

# G5 TECHNOLOGY ROLL OUT MANAGEMENT OF ENVIRONMENTAL & HEALTH RISKS

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## PRESENTATION OUTLINE

**A. Radiations From Communication  
infrastructure- EMR, EMF, or RF**

**B. What is 5 “G” as Compared with other  
“G”s**

**C. The Effects Of RF EMF On Human Health**

**D. Role of NEMA in 5 “G” Roll out**

**E. Challenges**



## A. Radiations From Communication infrastructure

- **What is EMR, EMF, or RF?**-The term EMF is an abbreviation for Electric, Magnetic and Electromagnetic Fields, **EMR is an abbreviation for Electromagnetic Radiation** and **RF is Radio Frequency**. These terms are often used interchangeably.
- EMR is part of everyday life, emitted by:
  - a. **Natural sources** like the sun, the earth and the ionosphere, as well as
  - b. **Artificial sources**: TV transmission, Microwave telephony radio, transmitters, Mobile phones base stations, Broadcast Transmitters, Remote controls, Electrical and electronic equipment, and AM and FM radio signals.



## B. What is 5 “G”

- **Wireless Standard (WS)** is a specific method of utilizing RF-EMF.
- WS used in the “**First Generation**” of mobile telecommunications is referred as “**1G**”
- Technology develops and standards upgrades to the “1G” wireless standard resulted in the **new standard “2G”**
- Similarly “2G” was replaced by “3G”; “3G” with “4G”.
- And now substantial developments are being implemented relative to the “4G”, hence the **emergence of “5G”**



## 5 “G” AND OTHER “Gs” COMPARED

- 5G utilizes higher (above 24GHz) EMF frequencies than the 3G and 4G (less than 4GHz)
- The Higher the frequency, the lower the depth of penetration of the EMF into the body.
- Power from the higher frequencies will be primarily absorbed more superficially than that from previous mobile telecommunication technologies.
- However the proportions of power that is absorbed superficially (as opposed to deeper in the body) is larger for the higher frequencies.



## C. What Are The Effects Of RF-EMF On Human Health?

- The need to understand Hazard, Risks and Safety Concepts
- Research and Risk Assessment - scientific characterization of potential adverse effects of a chemical/agent resulting from exposure.
- Studies undertaken by:
  - i. World Health Organization-International EMF project,
  - ii. International Agency for Research on Cancer (IARC),
  - iii. International Commission on Non-Ionising Radiation Protection (ICNIRP),
  - iv. ITUT-T activities on human exposure to EMF among others



# Hazard, Risk and Safety

- **Hazard**-determining the dangerous and harmful factor (toxicity) or anything that has a known potential to cause damage to life, property and/or the environment.
- **Risk** is the probability of harm (health effect) or the likelihood of a significant impact.
- **Safety** is a condition of low risk in which the risk level is adequately protective.
- **No risk** is not practicable, however we should strive to seek less and less risk (more and more safety)

Risk=Hazard x Exposure

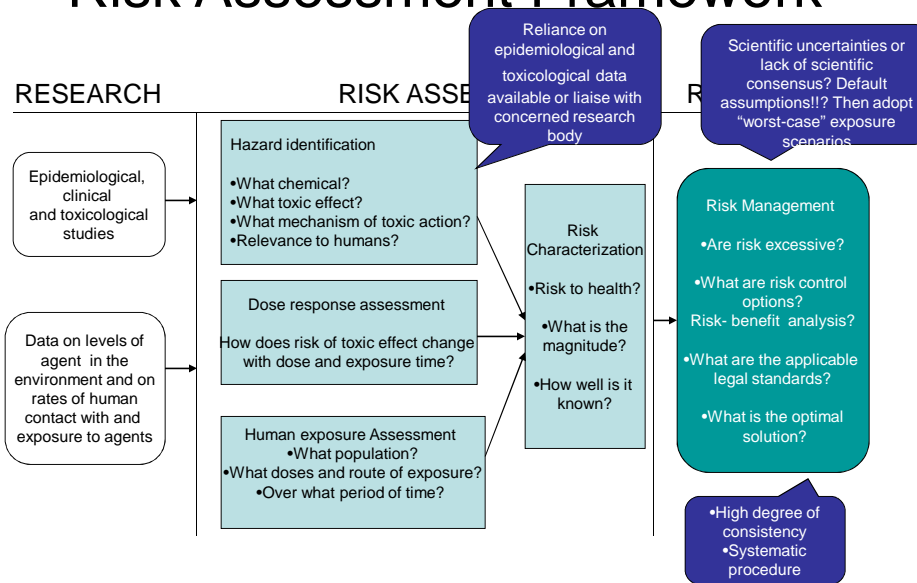
Exposure: time x concentration

If exposure is 0, risk is 0 (mathematically) even if Hazard is very high

If exposure is high, risk might be High even if the hazard is low

The critical need to move from Hazard (toxicity) based Assessment to Risk Based Assessment

