000</td>
</tr>
<tr>
<td>100</td>
<td>0.1194</td>
<td>119,400</td>
</tr>
<tr>
<td>500</td>
<td>0.00477</td>
<td>4,770</td>
</tr>
</tbody>
</table>

For **5 carriers** and **3 operators** on the same roof top or tower, radiation level is extremely high.
India adopts ICNIRP guideline for Power density ($P_d$) 

$$P_d = \frac{\text{Frequency}}{200}, \text{frequency is in MHz}$$

(averaged over 6 min exposure)

For GSM900 (935-960 MHz), $P_d = 4.7\text{W/m}^2$ and 

GSM1800 (1810-1880 MHz), $P_d = 9.2\text{W/m}^2$.

ICNIRP has given following disclosure: 

ICNIRP is only intended to protect the public against short term gross heating effects and NOT against 'biological' effects such as cancer and genetic damage from long term low level microwave exposure from mobile phones, masts and many other wireless devices. 

http://ww.icnirp.de/documents/emfgd1.pdf
According to ICNIRP, for frequency (400-2,000 MHz) safe power density = \( \frac{f}{200} \)

So for GSM1840;

Safe power density according to ICNIRP is \( \frac{1840}{200} = 9.2 \text{W/m}^2 \) which is for 6 min as mentioned in point no. 3

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Table 7. Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed rms values).\(^a\)

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>E-field strength (V m(^{-1}))</th>
<th>H-field strength (A m(^{-1}))</th>
<th>B-field ((\mu\text{T}))</th>
<th>Equivalent plane wave power density (S_{eq}) (W m(^{-2}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 1 Hz</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1–8 Hz</td>
<td>10,000</td>
<td>(3.2 \times 10^4)</td>
<td>(4 \times 10^4)</td>
<td>—</td>
</tr>
<tr>
<td>8–25 Hz</td>
<td>10,000</td>
<td>(4.0 \times 10^4/f^2)</td>
<td>(5.0 \times 10^4/f^2)</td>
<td>—</td>
</tr>
<tr>
<td>0.025–0.8 kHz</td>
<td>250/f</td>
<td>(4/f)</td>
<td>(5/f)</td>
<td>—</td>
</tr>
<tr>
<td>0.8–3 kHz</td>
<td>250/f</td>
<td>(5)</td>
<td>(6.25)</td>
<td>—</td>
</tr>
<tr>
<td>3–150 kHz</td>
<td>87</td>
<td>(5)</td>
<td>(6.25)</td>
<td>—</td>
</tr>
<tr>
<td>0.15–1 MHz</td>
<td>87</td>
<td>(0.73/f)</td>
<td>(0.92/f)</td>
<td>—</td>
</tr>
<tr>
<td>1–10 MHz</td>
<td>87/f(^{1/2})</td>
<td>(0.73/f)</td>
<td>(0.92/f)</td>
<td>—</td>
</tr>
<tr>
<td>10–400 MHz</td>
<td>28</td>
<td>0.073</td>
<td>0.092</td>
<td>—</td>
</tr>
<tr>
<td>400–2,000 MHz</td>
<td>(1.375f^{1/2})</td>
<td>(0.0037f^{1/2})</td>
<td>(0.0046f^{1/2})</td>
<td>(f/200)</td>
</tr>
<tr>
<td>2–300 GHz</td>
<td>61</td>
<td>0.16</td>
<td>0.20</td>
<td>10</td>
</tr>
</tbody>
</table>

\(^a\) Note:

1. \(f\) as indicated in the frequency range column.
2. Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded.
3. For frequencies between 100 kHz and 10 GHz, \(S_{eq}\), \(E^2\), \(H^2\), and \(B^2\) are to be averaged over any 6-min period.

