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Networks and Communication



What is a Network?

A network is a group of connected things that can share information.

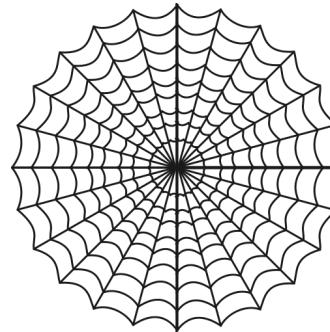
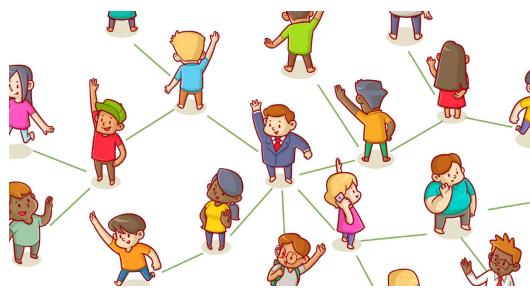
Right now, everyone in this room is a sort of network and we can pass information around by talking to each other.



Types of Network

Networks can come in many forms.

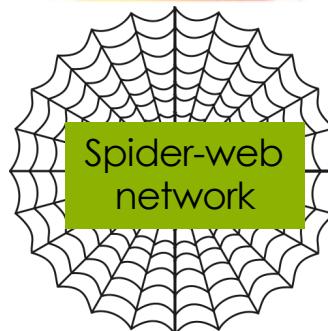
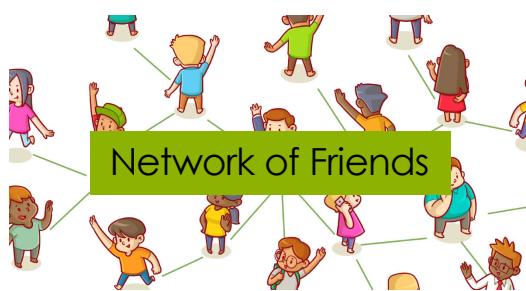
Can you think of any examples that could link to each of these photos?



Networks

Networks can come in many forms.

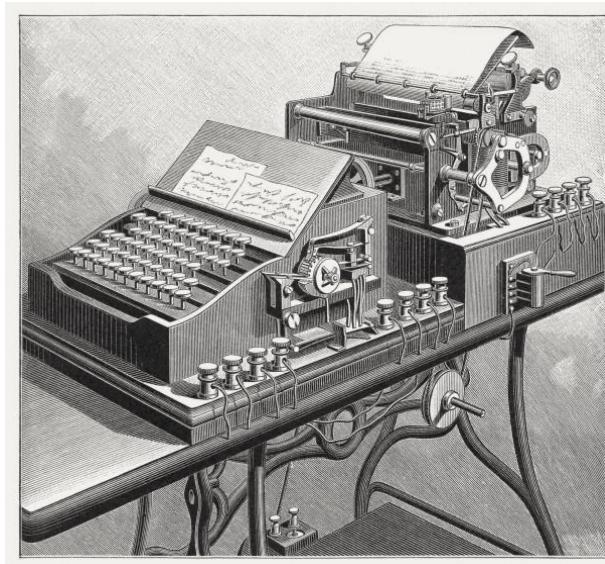
Can you think of any examples that could link to each of these photos?



