HEALTH IMPLICATION OF THE MOUNTING OF TELECOMMUNICATIONS MAST CLOSE TO BUILDINGS

Presentation to the House of Representatives Ad-Hoc Committee to Investigate the Health Implication of the Mounting of Telecommunications Mast Close to Buildings

By

Nigerian Communications Commission (NCC)

NIGERIAN COMMUNICATIONS COMMISSION

OBJECTIVES OF THIS PRESENTATION

- To provide information to the Honourable Members on the safety of telecommunications (telecoms) infrastructure.
- To allay any health concerns and misconceptions on radiation from telecoms masts.
- To assure Honourable Members that radiation emanating from mobile networks within the specified limits is not harmful.

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INTRODUCTION

- Explosive growth in the Telecommunication industry in Nigeria

- The industry has grown from a teledensity of **0.45% in 2001** to **110% in 2016.**

- Well above **150,000,000** (**One Hundred & Fifty Million**) active lines

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INTRODUCTION CON'T

- There are about 7 billion mobile subscriptions globally.

- By 2020, we expect that **nearly everything will be connected**, with an estimated 50 billion connected devices.

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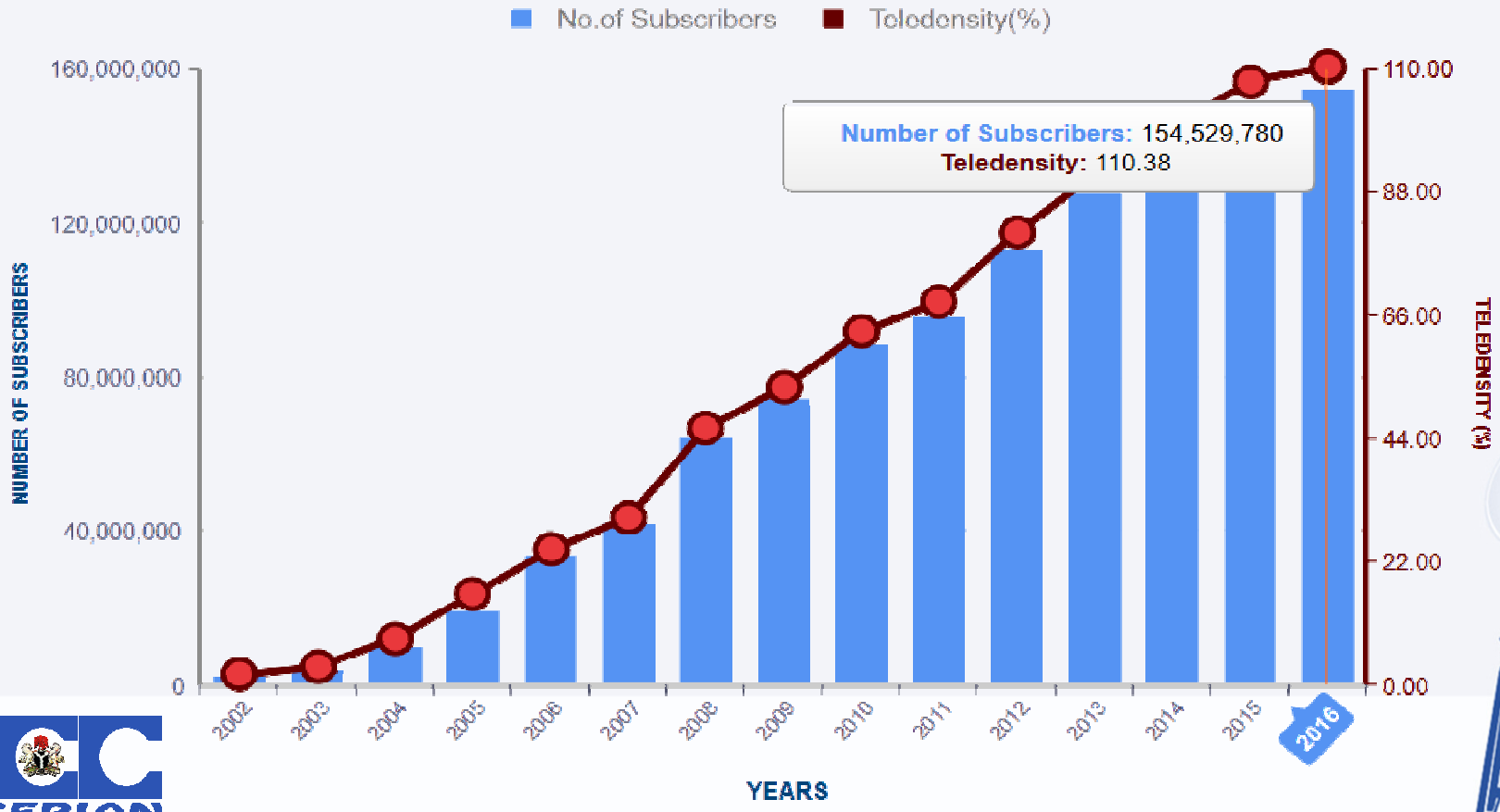
SUBSCRIBER/TELEDENSITY DATA (2002 - 2016)



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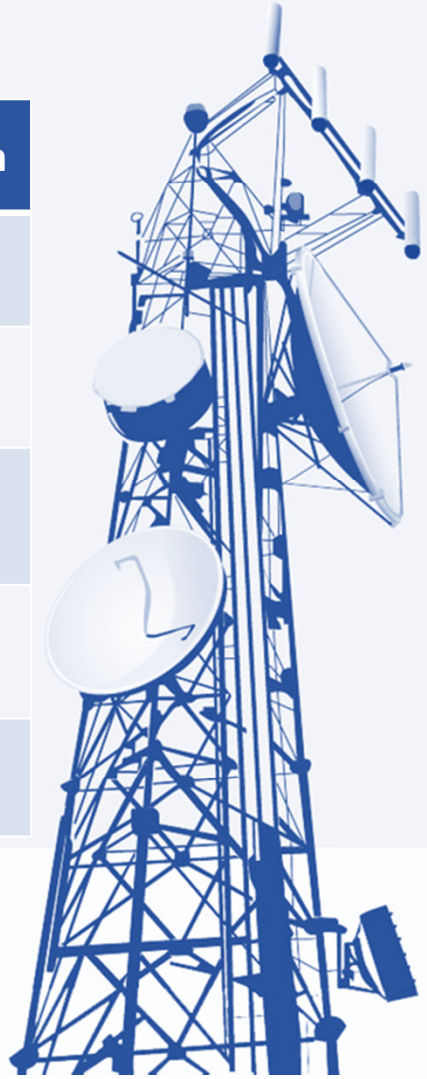
COUNTRY BENCHMARK STATISTICS

	Nigeria	India	United States	United Kingdom
Area (sq. km)	**923,768**	**3,287,263**	**9,833,517**	**243,610**
Population (July 2015)	**181,562,056**	**1,251,695,584**	**321,368,864**	**64,088,222**
Total Active Lines (July 2015)	**150,741,005**	**1,036,572,000**	**504,298,000**	**113,897,000**
Number of Base Stations (2015 est.)	**49,096**	**400,000**	**215,000**	**52,500**
Ratio of Subscriptions to Base Stations	**3070.33**	**2591.43**	**2345.57**	**2169.47**



