

TECHNOLOGY AND RADIO FREQUENCY USE

NAME

DATE

QUESTIONS

1) What is the approximate frequency range for most of our everyday technology?

2) How does the range of radio waves and microwaves compare to the rest of the spectrum?

3) How does a 4G phone signal compare to a 5G signal?

THE ELECTROMAGNETIC SPECTRUM

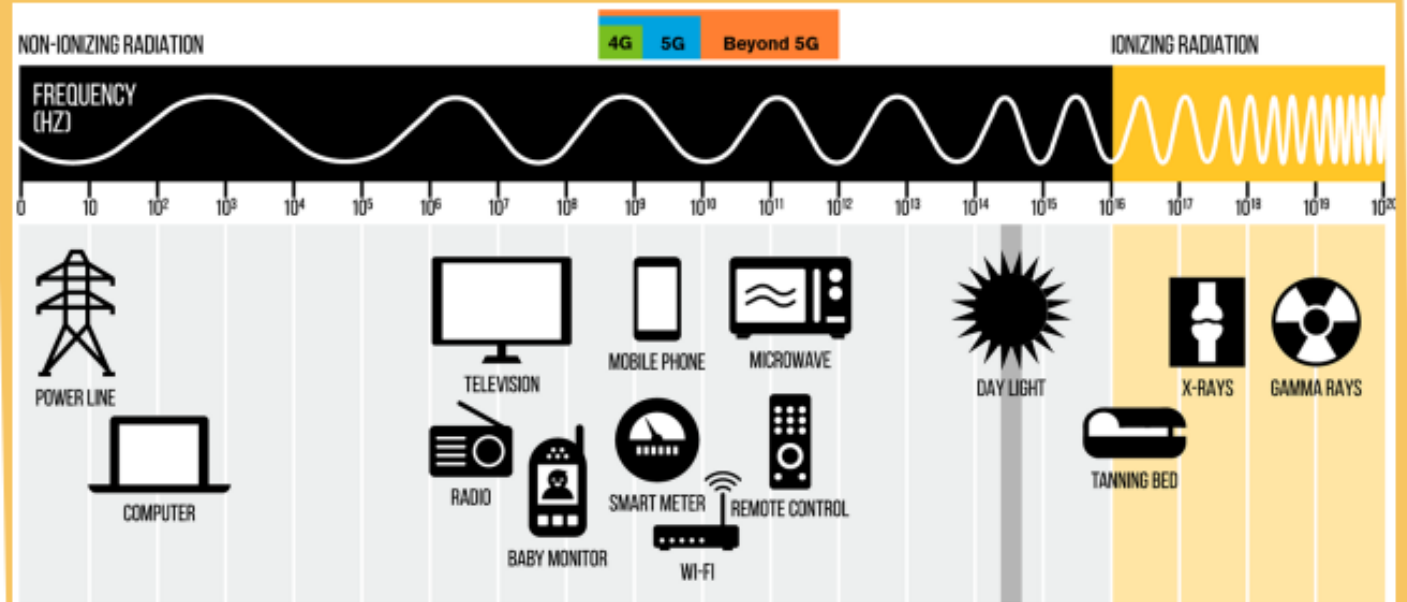


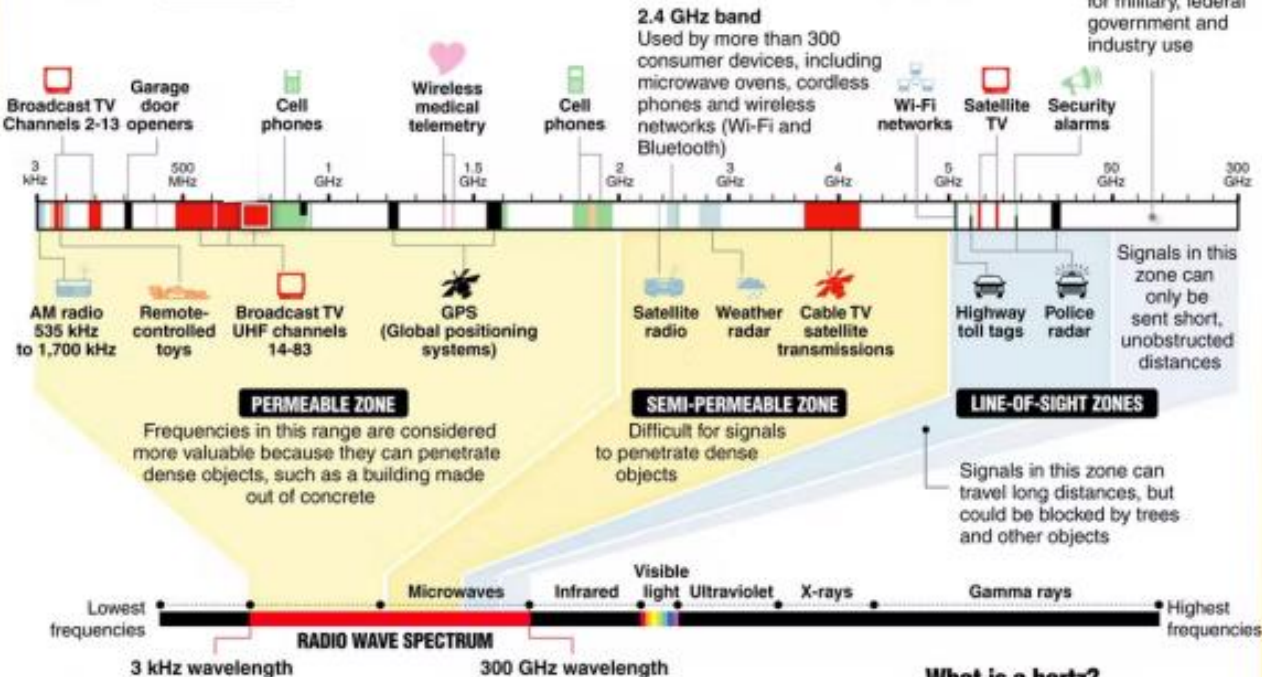
image credit: <https://engineering.asu.edu/news/leading-exploration-of-6g/>

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INSIDE THE RADIO WAVE SPECTRUM

Almost every wireless technology – from cell phones to garage door openers – uses radio waves to communicate. Some services, such as TV and radio broadcasts, have exclusive use of their frequency within a geographic area. But many devices share frequencies, which can cause interference. Examples of radio waves used by everyday devices:

Most of the white areas on this chart are reserved for military, federal government and industry use



2.4 GHz band
Used by more than 300 consumer devices, including microwave ovens, cordless phones and wireless networks (Wi-Fi and Bluetooth)

PERMEABLE ZONE

