



- + . **5G**
- o **REALITIES AND MYTHS**

DANIEL OBAM
RADIOCOMMUNICATION EXPERT

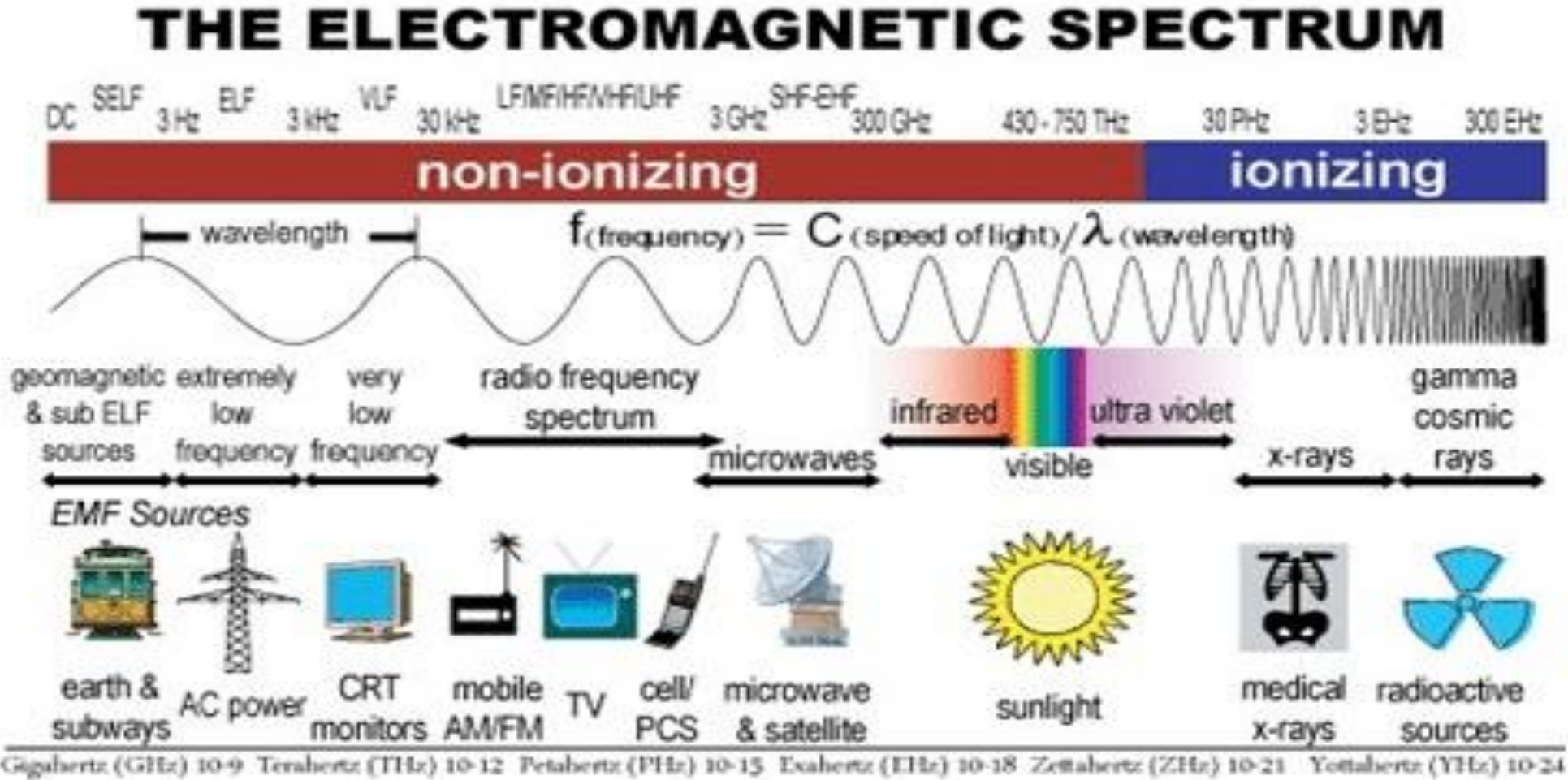
A vertical line on the left side of the page with a color gradient from orange at the top to blue at the bottom.

5G REALITIES

INTRODUCTION

- As with previous cellular technologies, 5G networks rely on signals carried by radio waves - part of the electromagnetic spectrum - transmitted between an antenna or mast and your phone.
- We're surrounded by electromagnetic radiation all the time - from television and radio signals, as well as from a whole range of technologies, including mobile phones, and from natural sources such as sunlight.
- 5G uses higher frequency waves than earlier mobile networks, allowing more devices to have access to the internet at the same time and at faster speeds.
- These waves travel shorter distances through urban spaces, so 5G networks require more transmitter masts than previous technologies, positioned closer to ground level.