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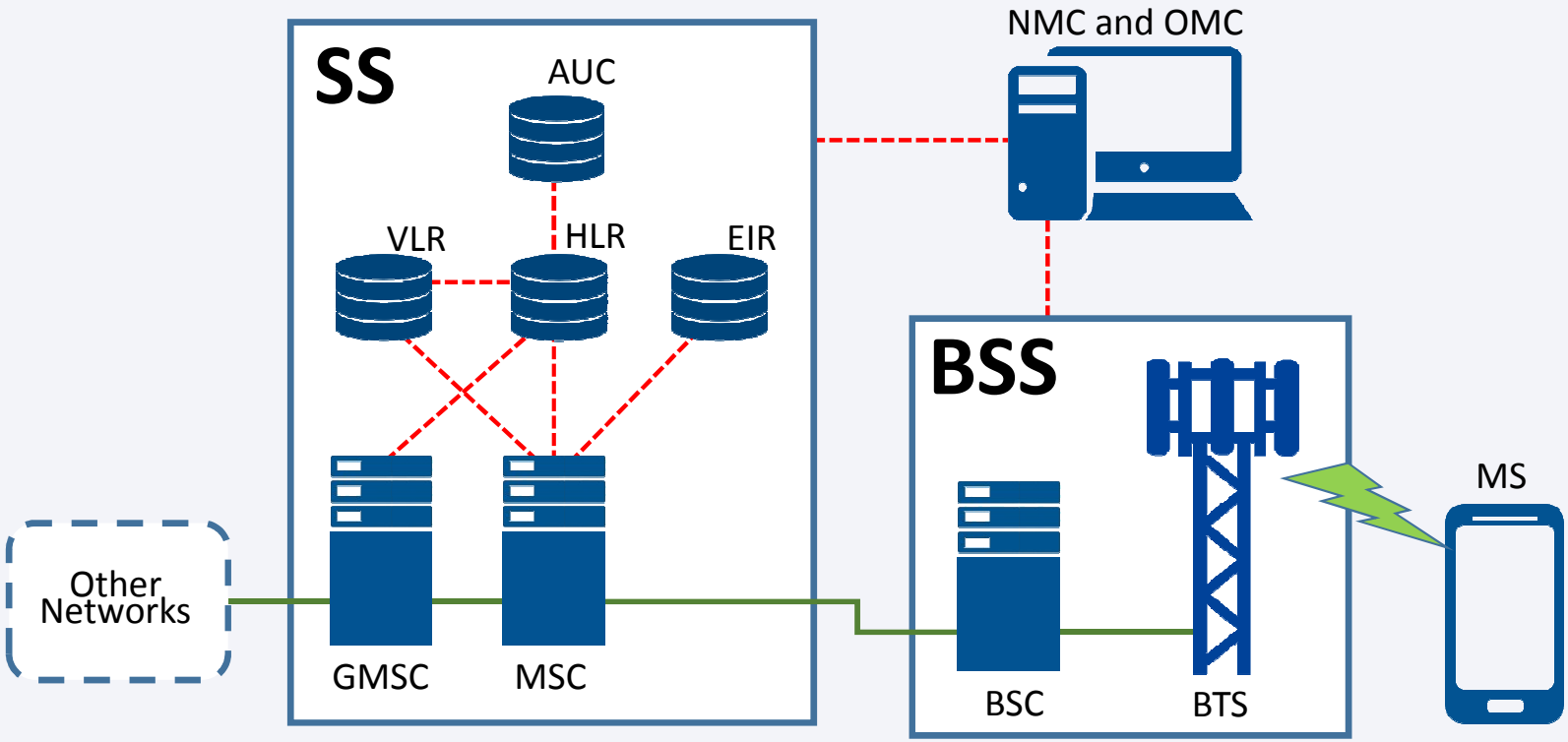
GSM NETWORK COMPONENTS

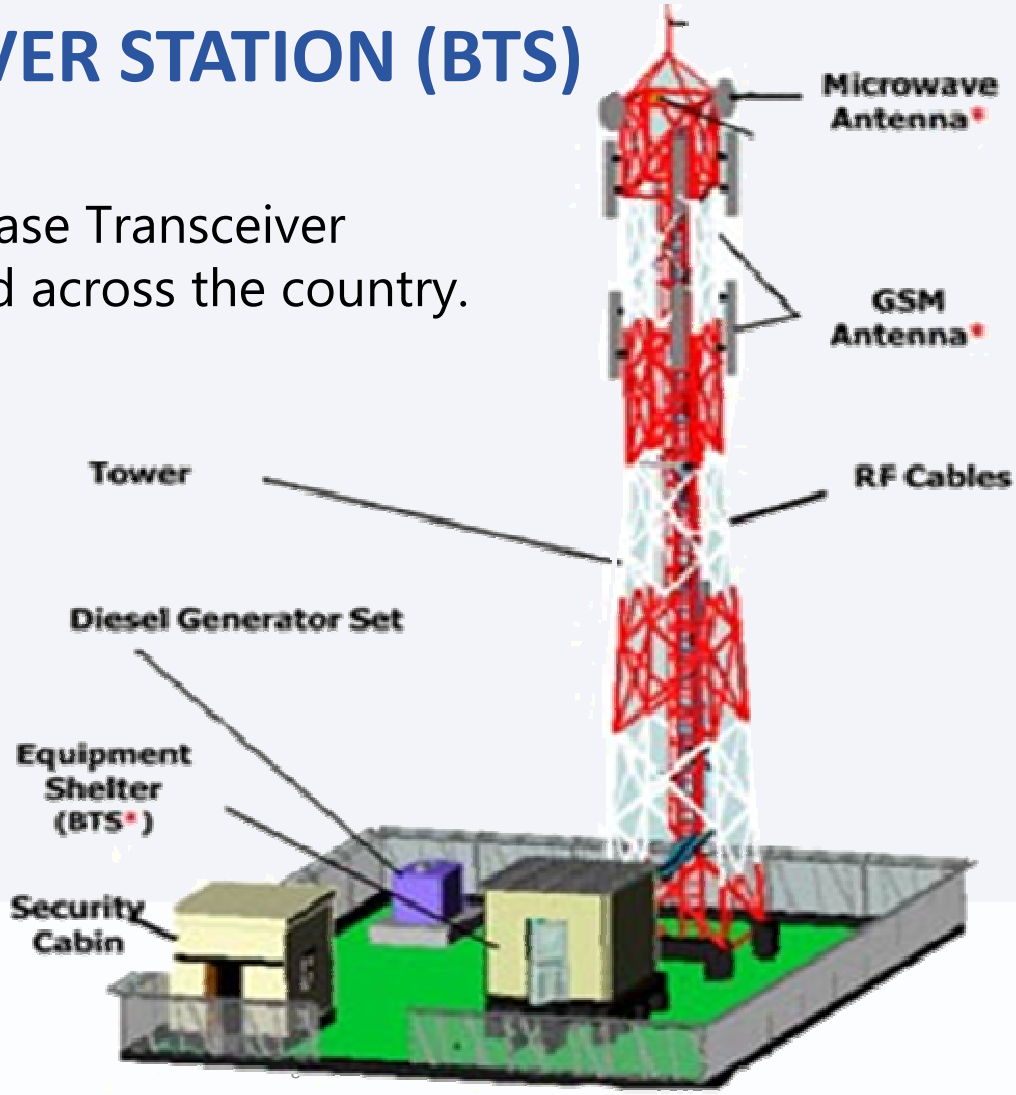


SS: Switching System
BSS: Base Station System

Signaling Transmission
Call Connection & Signaling Transmission

BASE TRANSCEIVER STATION (BTS)

- More than **50,000** Base Transceiver Stations (BTS) spread across the country.