Early Communication Networks

Early communication networks included

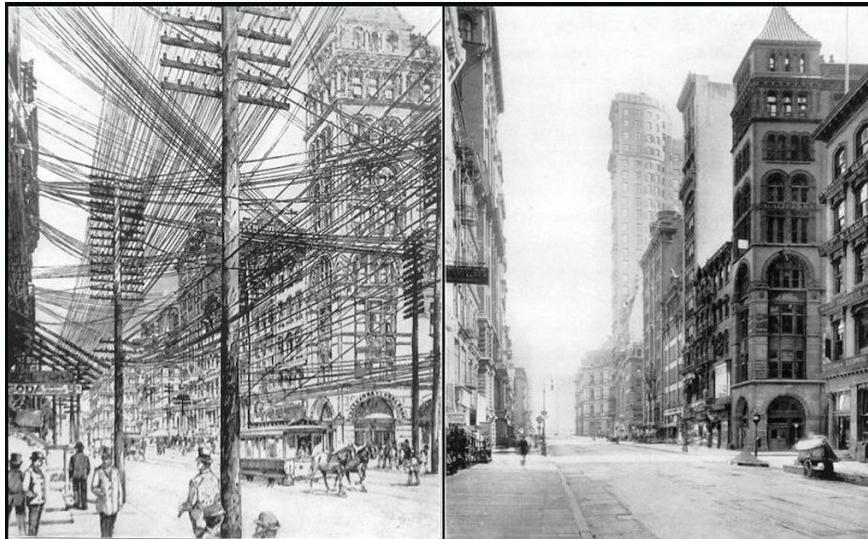
- Telegram
- Telephone
- Radio

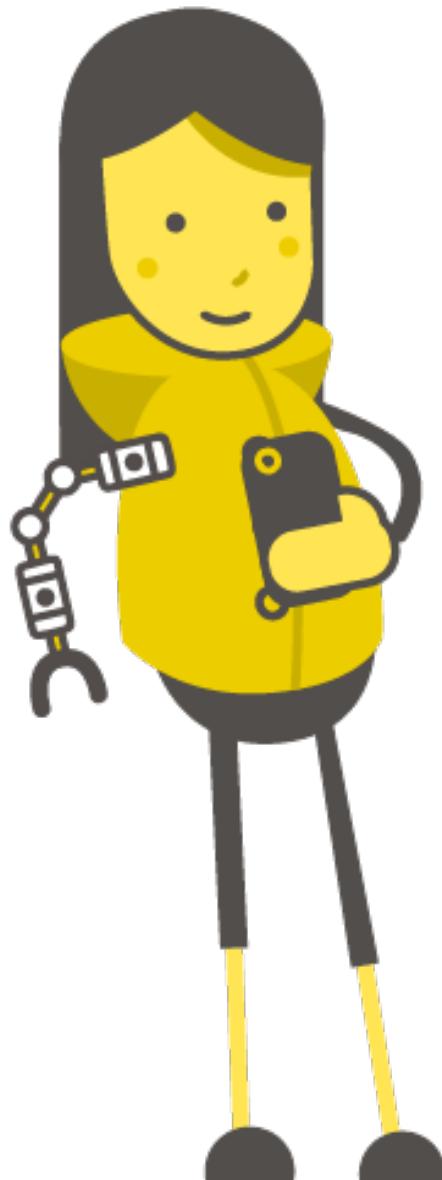


Telegram and Telephone

Both the telegram and telephone connected the world with instant communication, this changed the world and was something never achieved before.

However they did require a wired connection to every device in every office and every home! This quickly became a problem.



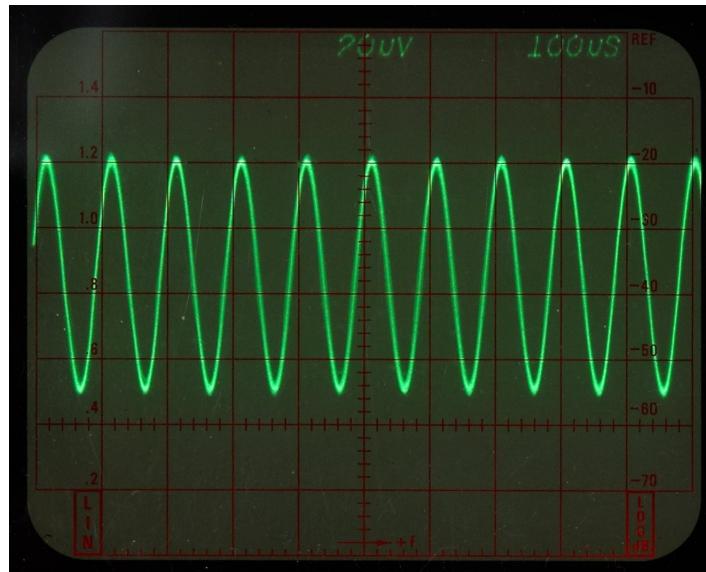


Activity: Cup Phones

Activity: Cup Phones

Both the telegram and telephone are devices connected by wires. Down these wires we send an electrical signal to communicate our information.