RADIOWAVES



5G FREQUENCIES

- Whereas 1G, 2G, 3G and 4G used the 1 - 5 GHz frequency band, and 5G was initially to use between 24 - 90 GHz frequency band.
- In 2018, new 5G/NR bands defined by 3GPP in Release 15, were defined in two frequency ranges
 - FR1 450–6000 MHz
 - FR2 24 250–52 600 MHz
- During ITU WRC-19 the following frequency bands were harmonized for 5G deployment
 - 24.25 - 86 GHz Band
 - 24.25 - 27.5 GHz, 37 - 43.5 GHz and 66 - 71 GHz globally harmonized
 - 45.5-47 GHz and 47.2-48.2 GHz regionally harmonized

SPECTRUM BAND SUPPORT OF 5G DEVICES

- Availability of information about spectrum support is improving as a greater number of devices become commercially available.
- According to Global Mobile Suppliers Association (GSA – [gsa.com](https://www.gsa.com)) April 2020 Report:
 - 70% of all announced 5G devices are identified as supporting sub-6 GHz spectrum bands
 - 29.3% are understood to support mmWave spectrum.
 - Just 22.6% of all announced devices are known to support both mmWave and sub-6 GHz spectrum bands.
- The 5G device ecosystem is expected to continue to grow quickly and based on vendors' statements, more than 35 additional announced devices are expected to become commercially available before the end of June 2020.

MOBILE PHONES AND HEALTH

- The electromagnetic radiation used by all mobile phone technologies has led some people to worry about increased health risks, including developing certain types of cancer.
- In 2014 the World Health Organization (WHO) said that "no adverse health effects have been established as being caused by mobile phone use"

<https://www.who.int/news-room/fact-sheets/detail/electromagnetic-fields-and-public-health-mobile-phones>

- However, the WHO together with the International Agency for Research on Cancer (IARC) has classified all radio frequency radiation (of which mobile signals are a part) as "possibly carcinogenic".
- *However, alcoholic drinks and processed meat are in a higher category because the evidence is stronger*

A vertical line on the left side of the slide, transitioning from orange at the top to blue at the bottom.

5G MYTHS

COMMON 5G MYTHS

- 5G is all about faster speeds
 - 5G should be about 100 times faster than 4G networks, but it will have on many other industries. E.g. massively increase the effectiveness of IoT, self-driving cars, and robotics.
- 5G is all about bandwidth
 - This is true but the real benefit is low latency connectivity: not just about how much data transferred (bandwidth) at any one time, but also the speed to do it.
 - 5G will be a game changer for many industries and should allow for near-instant data transfer. E.g. help doctors perform remote surgery using surgical robots.
- 5G will only really impact the telecoms industry
 - 5G will revolutionize telecoms as well as entertainment, farming, etc

COMMON 5G MYTHS/2

- Once deployed, 5G will completely replace 4G
 - Prior to 5G, a hard switchover was required for each generation change (2G to 3G, 3G to 4G).
 - New infrastructure equipment and devices were required to support the upgraded network – but this is not the case with 5G, at least not yet.
 - 5G networks are currently implemented as a non-standalone (NSA). Because implementing full 5G standalones (SA) is time-consuming and expensive, NSA serves as a transitional standard from 4G to 5G SA.
 - NSAs can be thought of as a hybrid of 4G and 5G technology. When calls or connections are attempted on 5G devices, it will first be managed by core 4G networks, then switched back to 5G..
 - 5G will be used for mobile broadband capacity and 4G for coverage
 - It is not cost effective to completely abandon existing 4G networks just yet
- 5G is Coming to you very soon!
 - In certain areas of big cities, yes. For the rest of us, we have to wait a little bit