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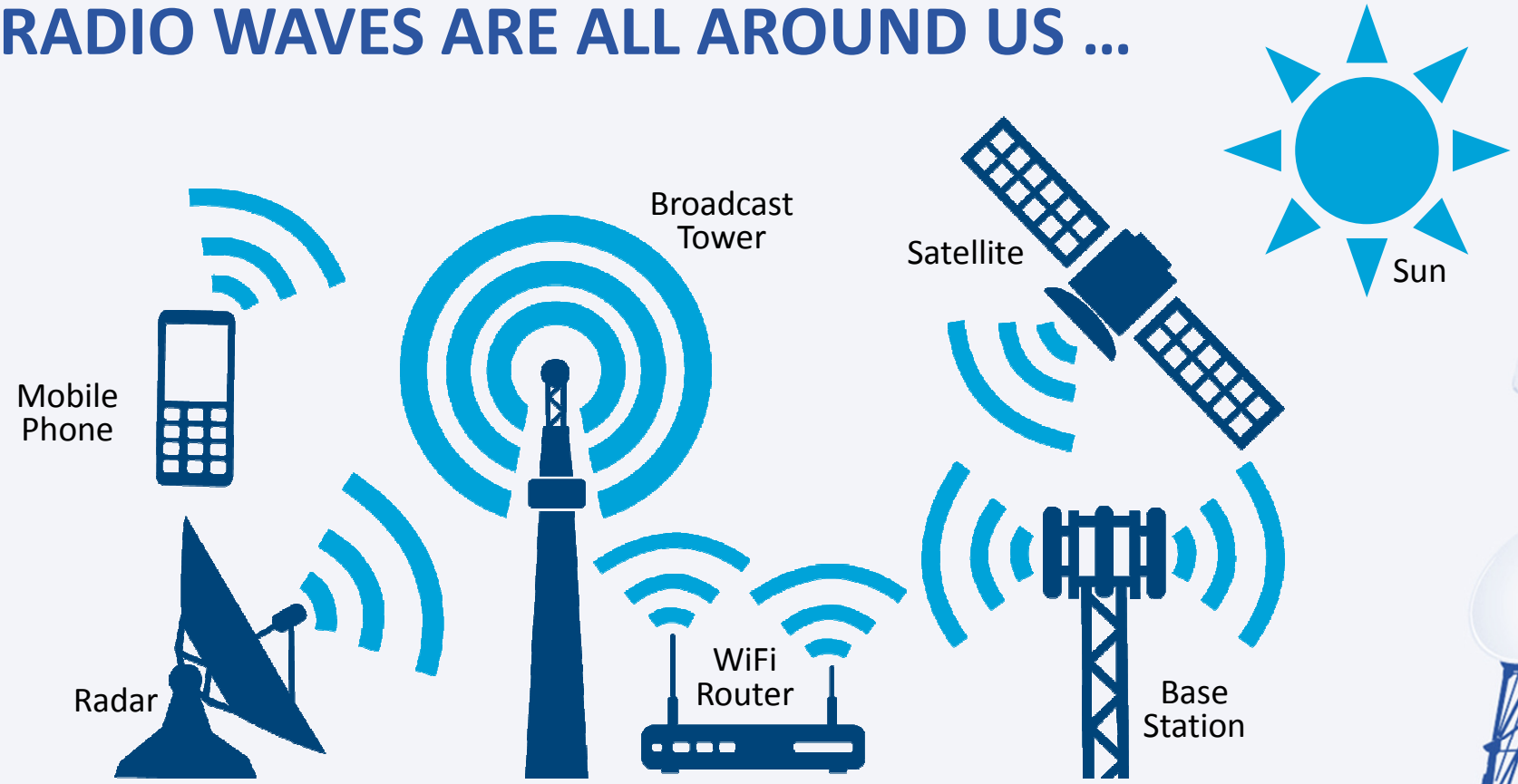
RADIO WAVES ARE ALL AROUND US …



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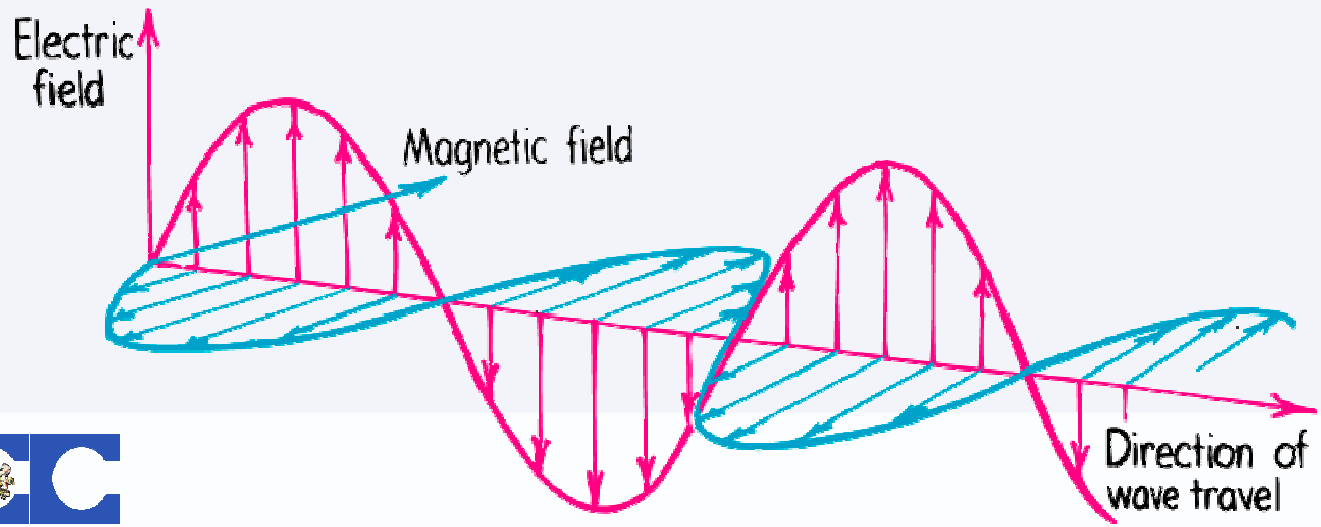
ELECTROMAGNETIC FIELDS (EMF)

What is an Electromagnetic Field (EMF)?

- An electromagnetic field consists of waves of electric and magnetic energy moving together through space. Often the term "electromagnetic field" or EMF is used to indicate the presence of electromagnetic radiation.



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TYPES OF RADIATION

There are two (2) types of Radiation

- **Ionizing radiation**
- **Non-ionizing Radiation**

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IONIZING RADIATION

- Ionizing radiation carries large amount of energy which is enough to ionize atoms and molecules, and break chemical bonds.
- A common source of ionizing radiation is radioactive materials that emit α (Alpha), β Beta), or γ (Gamma) radiation.
- Other sources include X-rays from medical radiography.
- In general, ionizing radiation is harmful and potentially lethal to living beings but can have health benefits in radiation therapy for the treatment of cancer and some thyroid diseases.

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NON-IONIZING RADIATION

- The lower-energy, longer-wavelength part of the spectrum including visible light, infrared light, microwaves, and radio waves is non-ionizing; its main effect when interacting with tissue is heating.

- This type of radiation only damages cells if the intensity is high enough to cause excessive heating.