# Risk Assessment Framework



## Studies undertaken by WHO, IARC, ICNIRP

- The primary reference on EMF and Health is the WHO
- WHO has confirmed that a large number of studies have been performed over the last 2 decades to assess potential health Risks and “to date NO adverse health effect have been established as being caused by the mobile phone use”.
- WHO-tissue heating is the principal mechanism of interaction between radio frequency energy and human body.
- WHO-Results of animal studies consistently show no increased cancer risk for long term exposure to EMF.
- IARC has classified RF-EMF as a category 2B agent “limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals (refer to IARC Classification of agents- Grp. 1, Grp2A, Grp 2B, Grp 3 to Grp 4)



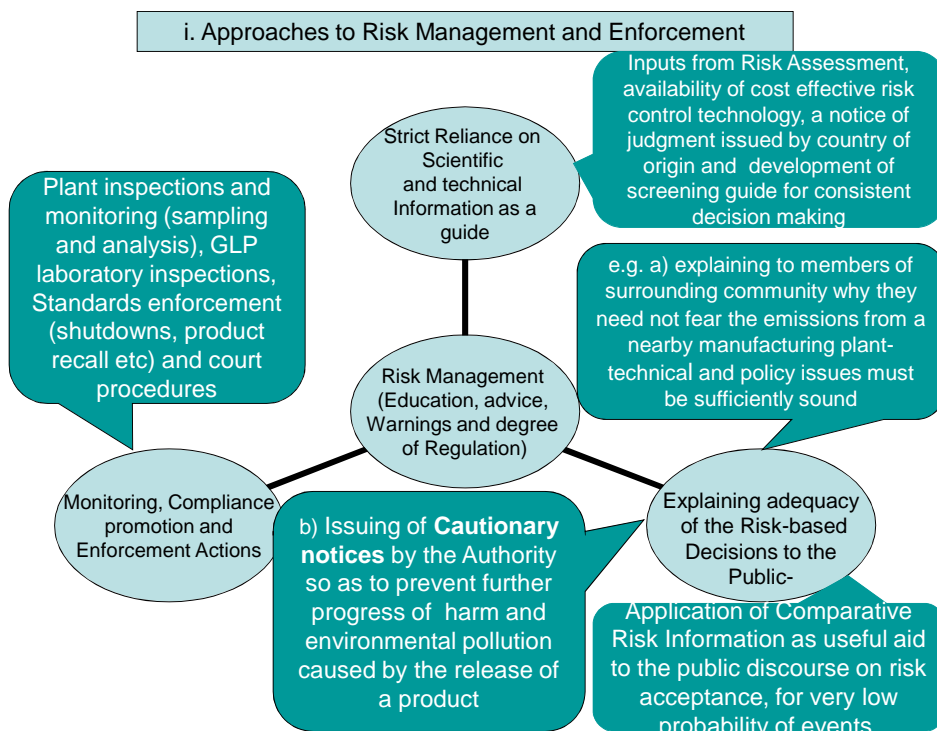
## Other studies undertaken

- When the human head is exposed to pulsed radiation such as radar, an audible sound described as buzz, chirp, click or knocking sensation is perceived by some individuals; the sound seems to originate within or behind the head a phenomenon called “RF hearing” or “ RF sound” .
- One of the effects of RF is heat due to absorption by the body tissue. However, this does not pose a health risk as the body’s thermo-regulatory process carries that heat away.
- Reports have also been made of symptoms such as nervousness, disturbed sleep and fatigue associated with the use of the mobile phone. However, studies done to prove the significant association between use of the mobile phone and the above-mentioned symptoms remain inconclusive.