This signal is sent as an electrical wave.



Activity: Cup Phones

Waves are used to carry all of our signals, from electricity to light and sound, and even vibrations.

We can make a basic telephone by connecting two cups with string.

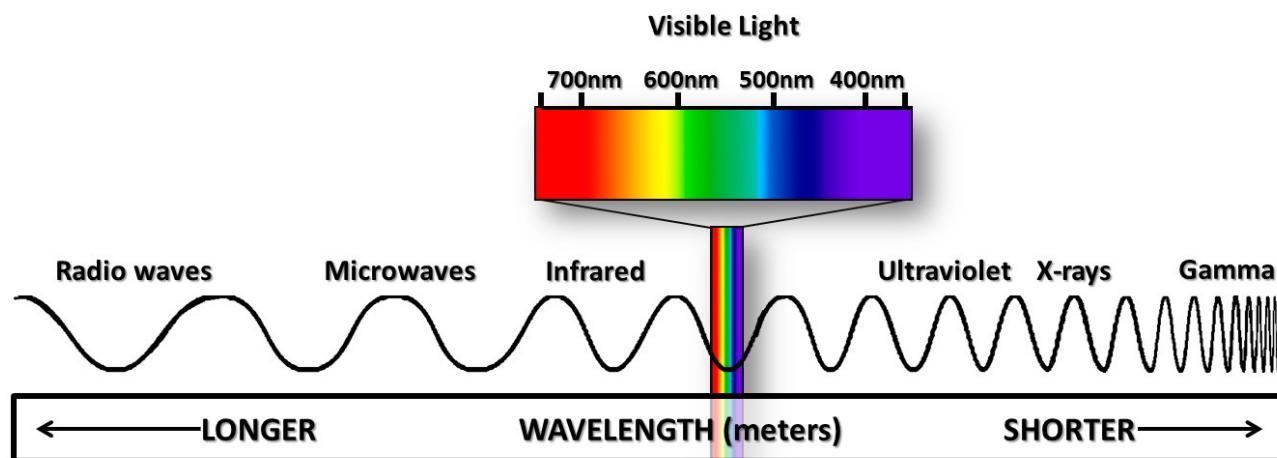
Pulling the string tight will allow the sound to travel through the string as a wave of vibration!