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Figure 1 Reference (ICNIRP, Pg 18 Table 7)
### Table 1. FCC Limits for Maximum Permissible Exposure (MPE)

#### (A) Limits for Occupational/Controlled Exposure

<table>
<thead>
<tr>
<th>Frequency Range (MHz)</th>
<th>Electric Field Strength (E) (V/m)</th>
<th>Magnetic Field Strength (H) (A/m)</th>
<th>Power Density (S) (mW/cm²)</th>
<th>Averaging Time</th>
<th>Power Density</th>
<th>Averaging Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3-3.0</td>
<td>614</td>
<td>1.63</td>
<td>(100)*</td>
<td>6</td>
<td>f/300</td>
<td>6</td>
</tr>
<tr>
<td>3.0-30</td>
<td>1842/f</td>
<td>4.89/f</td>
<td>(900/f²)*</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-300</td>
<td>61.4</td>
<td>0.163</td>
<td>1.0</td>
<td>6</td>
<td>f/300</td>
<td>30</td>
</tr>
<tr>
<td>300-1500</td>
<td>--</td>
<td>--</td>
<td>f/300</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500-100,000</td>
<td>--</td>
<td>--</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### (B) Limits for General Population/Uncontrolled Exposure

<table>
<thead>
<tr>
<th>Frequency Range (MHz)</th>
<th>Electric Field Strength (E) (V/m)</th>
<th>Magnetic Field Strength (H) (A/m)</th>
<th>Power Density (S) (mW/cm²)</th>
<th>Averaging Time</th>
<th>Power Density</th>
<th>Averaging Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3-1.34</td>
<td>614</td>
<td>1.63</td>
<td>(100)*</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.34-30</td>
<td>824/f</td>
<td>2.19/f</td>
<td>(180/f²)*</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-300</td>
<td>27.5</td>
<td>0.073</td>
<td>0.2</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300-1500</td>
<td>--</td>
<td>--</td>
<td>f/1500</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500-100,000</td>
<td>--</td>
<td>--</td>
<td>1.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

f = frequency in MHz

*Plane-wave equivalent power density

Table 1A – Safe Power density = f/300 averaged over 6 min exposure.

Table 1B – Safe power density = f/1500 averaged over 30 min exposure.

(From FCC 1999 - Pg 17 - Table 1)
<table>
<thead>
<tr>
<th>In USA</th>
<th>In India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular cell site towers are typically 50-200 feet high.</td>
<td>Cellular cell site towers are even 5-10 feet high; on sides of building and outside window.</td>
</tr>
<tr>
<td>In urban areas, cell sites commonly emit an ERP of 10 watts per channel or less. An ERP of 10 watts corresponds to an actual radiated power of around 1 watt depending on the type of antenna used.</td>
<td>In INDIA, cell sites transmit 100’s of Watts of power with antenna gain of more than 10, so ERP &gt; 1000 Watts</td>
</tr>
</tbody>
</table>

Power Absorbed by Human Body

Microwave power absorbed by human body if exposed to so called safe radiation level adopted in India, which is f/200, where f is in MHz?

ICNIRP Guideline—
At 940 MHz, Power density ($P_d$) is 4.7W/m²

Power received ($P_r$) by human body will be
$[P_r = P_d \times \text{Area}] = 6.75$ Watts in one sec.

Microwave oven: 700 to 1000 W. With say 60% efficiency, microwave power output is say 500 W.

In one day, microwave energy absorbed will be $[6.75 \text{ Watts} \times 60 \times 60 \times 24 \text{ sec}] = 583.2 \text{ KW-sec.}$

This implies that human body can be safely kept in a microwave oven for 1166 secs = 19 minutes per day
## EMF Radiation Standards (for GSM900)