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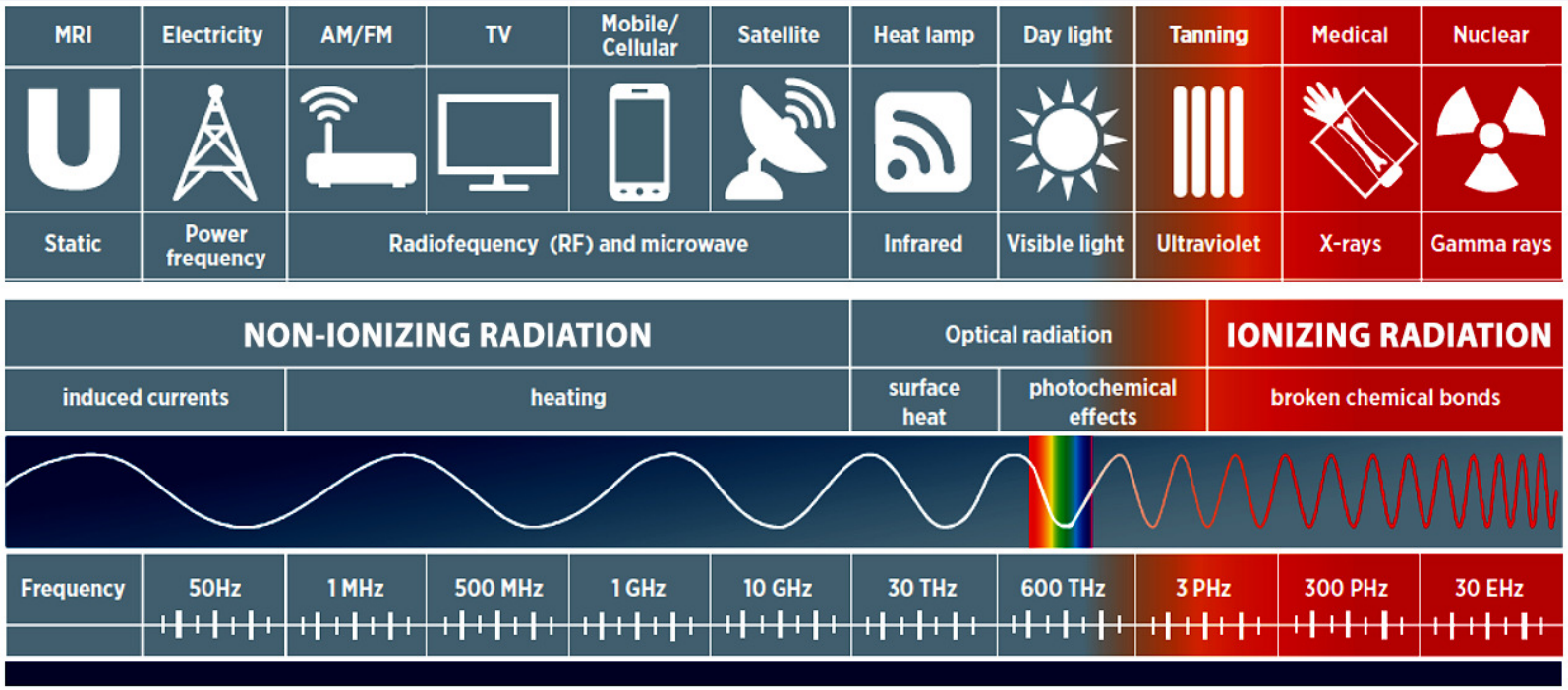
THE ELECTROMAGNETIC SPECTRUM



COMMON SOURCES OF EMF EXPOSURE

FM/AM Radio Stations | TV transmissions | Wireless Networks | Mobile Phones

S/N	EMF Source	Operating Frequency	Radiated Power
1	AM/FM Stations	540 KHz – 108 MHz	1,000 - 30,000 watt
2	TV Stations	48 MHz – 814 MHz	10,000 - 500,000 watt
3	Wi-Fi	2.4 – 2.5 GHz	0.010 – 0.10 watt
4	BTSs/Node-B	800, 900, 1800, 2100, 2300 MHz	20 watt
5	Mobile Phones	GSM-1800 / CDMA GSM-900	1 watt

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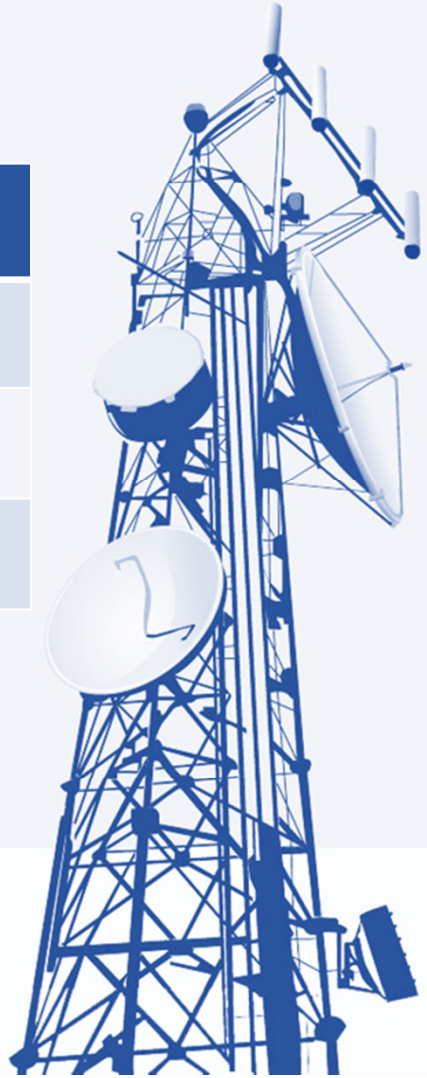
ICNIRP GUIDELINES

- ICNIRP - International Commission on Non-Ionizing Radiation Protection
- ICNIRP issues guidelines on the basis of the current scientific knowledge. Based on established biological and heath effects, it provides estimation for occupational and general public exposure.
- **Most countries (EU, India, Nigeria, etc.) draw on ICNIRP guideline for their own national standards.**

SUMMARY FOR ICNIRP GUIDELINE

	Mobile Phone/Base Station [Unit Power Density (W/m^2)]		
Frequency	**GSM 900MHz**	**GSM 1800MHz**	**WCDMA 2100MHz**
Public Exposure Limits	4.5	9.0	10.0
Occupational Exposure Limits	22.5	45.0	50.0



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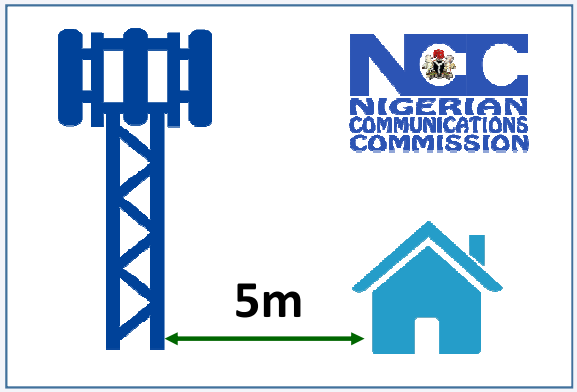
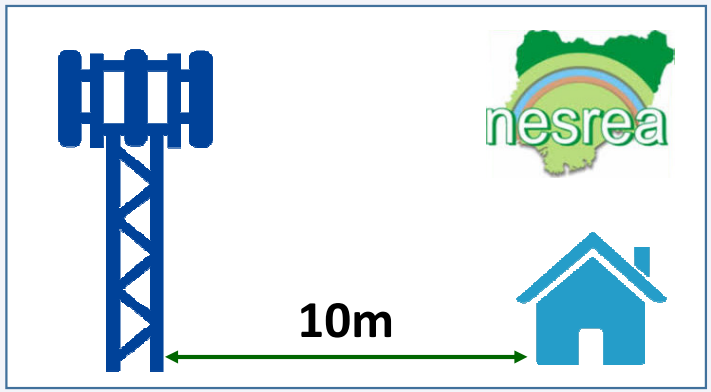
MAST SETBACK FROM DOMICILE BUILDINGS



From 2001 – January 2014

5 metre Setback

(NCC Regulation)



From January 2014 Onwards

10 metre Setback

(NESREA Regulation)