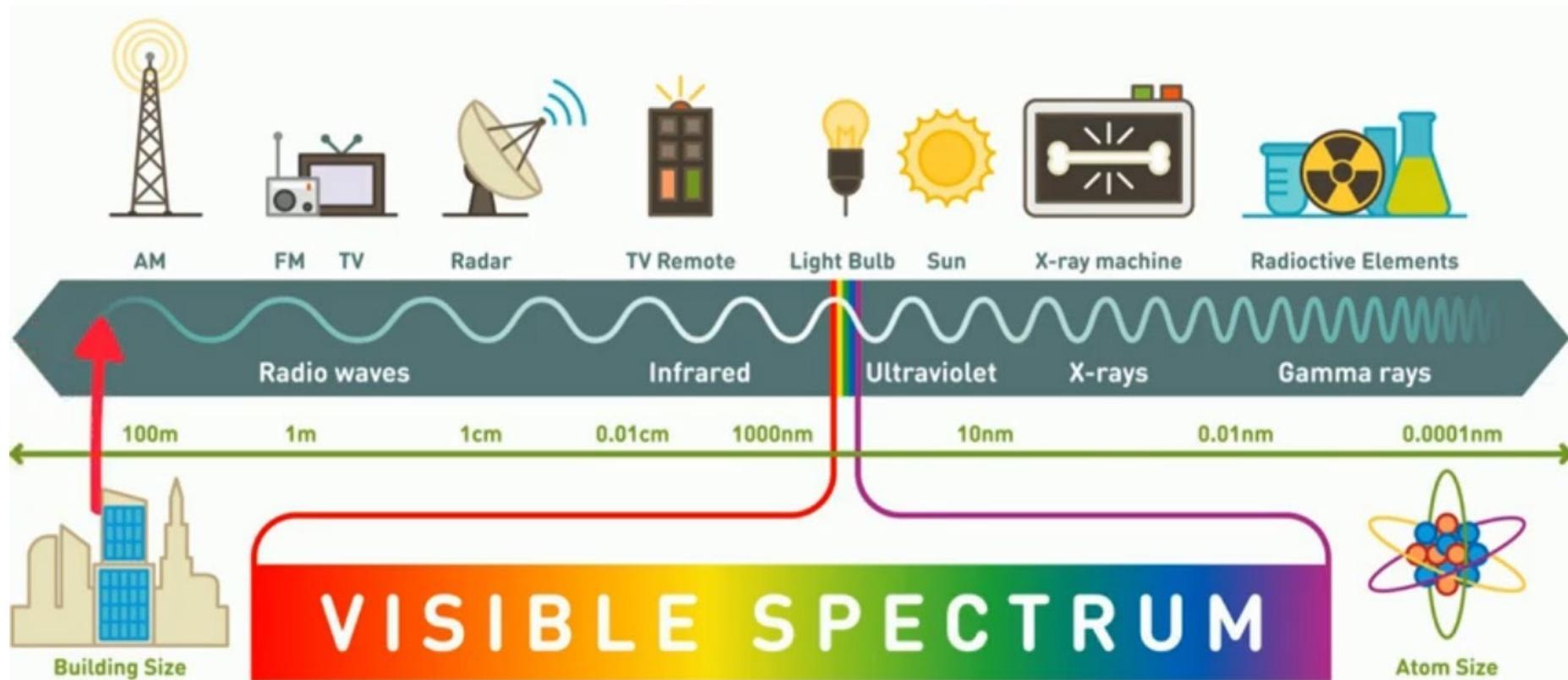
EM Waves

Waves come in all shapes and sizes, most of which we can't see or feel in any way!

Many of these waves are part of the EM Spectrum, which means they are made of light, but as humans we can only really see a small bit of that light!



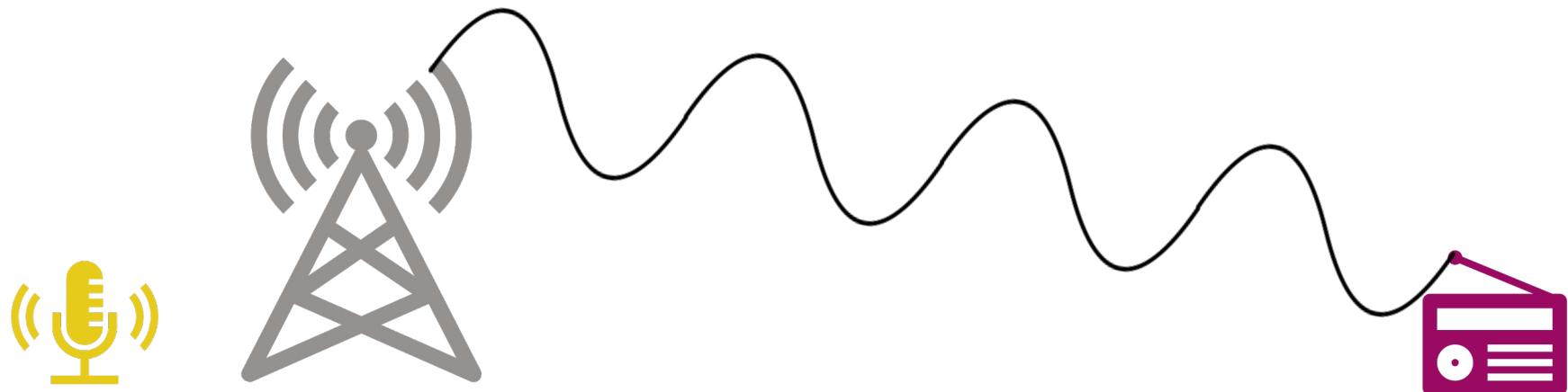
EM Waves



Radio

Radio is able to communicate over great distances using “radio waves” which are invisible to our eyes.

Radio is used for broadcasting music across the world, but also walkie-talkies, truck and police radios and more!