<table>
<thead>
<tr>
<th>Country</th>
<th>Milliwatt / m²</th>
<th>Watts / m²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INDIA (adopted ICNIRP)</strong></td>
<td>4500</td>
<td>4.5 (f/200)</td>
</tr>
<tr>
<td>INDIA (Proposed 1/10th of ICNIRP)</td>
<td>450</td>
<td>0.45 (f/2000)</td>
</tr>
<tr>
<td>AUSTRALIA (New South Wales proposed)</td>
<td>0.01</td>
<td>0.00001</td>
</tr>
<tr>
<td>AUSTRIA (Salzburg city)</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>45 to 1125</td>
<td>0.045 to 1.125</td>
</tr>
<tr>
<td>BELGIUM (Luxembourg)</td>
<td>24</td>
<td>0.024</td>
</tr>
<tr>
<td>BIO-INITIATIVE REPORT (Outdoor)</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>BIO-INITIATIVE REPORT (Indoor)</td>
<td>0.1</td>
<td>0.00001</td>
</tr>
<tr>
<td>CANADA (Toronto Board of Health - proposed)</td>
<td>100</td>
<td>0.1</td>
</tr>
<tr>
<td>CHINA</td>
<td>400</td>
<td>0.4</td>
</tr>
<tr>
<td>FRANCE (Paris)</td>
<td>100</td>
<td>0.1</td>
</tr>
<tr>
<td>GERMANY (ECOLOG 1998 - Precautionary Recommendation)</td>
<td>90</td>
<td>0.09</td>
</tr>
<tr>
<td>GERMANY (BUND 2007 - Precautionary Recommendation)</td>
<td>0.1</td>
<td>0.00001</td>
</tr>
<tr>
<td>ITALY</td>
<td>100</td>
<td>0.1</td>
</tr>
<tr>
<td>NEW ZELAND (Auckland)</td>
<td>500</td>
<td>0.5</td>
</tr>
<tr>
<td>POLAND</td>
<td>100</td>
<td>0.1</td>
</tr>
<tr>
<td>RUSSIA</td>
<td>100</td>
<td>0.1</td>
</tr>
<tr>
<td>SWITZERLAND (Apartments, Schools, Hospitals, Offices &amp; Playgrounds)</td>
<td>42</td>
<td>0.042</td>
</tr>
<tr>
<td>USA (Implementation is strict)*</td>
<td>3000</td>
<td>3 (f/300)</td>
</tr>
</tbody>
</table>

**Final Recommendations**

- Indoor - include apartments, schools, hospitals, offices & playgrounds. **0.1 0.0001**
- Outdoor - where people spend few minutes a day. **10 0.01**

*USA - FCC Guidelines: f/300 if averaged over 6 minutes and f/1500 if averaged over 30 min
Radiation Measurement at various locations

Cumulative Readings including CDMA, GSM 900, and GSM 1800

<table>
<thead>
<tr>
<th>Location</th>
<th>Reading in dBm</th>
<th>Readings in W/m²</th>
<th>Readings in microW/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrace, New Rajindra Nagar, Delhi</td>
<td>+09</td>
<td>0.561</td>
<td>5,61,479</td>
</tr>
<tr>
<td>Resident 1, Bedroom - Chowpatty</td>
<td>+06</td>
<td>0.281</td>
<td>2,81,406</td>
</tr>
<tr>
<td>Resident 2, Bedrooms - Opera House</td>
<td>+05</td>
<td>0.223</td>
<td>2,23,529</td>
</tr>
<tr>
<td>Resident 3, Bedroom – ML Dahanukar Marg</td>
<td>+05</td>
<td>0.223</td>
<td>2,23,529</td>
</tr>
<tr>
<td>Delhi-Gurgaon Highway - near Toll (3 towers)</td>
<td>0</td>
<td>0.0706</td>
<td>70,686</td>
</tr>
<tr>
<td>Vashi Bridge - after Railway Station</td>
<td>-4</td>
<td>0.0282</td>
<td>28,274</td>
</tr>
<tr>
<td>Resident 3, 4th Fl: Sergeant House Lady w/cancer</td>
<td>-6</td>
<td>0.0177</td>
<td>17,756</td>
</tr>
<tr>
<td>Resident 4, Dadar East, Lady w/cancer</td>
<td>-6</td>
<td>0.0177</td>
<td>17,756</td>
</tr>
<tr>
<td>Resident 5, Opposite roof, Rane Society, Powai</td>
<td>-10</td>
<td>0.00706</td>
<td>7,069</td>
</tr>
<tr>
<td>Ustav Chowk, Kharghar</td>
<td>-12</td>
<td>0.00446</td>
<td>4,460</td>
</tr>
<tr>
<td>Govandi- Residential towers - near Indian Oil</td>
<td>-14</td>
<td>0.002814</td>
<td>2,814</td>
</tr>
<tr>
<td>Lower Parel Employees-headaches, forgetfulness</td>
<td>-16</td>
<td>0.001776</td>
<td>1,776</td>
</tr>
<tr>
<td>Vashi Highway – near Turbhe</td>
<td>-18</td>
<td>0.001120</td>
<td>1,120</td>
</tr>
<tr>
<td>Nerul Bridge</td>
<td>-20</td>
<td>0.000707</td>
<td>707</td>
</tr>
<tr>
<td>Vivero pre School (opposite powai lake)</td>
<td>-22</td>
<td>0.000446</td>
<td>446</td>
</tr>
<tr>
<td>Rajeev Gandhi nagar</td>
<td>-26</td>
<td>0.000177</td>
<td>177</td>
</tr>
<tr>
<td>On road near Evita (Hiranandani Building)</td>
<td>-28</td>
<td>0.000112</td>
<td>112</td>
</tr>
<tr>
<td>D-Mart, Hiranandani, Powai</td>
<td>-34</td>
<td>0.0000280</td>
<td>28</td>
</tr>
<tr>
<td>IIT Bombay School of Management - Entrance</td>
<td>-46</td>
<td>0.00000178</td>
<td>1.78</td>
</tr>
</tbody>
</table>
Health concerns with current Safety Guidelines