Frequencies in this range are considered more valuable because they can penetrate dense objects, such as a building made out of concrete

SEMI-PERMEABLE ZONE

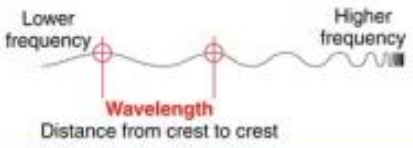
Difficult for signals to penetrate dense objects

LINE-OF-SIGHT ZONES

Signals in this zone can travel long distances, but could be blocked by trees and other objects

The electromagnetic spectrum

Radio waves occupy part of the electromagnetic spectrum, a range of electric and magnetic waves of different lengths that travel at the speed of light; other parts of the spectrum include visible light and x-rays; the shortest wavelengths have the highest frequency, measured in hertz



What is a hertz?

One hertz is one cycle per second. For radio waves, a cycle is the distance from wave crest to crest
1 kilohertz (kHz) = 1,000 hertz
1 megahertz (MHz) = 1 million hertz
1 gigahertz (GHz) = 1 billion hertz

Image credit: <https://theconversation.com/wireless-spectrum-is-for-sale-but-what-is-it-1794>

QUESTIONS

4) According to the line in the lower part of the graphic, what is the range for the "Radio Wave Spectrum"?

5) What is special about waves in the permeable zone? Are cell phones included?

6) Which part of the radio spectrum do you think is the most valuable? Why?