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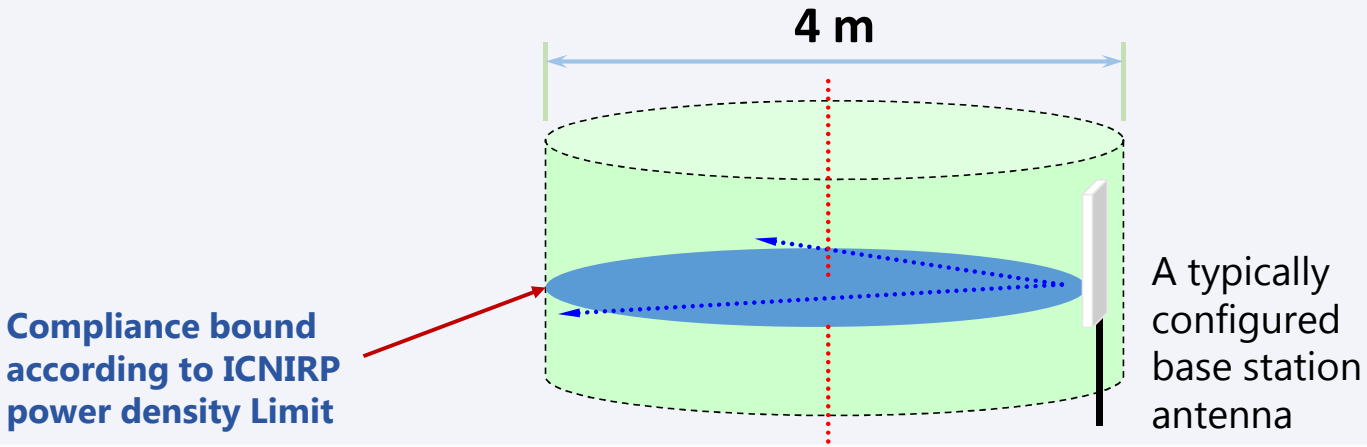
A TYPICAL COMPLIANCE BOUNDARY

- For a typical base station and antenna (output power is 20W, antenna gain is 15dBi) and considering general public, the area outside about 4m diameter around antenna is safe.



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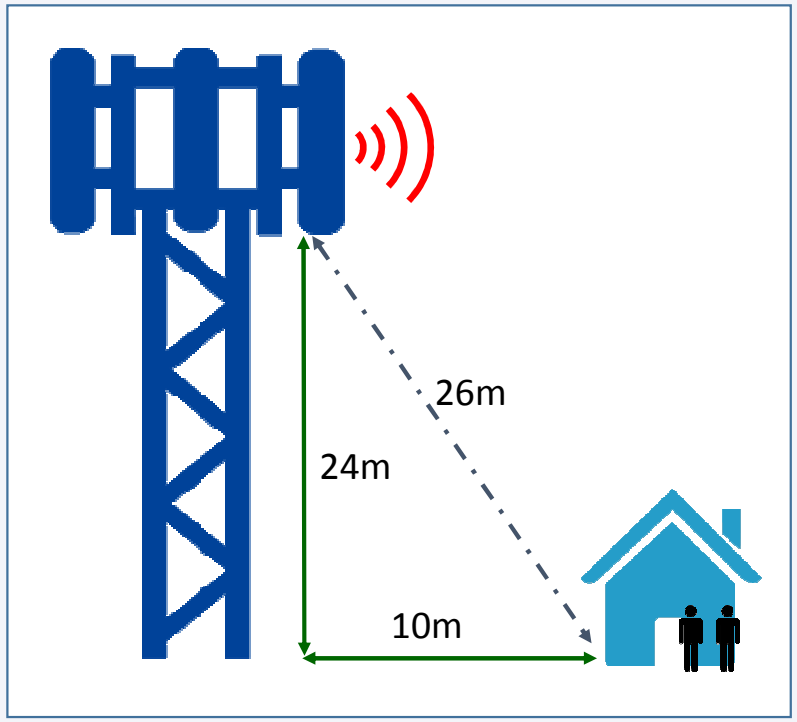
ACTUAL DEPLOYMENT CONDITIONS

- The minimum height for the installation of radio antenna is **24 metres.**
- Minimum distance from base of a telecoms mast to a domicile is **10 metres.**
- ICNIRP Compliance boundary is **4 metres.**



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BASE STATIONS INSTALLATIONS

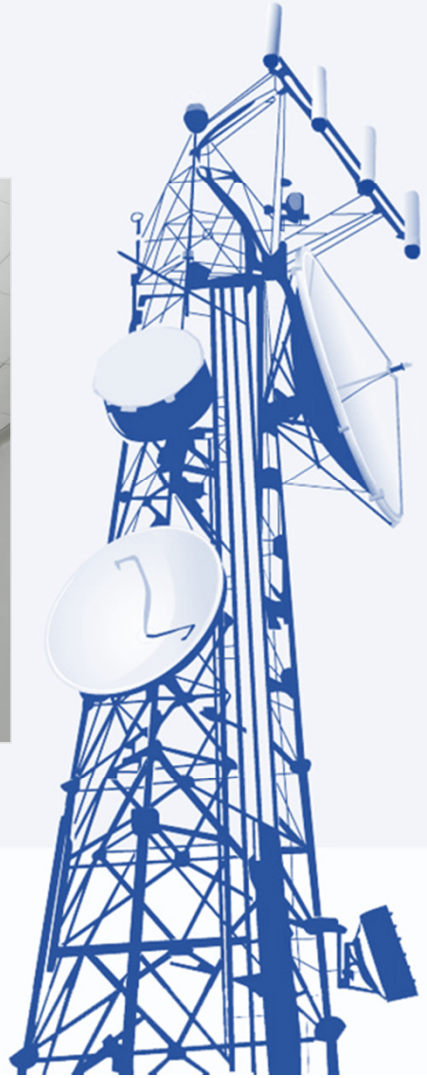
Base Stations and Associated Antennas are installed …

On the building rooftop

On the external wall of the building

On the tower/mast

Sometimes even in the office ceiling!



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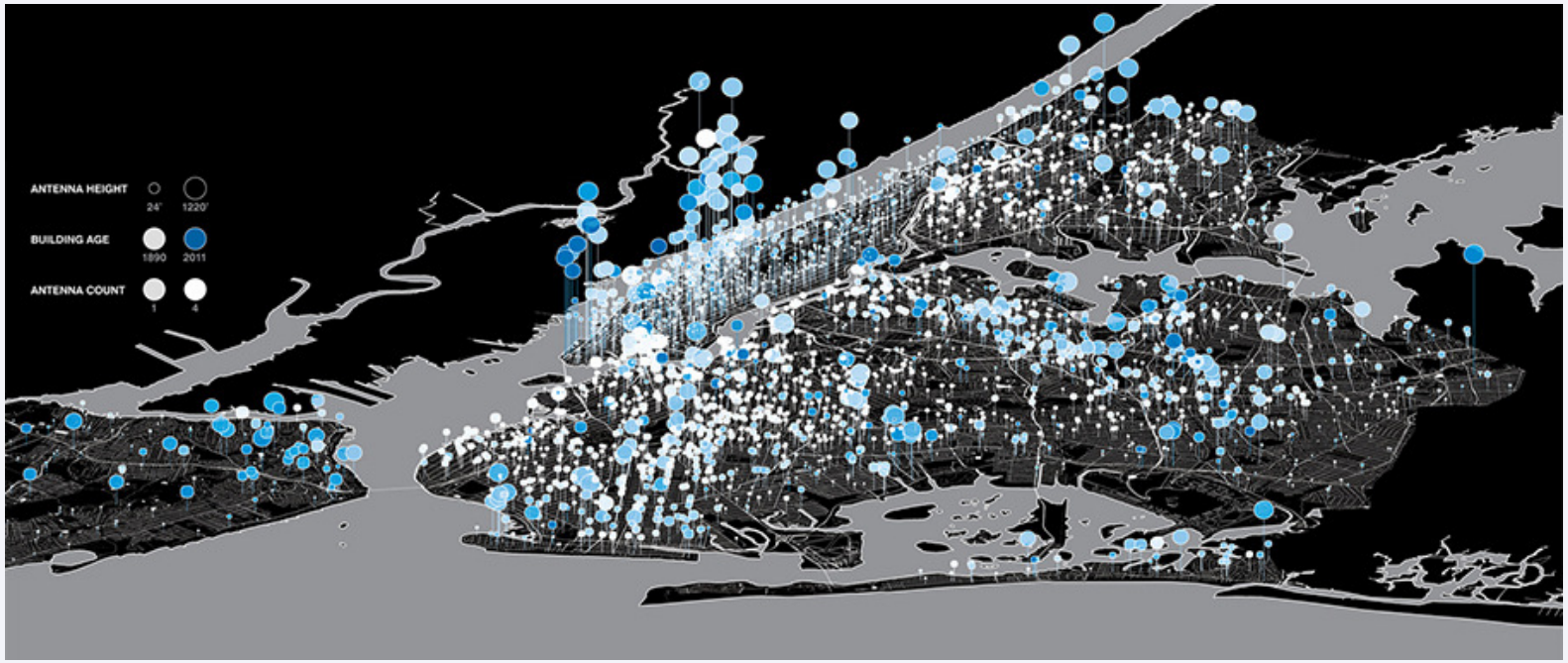
ANTENNA MAP OF NEW YORK CITY