Data from Firstenberg 2001
BIOLOGICAL EFFECTS

Most common complaints:

- Sleep disruption
- Headache
- Concentration
- Forgetful memory
- Depression
- Fatigue

- Dizziness
- Palpitations of the heart
- Visual disorders
- Cardiovascular problems
- Buzzing in the head
- Altered reflexes

Many of these are related to changes in the electrical activity of the brain
Neurodegenerative Disorders – Alzheimer, Parkinson's

Immune System Degradation

Tinnitus and Ear Damage

Irreversible infertility

Effect on Skin

DNA Damage

Increase in Cancer risk

BIOLOGICAL EFFECTS

Breakdown of Blood Brain Barrier

Increased Risk of Eye Cancers

Increased Risk of Ear Tumors

Increased Risk of Other Cancers
Use of mobile phones before bed disturbs Stage 4 sleep, the stage important for full recuperation of brain and body.

Keeping mobile phone next to head or below pillow while sleeping

NOT ADVISABLE
Children are more vulnerable as:

- Skulls are smaller & thinner - increases radiation absorption
- Rate of cell division - more susceptible to genetic damage
- Myelin sheath not developed - Electrical brain-wave activity
- Immune system not well developed - less effective against fighting cancer growth

RF penetration in the skull of an adult (25%), 10 year (50%) and a 5 year old (75%).
Risk to Pregnant Women

A pregnant woman and the fetus both are vulnerable as RF radiations can pass placental barrier & continuously react with the developing embryo and increasing cells.
Effect on Eye/ Uveal Melanoma

Good quality lens Ability to focus the laser beam at the various locations is altered.

Prolonged exposure to microwave radiation can lead to macroscopic and microscopic damage to the lens and part of this damage does not heal and accumulates with time.
Irreversible infertility

Continuous exposure

30% sperm decrease in intensive mobile users, in addition to damage of sperms
Live Blood Cells and Electrosmog

Dr. Magda Havas
Trent University, Canada

Consequences

- Poor Circulation
- Reduces waste removal
- Lower Oxygen transport
Single and double strand breaks observed in DNA from microwave exposure at levels below the current FCC exposure standard. When Damage to DNA > Rate of DNA repaired, there is the possibility of retaining mutations and initiating cancer.
Effect of Cell Towers (some references)

- 8 times increased cancer risk for exposure > 1000μW / m² =1 mW / m²
- Risk is higher after 6-10 years of exposure
- Women living near towers had 10 times increased cancer risk

http://www.getmefacts.info/files/emfposter.pdf  updated on 11Sep’11
Effect on Birds and Animals

Have you ever seen any bird near cell towers? May be not, because birds have more volume and less weight, so heating effect is very fast.