Computer Networks

There are 3 ways we can get computers and phones to connect to the internet:

- Ethernet
- Wi-Fi
- Mobile network



Ethernet

Ethernet is a type of wired computer network normally used in offices; it needs cables to connect to everything, which means it uses electrical waves.

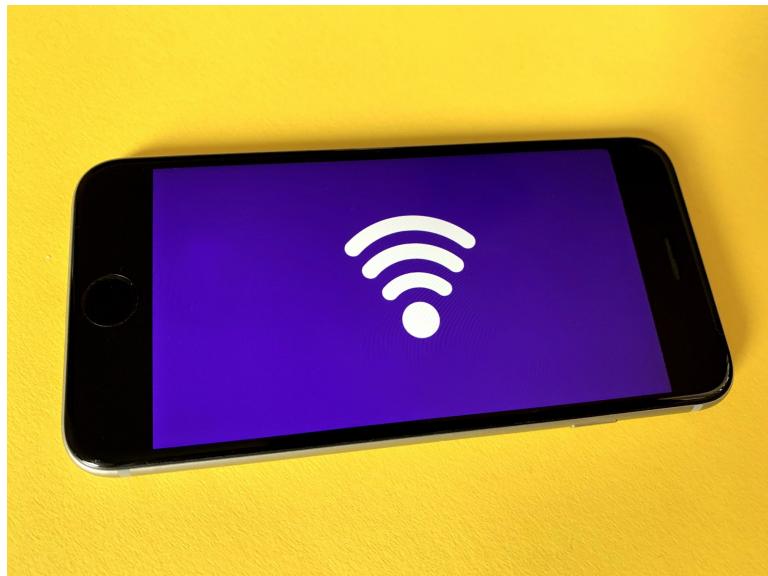
It is the oldest of the three.



Wi-Fi

Wi-Fi is the wireless technology used to connect devices to the internet, it uses shorter radio waves to connect devices but it isn't very powerful and has a short range.

The shorter waves means that more information can be sent!



Mobile Network

Mobile networks are like Wi-Fi as you don't need cables, but they use even shorter waves and are more powerful meaning the signal can travel much further.



Is More Power Dangerous?

We tend to think of something more powerful as being more dangerous, so that's the same for radio waves, right?

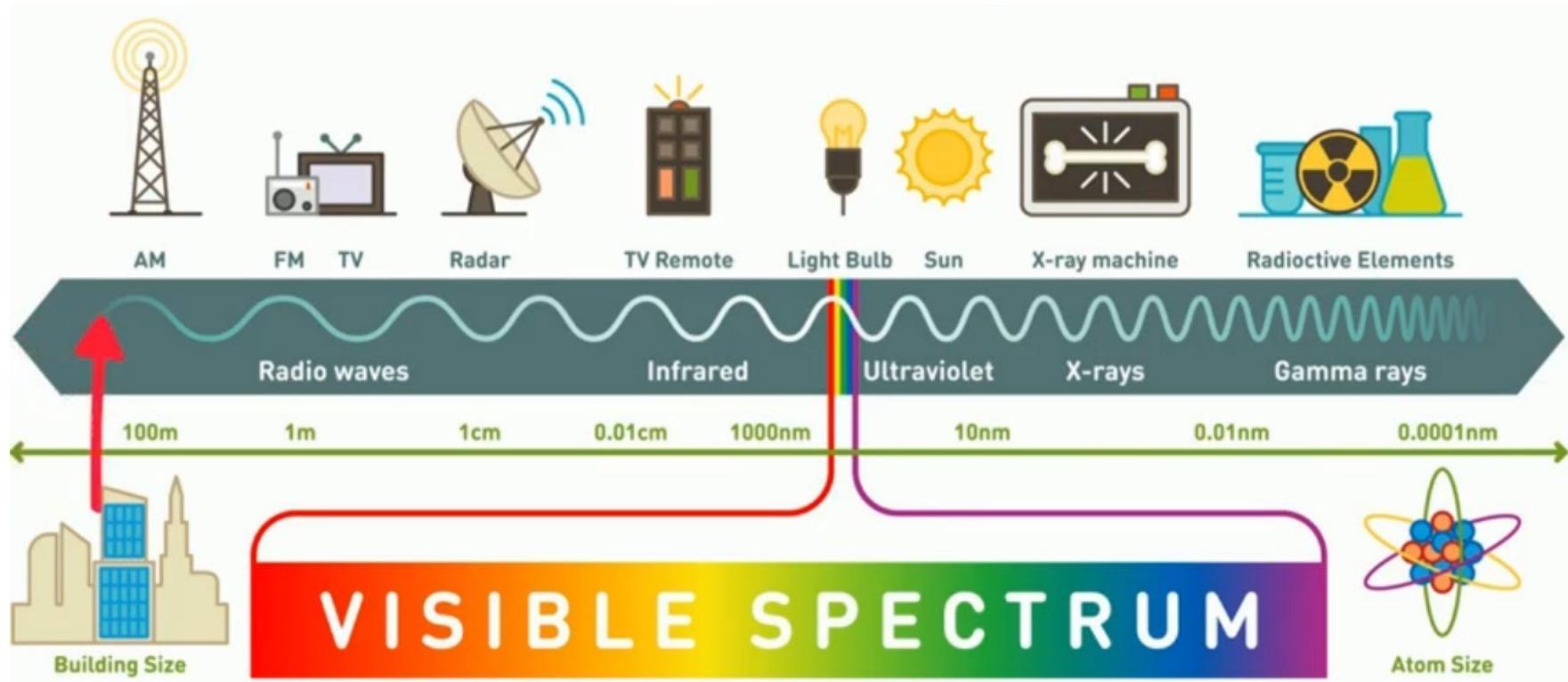
Well radio waves aren't really able to hurt or affect us in the first place, so making them more powerful doesn't really have any effect.