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ANTENNAS ON BUILDINGS (NEW YORK CITY)

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WORLD HEALTH ORGANISATION (WHO)

What is the position of WHO on EMF Radiation from GSM Equipment?

World Health Organization

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MOBILE PHONES AND HEALTH

In regards to mobile phones and health, the WHO notes that:

"A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. **To date, no adverse health effects have been established as being caused by mobile phone use.**"

SOURCES

1. **WHO Fact Sheet 193 June 2011**

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BASE STATIONS AND HEALTH

With respect to base stations and health, the WHO notes that:

"Considering the very low exposure levels and research results collected to date, **there is no convincing scientific evidence** that the weak RF signals from base stations and wireless networks cause adverse health effects."

"Studies to date **provide no indication** that environmental exposure to RF fields, such as from base stations, increases the risk of cancer or any other disease."

SOURCES

1. **WHO Online Q&A September 2013**
2. **WHO Backgrounder 2006**

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BASE STATIONS AND HEALTH

Conclusions by Other Experts

UK Advisory Group on Non-Ionising Radiation (AGNIR)

In summary, although a substantial amount of research has been conducted in this area, **there is no convincing evidence that RF field exposure below guideline levels causes health effects in adults or children.**

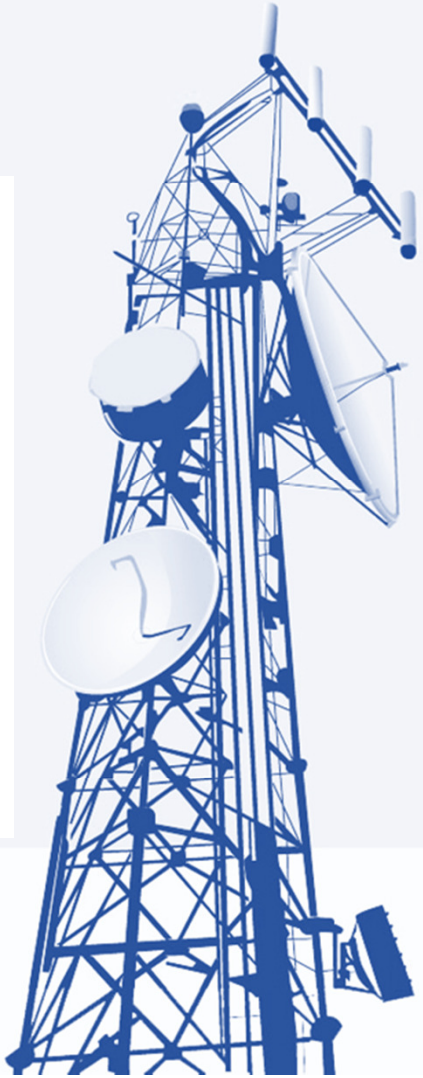
http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1317133826368

EUROPEAN COMMISSION

Scientific Committee on Emerging and Newly Identified Health Risks (*SCENIHR*)

The results of current scientific research show that there are **no evident adverse health effects if [EMF] exposure remains below the levels set by current standards.**

http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf



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BASE STATIONS AND HEALTH

Conclusions by Other Experts (Continued)

IET The Institution of Engineering and Technology

… The balance of scientific evidence to date **still does not indicate that harmful effects occur in humans due to low-level exposure to EMFs.**

http://www.theiet.org/factfiles/bioeffects/emf-position-page.cfm

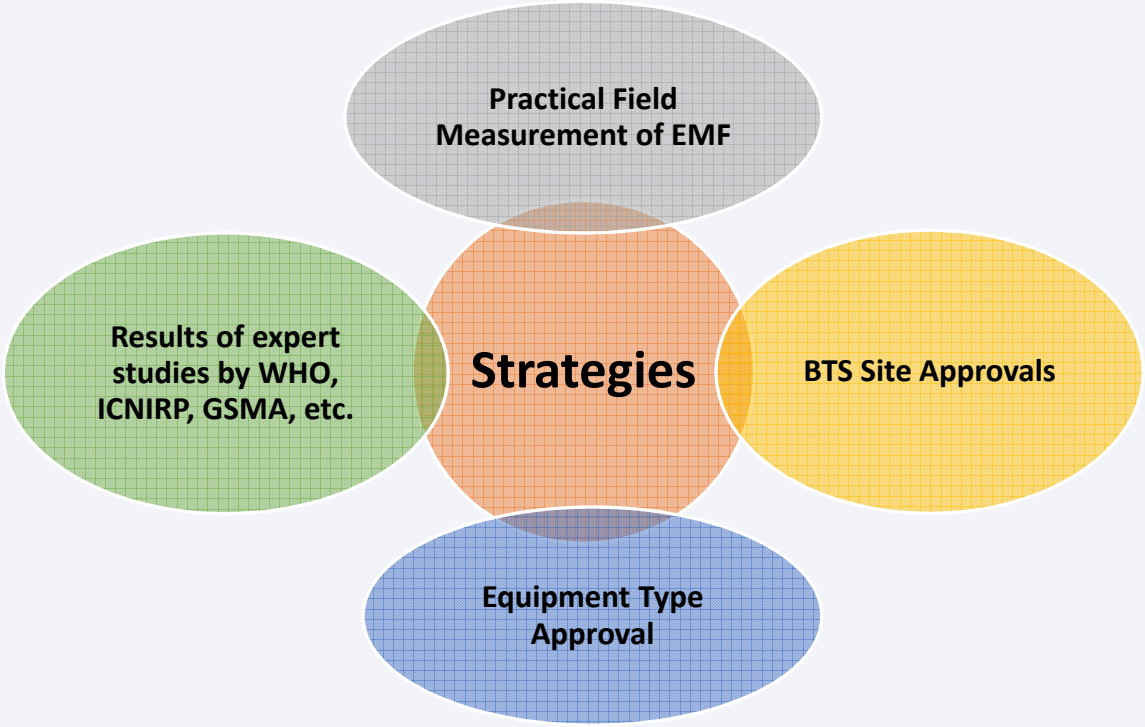
Health Canada

… With respect to cell phone towers, as long as exposures respect the limits set in Health Canada's guidelines, **there is no scientific reason to consider cell phone towers dangerous to the public.**

http://www.hc-sc.gc.ca/hl-vs/alt_formats/pacrb-dgapcr/pdf/iyh-vsv/prod/cell-eng.pdf

NCC NIGERIAN COMMUNICATIONS COMMISSION

NCC STRATEGIES FOR MINIMIZING EFFECTS OF RADIATION



PRACTICAL FIELD MEASUREMENTS

- The NCC, in the pursuance of its regulatory functions in ensuring compliance with acceptable environmental, public health and safety standards, conducts regular measurements of EMF on BTS across the country.