**Birds and Bees**

- Interfere with navigation and reproduction

**Animals**

- Dairy cows – Decreased milk production, reproductive and developmental problems and decline in overall health.
- Sheep, dogs, cats, rabbits living near base stations affected.
Effect on Plants

4 cell towers near Gurgaon-Delhi Toll Naka
Output of most of fruit bearing trees drastically reduced from 100% to < 5% after 2.5 years of cell tower installation.
Electromagnetic Radiation Research foundation of South Africa

EMF adversely affecting vegetation - Republic of South Africa

Picture sent by Tracey-Lee, South Africa
DOT Inter-Ministry Committee (IMC) accepts cell phone and tower radiation hazard

IMC Report ON EMF RADIATION was uploaded on DOT website in Jan. 2011.

Mentions several health hazards due to radiation on Human Health and Environment (pages 12-27).


Yet recommended RF exposure limits in India may be lowered to only 1/10th of the existing reference level, which will be 0.92W/m2 for GSM1800 (Page 33).
Expert Group reported impacts of communication towers on Wildlife including Birds and Bees (2011)

Out of 919 research studies collected:

593 - report Impact; 130 - No Impact; 196 - Inconclusive
State to nix cell towers on schools, hospitals

Prafulla Marapakar | tns

Mumbai: Taking a cue from the widespread concern about mobile towers installed on school and hospital buildings, the Maharashtra government is all set to amend the Development Control (DC) Rules in this regard. Of the 1,600 mobile towers in Mumbai, nearly 500 (or 30%) are atop schools and hospitals. The remaining ones are on private or commercial buildings.

"Since fears have been expressed about the radiation from mobile towers, we are ready to remove those on school and hospital buildings," official told TOI on Monday: "On rules are amended, it will be mandatory for the operators to remove the towers within six months."

As per the proposed amendment, the operator will have to submit a certificate stating that the emission is within the permissible level and an undertaking that the existing tower will be removed within six months. "New Delhi has al-

‘Actor’s house vulnerable to radiation’

Sayli Udasi Manikkar | mumbai Desk correspondent

MUMBAI: A day after Hindustan Times reported about Bollywood actor Juhi Chawla being worried about the mobile towers set up at Subhash's state guesthouse located 10 meters across her house, a team from IIT Mumbai headed by professor Girish Kumar volunteered to check her claims, and found a major part of her house was vulnerable.

"The range we found was between 10 to 25 milli-tesla per sq km at certain intervals it even shot up to 800. What's important is that the most occupied space in the house—the hall—has continuous exposure which is dangerous," Kumar said.

"Even low-level radiation is harmful and here there is exposure to about 25. And at a distance of 40 meters from a high radiation zone, one is prone to ill effects of electromagnetic radiation," Kumar said.

An independent agency reported radio frequency levels above 2000 mw per sq cm at the actor's house in July 2010. The government, then, changed the location of the towers and showed a lower range between 16 to 25 mw per sq cm. Chawla continues to be concerned and hopes that some concrete action is taken. "If the change in tower direction has led to lesser radiation levels at my house, it only means someone else is facing higher radiation since there are many buildings nearby," she said.
SEVEN cancer cases in C-Scheme – Jaipur City

SIX cancer cases in Shalimar Bagh – Jaipur City

If mobile towers were safe.. What is the mystery behind their illness?
Milind Deora and A.K Mittal of TERM inspects radiation level of mobile towers at Haji Ali, Mumbai

22nd September’11

<table>
<thead>
<tr>
<th>Measurement Location</th>
<th>Reading (in µW / m² )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haji Ali Juice Center</td>
<td>85,000 µW / m²</td>
</tr>
<tr>
<td>Raj Niketan, Opp. Sahyadri State Guest House, Malabar Hill</td>
<td>Max: 42,260 µW/m² Min: ~178 µW/m²</td>
</tr>
</tbody>
</table>