Light is a more powerful wave than radio, but does your TV hurt you?



Is More Power Dangerous?

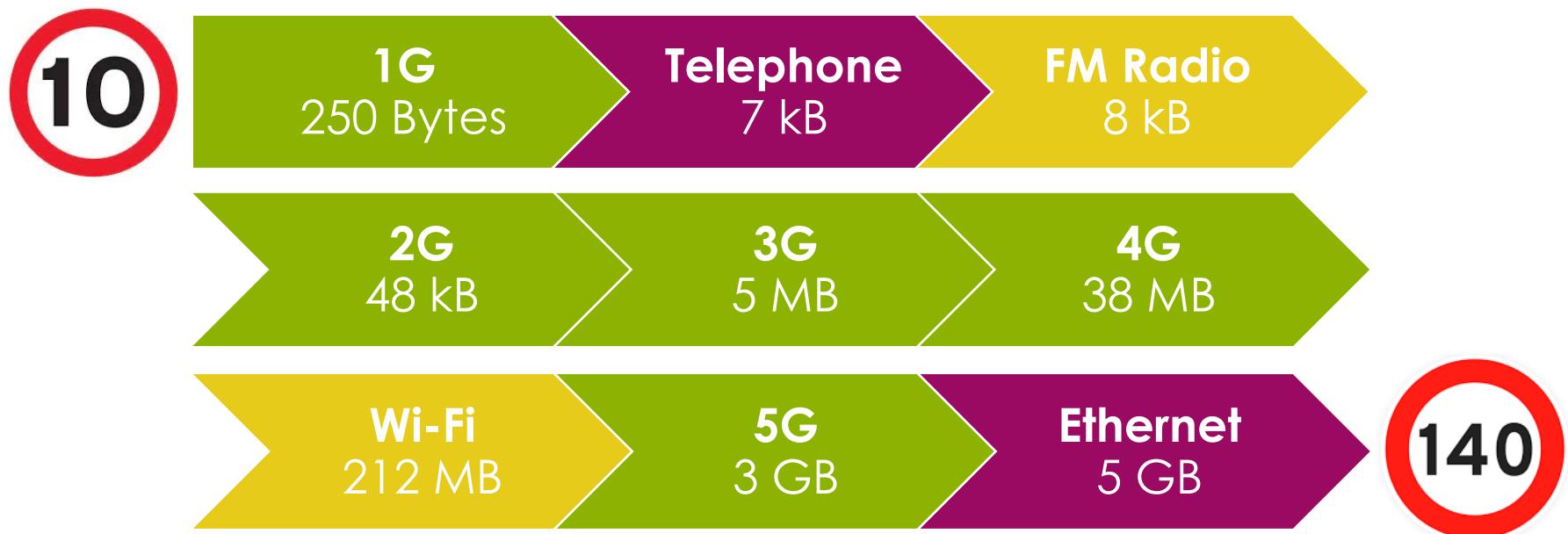
Longer waves have less energy, which means only those waves shorter than visible light can be dangerous to us!