COMMON 5G MYTHS/3

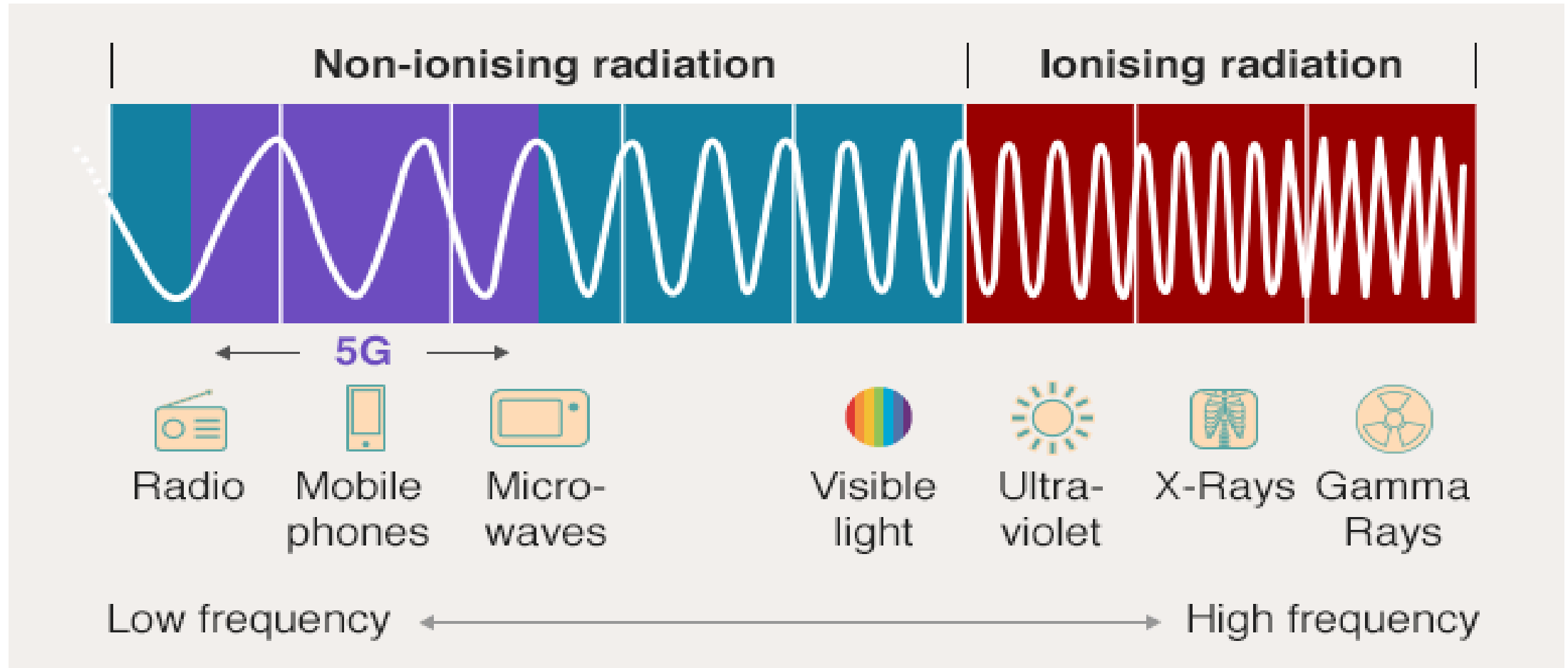
- 5G is Dangerous
 - Although 5G will improve our day to day lives, there is concern about potential health hazards.
 - Many of these concerns are over 5G's use of the higher energy millimeter-wave radiation, But 5G also uses sub 6 GHz frequency bands
 - Like other cellular technologies, 5G relies on radio waves for propagation of signals at a higher frequency (and shorter wavelength) to enable more connections at a faster speed.
 - Some believe that this poses health risks, and attribute an odd range of maladies such as cancer and even Alzheimer's to the technology.
 - It is said that the chances of getting cancer from 5G exposure is just as high as with 4G, 3G or even 2G.
 - There is often confusion between ionizing and non-ionizing radiation because the term radiation is used for both
 - All light is radiation because it is simply energy moving through space. It's ionizing radiation that is dangerous because it can break chemical bonds

5G – COVID-19 CONSPIRACY THEORY

- **THEORY NO. 1:** 5G can suppress the immune system, thus making people more susceptible to catching the Coronavirus
- **THEORY NO. 2:** Coronavirus can be transmitted through the use of 5G technology
- Radio waves can disrupt our physiology by heating up our bodies, causing our immune system not to function properly.
- However, the energy levels from 5G radio waves are tiny and they are nowhere near strong enough to affect the immune system.
- Mobile phone technology and 5G radio waves sit on the lower end of the electromagnetic spectrum.
- They are less powerful than visible light, and are not strong enough to damage cells - unlike radiation at the higher frequency end of the spectrum which includes the sun's rays and medical x-rays.

5G RADIO WAVES

Where 5G fits in the electromagnetic spectrum



Source: SCAMP/Imperial College London/EBU

CONCLUSION

- Many opponents to the use of RF waves cherry-pick studies that support their argument, and often ignore the quality of the experimental methods or inconsistency of the results.
- The proponents of 5G believe the benefits 5G can provide to society far outweigh the unknowns as it will have a transformational impact on our lives and enable fundamentally new things.
- We can learn from what history has taught us, and it is possible that 5G will be another example of what wireless technology can do for us.
- Therefore, we need more studies and conclusive proof on the potential health effects of mobile networks in general and 5G networks in particular.