The TERM team says “We were within WHO limits of 4,500,000 µW/ m²”.
## Analysis of Readings

<table>
<thead>
<tr>
<th>Standard/Location</th>
<th>Reading (in µW / m²)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indian Guideline - ICNIRP’ 98</strong></td>
<td>4,700,000</td>
<td>Equivalent to putting a person in microwave oven for 19 min/day.</td>
</tr>
<tr>
<td>IMC recommendation - Jan. 2011</td>
<td>4,70,000</td>
<td>However, the report mentions several health hazards at 1000 µW/m².</td>
</tr>
<tr>
<td><strong>Haji Ali Juice Center</strong></td>
<td>85,000</td>
<td>This level is very high but TERM says it is safe as it is within ICNIRP guideline</td>
</tr>
<tr>
<td><strong>Opp. Sahyadri State Guest House</strong></td>
<td>42,260</td>
<td>Cancer case in this house - “..same as above..”</td>
</tr>
<tr>
<td>Range at which health problems have been observed</td>
<td>&gt;10,000, &gt;100</td>
<td><strong>Several Cancer Cases</strong> observed in India. <strong>Headaches, concentration problem, fatigue, miscarriage, joint pains etc</strong></td>
</tr>
<tr>
<td>Safe Radiation Density level</td>
<td>100</td>
<td>For long term continuous exposure (as per Bio-Initiative Report 2007)</td>
</tr>
</tbody>
</table>

Disclaimer – Symptoms based on Individual sensitivity
Irrespective of the ICNIRP recommendations for acute effects, the following benchmarks apply to regular exposure of more than four hours per day.

*High-frequency electromagnetic radiation (as power flow density)*

- ≥1000 μW/m² (≥1 mW/m²) very far above normal
- 10-1000 μW/m² (0.01-1 mW/m²) far above normal
- 1-10 μW/m² (0.001-0.01 mW/m²) slightly above normal
- ≤1 μW/m² (≤0.001 mW/m²) within normal limits
Ultimately, everything is related to Energy

\[
\text{Energy} = (\text{Power} \times \text{Time})
\]

If we want to be safe for:

- 100 years, power density must be \( <100 \ \mu\text{W/m}^2 \)
- 10 years, power density must be \( <1000 \ \mu\text{W/m}^2 \)
- 1 year, power density must be \( <10,000 \ \mu\text{W/m}^2 \)

Above values are for continuous exposure. If we are exposed for only a few hours per day, then we can afford to be exposed to higher radiation density.
The Hon’ble Prime Minister has directed Secretary, DST to look into the matters concerning the harmful effects from cell towers on the population living in the vicinity of the towers.
Step 1

- Convince operators to reduce transmitted power from 20W/carrier to max. 1-2 W in dense urban area.

HOW TO IMPLEMENT?

Remove the power amplifier or reduce gain of amplifier.

ADDITIONAL BENEFITS:

- Cooling of the amplifier will not be required then it may not require Air conditioner.
- Power requirement will reduce, so Diesel Generator not required. Solar panel can meet this requirement.
- Operators can claim carbon credit and it truely leads to Green Telecom.

You can see TRAI-Green-Telecom-Openhouse-GK Report

DISADVANTAGES OF REDUCING POWER:

- Range will reduce. People living at larger distance may have signal problem initially.
- Operators have to install more number of low power transmitter or they can provide low power repeaters.
- Which will cost them MORE MONEY!
Step 2

- Radiation measurements have to be done at residences, offices, schools, hospitals.

**HOW TO IMPLEMENT?**

If power density level is still high (i.e., more than 100-1,000 microW/m² after reduction of the transmitted power, then either:

- Towers have to be relocated or
- Height of the towers has to be increased or
- Direction of the antenna has to be changed. *

*Again, any of these steps will require additional investment.
PEOPLE HAVE TO DECIDE:

1. Health vs wealth.

2. Good cell phone connectivity at the expense of health of people living near cell tower or somewhat poor connectivity for the people living at larger distance from the tower.

Thank you