- The results obtained revealed that measured radiation levels are far below ICNIRP permissible levels for occupational staff and the general public.

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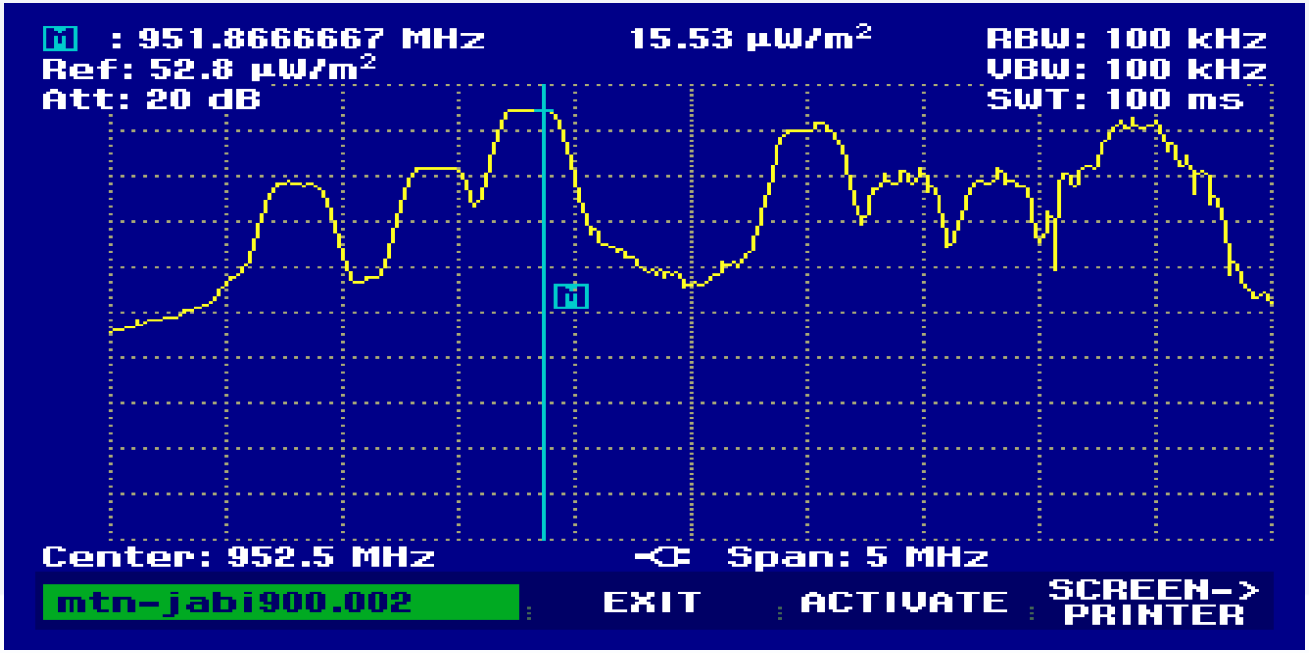
TYPICAL POWER DENSITY (Watt/m^2) MEASUREMENT

The signal trace shown below is a typical measured power density value of 15.53µwatt/m^2 on the 900 MHz band.



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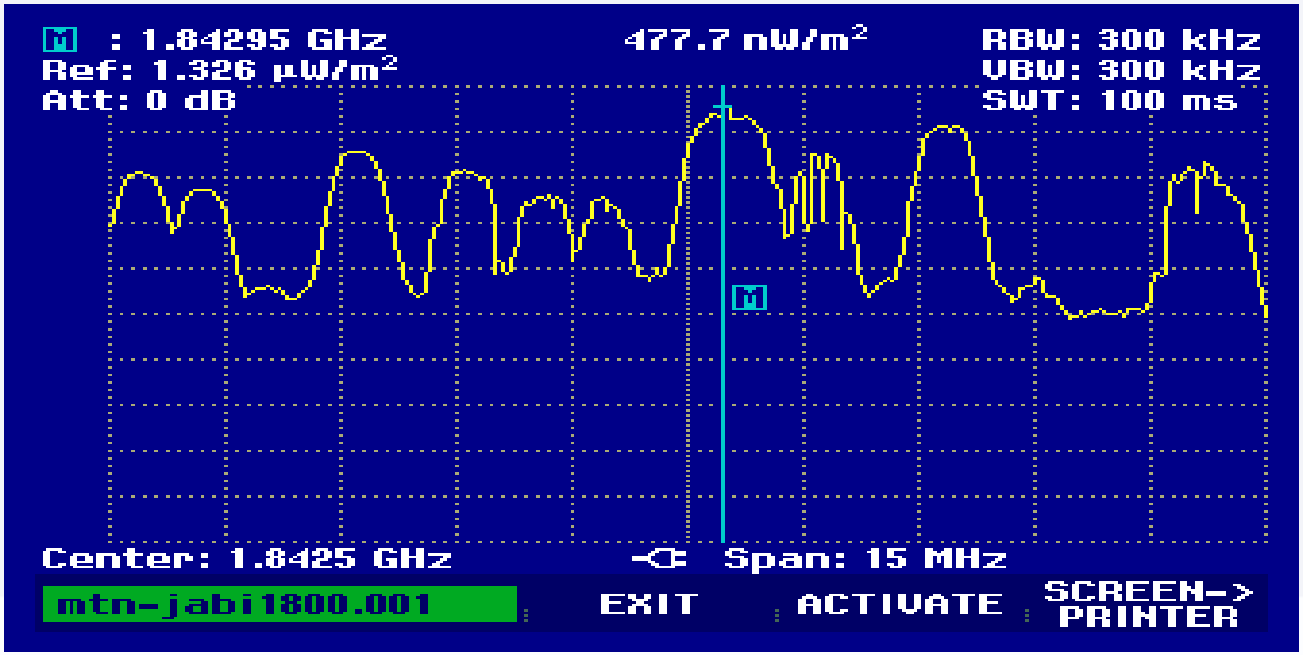
TYPICAL POWER DENSITY (Watt/m^2) MEASUREMENT

Similar signal trace on the 1800 MHz band is shown below with a measured power density value of 477.7 nwatt/m^2.



COMPARISON BETWEEN MEASURED VALUES AND ICNIRP LIMITS ON POWER DENSITY

Frequency	General Public Limit	NCC Measured Value (Public Limit)	Percentage
900 MHz	4.5w/m^2	**0.00001553w/m^2**	**0.0003451%**
1800MHz	9.0w/m^2	**0.0000004777w/m^2**	**0.0000053%**

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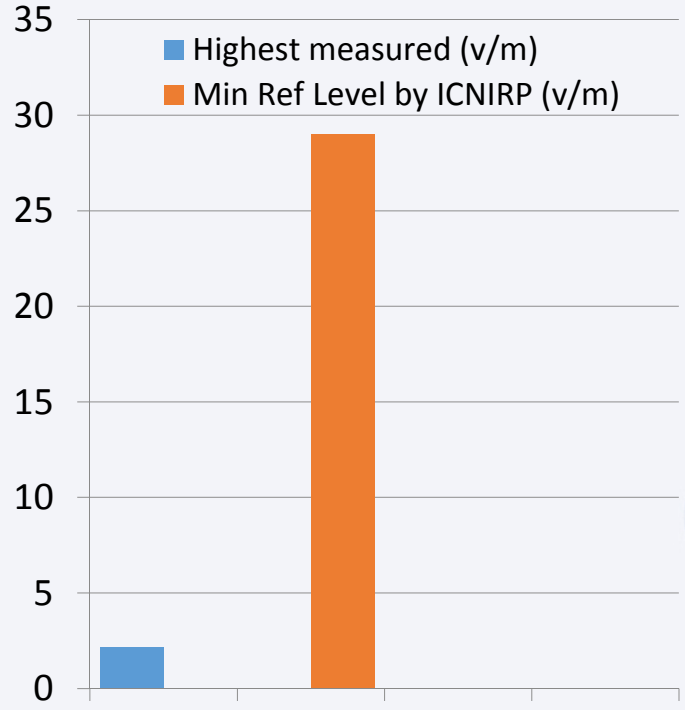
ELECTRIC FIELD STRENGTH MEASUREMENTS

- In a typical field measurement exercises, the strongest measured field strength taken at the closest distance to the tower was 2.2v/m, representing **7.5%** of the minimum reference level of 29v/m specified by ICNIRP.