Connection Speed

Networks have different data speeds, this limits how much information can be sent between devices **per second**.

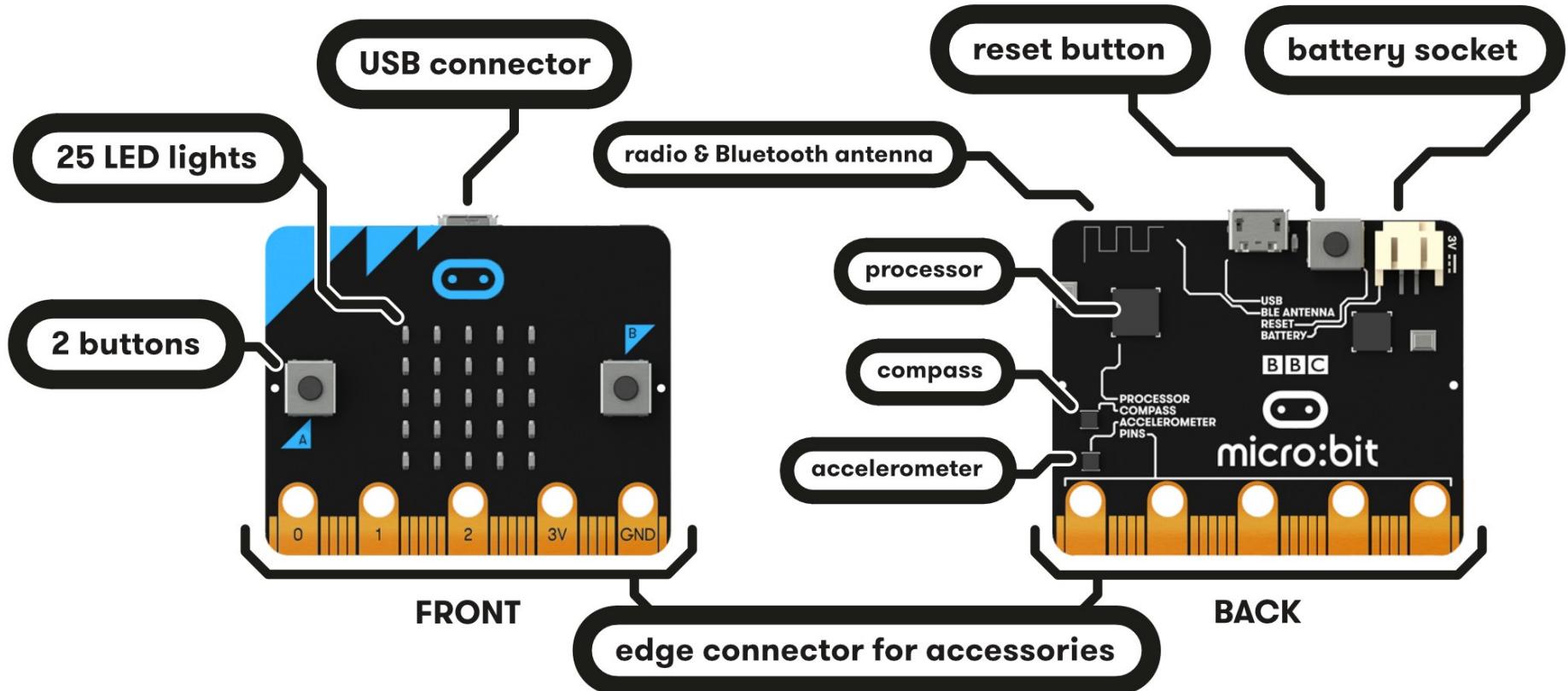
You can think of this like a speed limit on roads, the higher it is the quicker a car (information) can get from point A to B, and so more cars are able to travel down the road.