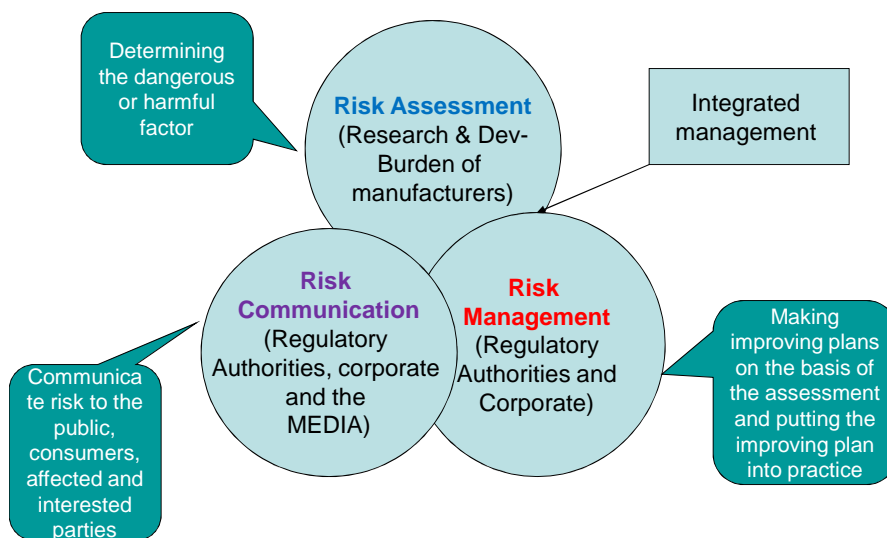


## D. Role of NEMA in 5G Roll Out

- i. Risk Management and Enforcement
- ii. Risk Communication
- iii. **Precautionary Principle** as applicable
- iv. **Environmental Impact Assessment & Environmental Audit**  
Requirements to ensure appropriate Environmental and Social safeguards
- v. **Compliance Promotion:**



## ii. Risk Communication-*integrated management*



## iii. Application of Precautionary Principle as advised by WHO

- The WHO advice on electromagnetic fields and public health with respect to mobile telephones and their includes the following precautionary measures:
- **Government:** if regulatory authorities have adopted health-based guidelines but, because of public concerns, would like to introduce additional precautionary measures to reduce exposure to RF fields, **they should not undermine the science base of the guidelines** by incorporating arbitrary additional safety factors into the exposure limits. Precautionary measures should be introduced as a separate policy that encourages, through voluntary means, **the reduction of RF fields by equipment manufacturers** and the public.
- **Individuals:** choice to limit their own or their children's RF exposure by **limiting the length of calls**, or **using "hands-free" devices** to keep mobile phones away from the head and body.

#### iv. Environmental Impact Assessment & Environmental Audit key issues

- Comprehensive discussions on **safety standards, exposure and impacts** of EMF on public health.
- Adequate **PAP Consultation** with emphasis on **risk communication and full disclosure** of emission impacts so as to address the risk perception, provide public relief, enhance public confidence and acceptability.
- **Adequate site specific baseline information** on surrounding land use and existence of a similar tower in the vicinity.
- **Discussion on structural stability of the tower/mast** and the need for the **setback distance- the fall zone** prescribed as 1.5 times the height of the tower within which no residential or public utility structure should be located.

**MAZINGIRAYETU** relation to the background  
**UHAIWETU**  
**WAJIBUWETU**



#### Environmental Impact Assessment Requirements cont.

- **Analysis of Alternatives;**
  - a. **Co-location** recommended over new establishment
  - b. **Site selection-** sites away from residential areas recommended
  - c. **Greenfield, Roof top and Small-Cell**
  - d. **Lattice tower, Monopole and camouflage** considerations
- Genset-Prescribe compliance with Noise and Excessive Vibration Pollution Regulation, 2009
- **Occupational Safety-** Fall protection Programme and EMF exposure protection.

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**UHAIWETU**  
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## v. Compliance Promotion

- i. The need for **Duty of Care** and **Self Regulation** from the **equipment manufacturers**, **service providers** and **consumers** in ensuring compliance with the following standards and restrictions:
  - ii. **WHO Limit Guidelines**
  - iii. **ICNIRP (1998 & 2020) Guidelines**
  - iv. the guidelines has incorporated potential differences in the effect of RF EMFs as a **function of age, health status, depth of penetration, the effect of both acute and chronic exposure** and includes all substantiated effects regardless of mechanism.
    - **Public awareness on restrictions and safety requirements**
    - **Role of the consumers to comply with the cautionary Notices to enhance safety.**



## E. Challenges to Risk Management

- i. **Risk Overestimation and Risk Underestimation**
- ii. **Business Rivalry among the service providers**
- iii. **Inconclusive research work from WHO, IARC, ICNIRP& others**
- iv. **Public perception (or anxiety)**
- v. **The burden of providing evidence** that individuals have been exposed to harmful substances, and that they were exposed at sufficiently high level, for a sufficient period of time, to make it “more likely to be true than not true” that the injury or disease they have was caused by the particular exposure