- The very low signal strength shows that BTS installations pose no risk to the health and safety of humans.



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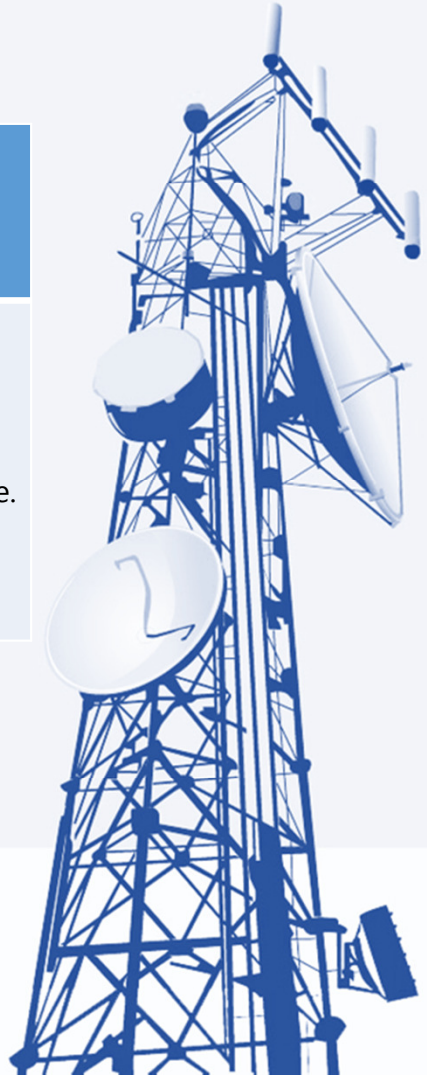
COLOCATION SITE – Utako, Abuja

Distance	Reference level for Electric-Field Strength (V/M)	Measured Value of Electric-Field Strength (V/M) at BTS site location.			Remarks
	ICNIRP	Peak Value	Pulse Value	Average Value	
10m	29 – 61	1.20	0.80	0.80	The maximum value of 1.20V/M (Peak value) represents 4.1% of the minimum Electric-Field Strength reference level i.e. 29V/M. Hence Measured Values are below the minimum Limits (29V/M)
20m	29 – 61	0.90	1.20	1.00	
30m	29 – 61	1.10	0.70	0.70	
40m	29 – 61	1.00	0.60	0.40	
50m	29 – 61	1.20	0.50	0.40	
60m	29 – 61	1.10	0.50	0.40	



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COLOCATION SITE - Karkasara, Kano.

Distance	Reference level for Electric-Field Strength (V/M)	Measured Value of Electric-Field Strength (V/M) at BTS site location.			Remarks
	ICNIRP	Peak Value	Pulse Value	Average Value	
5 m	29 – 61	0.64	0.60	0.60	The maximum value of 1.02 V/M (Peak Value) represents 3.5% of the minimum Electric-Field Strength reference level i.e. 29V/M. Hence Measured Values are below the minimum Limits (29V/M)
10m	29 – 61	0.51	0.54	0.45	
15m	29 – 61	0.76	0.62	0.56	
20m	29 – 61	0.70	0.65	0.65	
25m	29 – 61	0.92	0.77	0.65	
30m	29 – 61	0.84	0.86	0.76	
35m	29 – 61	1.02	0.93	0.74	
40m	29 – 61	0.76	0.69	0.63	
45m	29 – 61	0.83	0.75	0.66	
50m	29 – 61	0.80	0.83	0.82	

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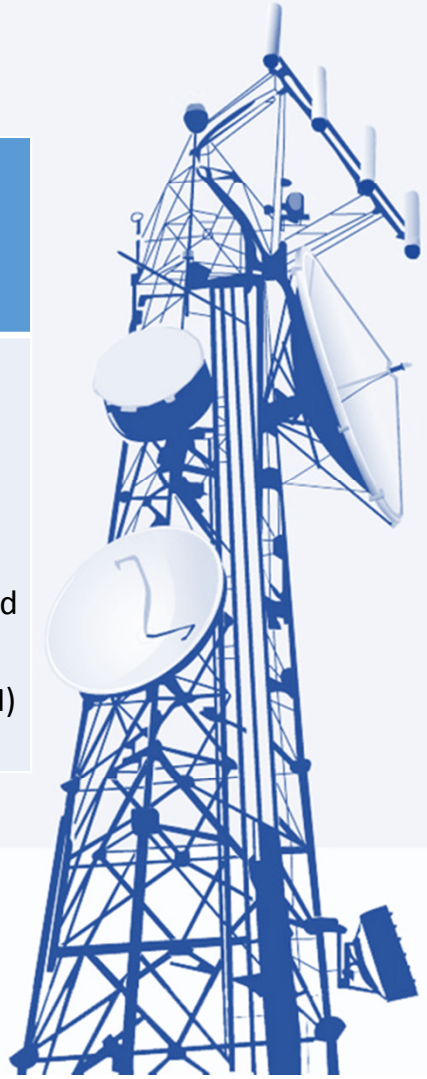
COLOCATION SITE - Anifowoshe, Ikeja, Lagos.

Distance	Reference level for Electric-Field Strength (V/M)	Measured Value of Electric-Field Strength (V/M) at BTS site location.			Remarks
	ICNIRP	Peak Value	Pulse Value	Average Value	
5m	29 – 61	1.80	1.50	1.69	The maximum value of 1.80 V/M represents 6.2% of the minimum Electric-Field Strength reference level i.e. 29V/M. Hence Measured Values are below the minimum Limits (29V/M)
10m	29 – 61	0.98	0.78	0.78	
15m	29 – 61	0.54	0.53	0.54	
20m	29 – 61	0.38	0.39	0.35	
25m	29 – 61	0.76	0.79	0.66	
30m	29 – 61	0.73	0.50	0.50	
40m	29 – 61	0.40	0.35	0.36	
50m	29 – 61	0.86	0.75	0.76	



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COLOCATION SITE - Akugbo Street, Port Harcourt

Distance	Reference level for Electric-Field Strength (V/M)	Measured Value of Electric-Field Strength (V/M) at BTS site location.			Remarks
	ICNIRP	Peak Value	Pulse Value	Average Value	
5 m	29 – 61	0.50	0.55	0.58	The maximum value of 0.81V/M (Pulse value) represents 2.8% of the minimum Electric-Field Strength reference level i.e. 29V/M. Hence Measured Values are below the minimum Limits of (29V/M)
10m	29 – 61	0.70	0.67	0.68	
15m	29 – 61	0.66	0.70	0.73	
20m	29 – 61	0.55	0.62	0.65	
25m	29 – 61	0.65	0.65	0.60	
30m	29 – 61	0.75	0.70	0.66	
35m	29 – 61	0.75	0.70	0.75	
40m	29 – 61	0.75	0.81	0.75	
45m	29 – 61	0.81	0.83	0.73	
50m	29 – 61	0.75	0.81	0.75	

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CONCLUSION

- The main conclusion from the WHO reviews and most studies is that, EMF exposures below the limits recommended in the ICNIRP international Guidelines **do not appear to have any known consequence on health.**

- The non-ionizing radiations from BTSs and mobile handsets **do not** disrupt the molecular structure of biological material in humans.

- **Please note that BTS radiation scare is a myth and NOT REALITY.**

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THANK YOU

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