Mobile Network micro:bits



What is a micro:bit?



micro:bits

We're going to be using micro:bits to pick up mobile signals being broadcast in this room.

You will have to decode the messages received from the mobile signals using ____.

Will all the mobile signals transmit at the same rate?

micro:bits

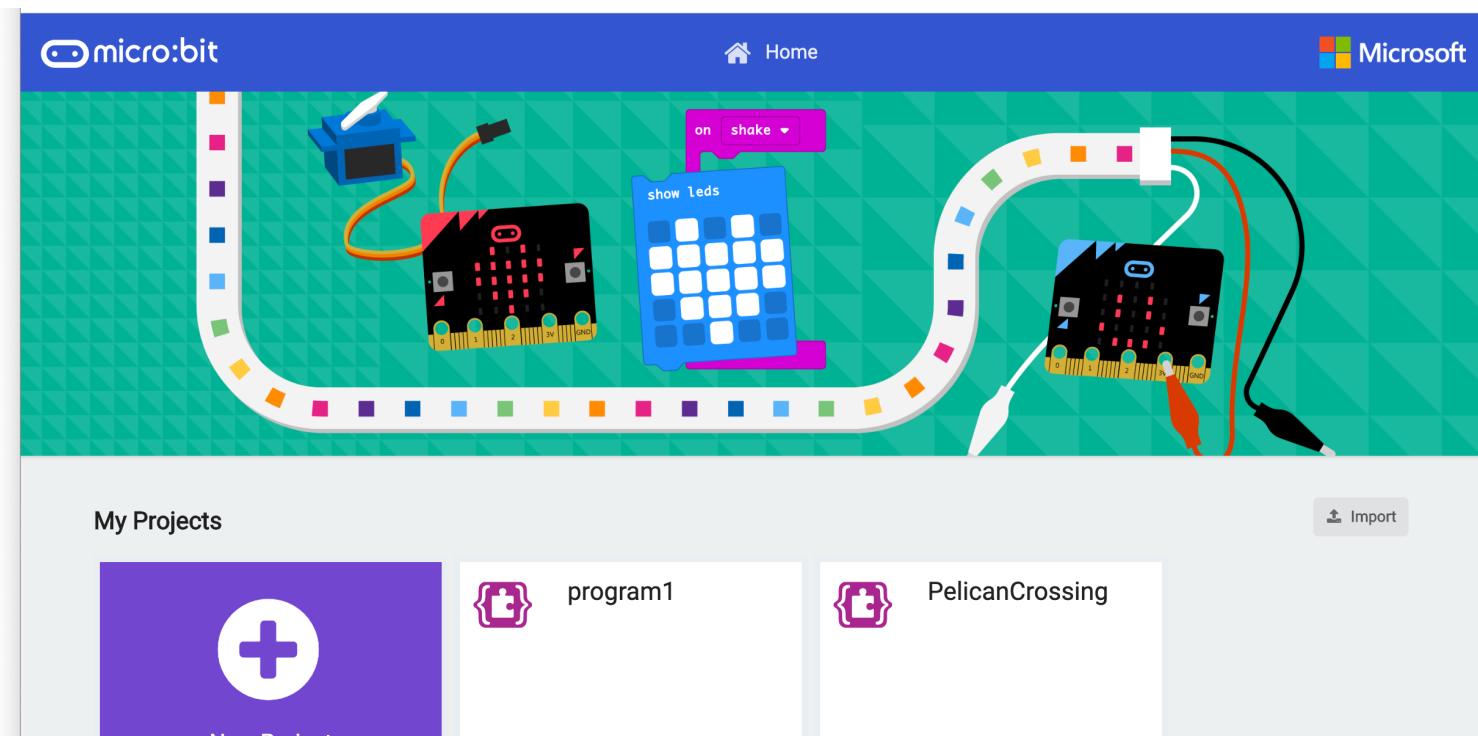
First we will have to program our micro:bits to enable them to pick up these signals being broadcast!

Log onto the laptops with the Password:

technoweb

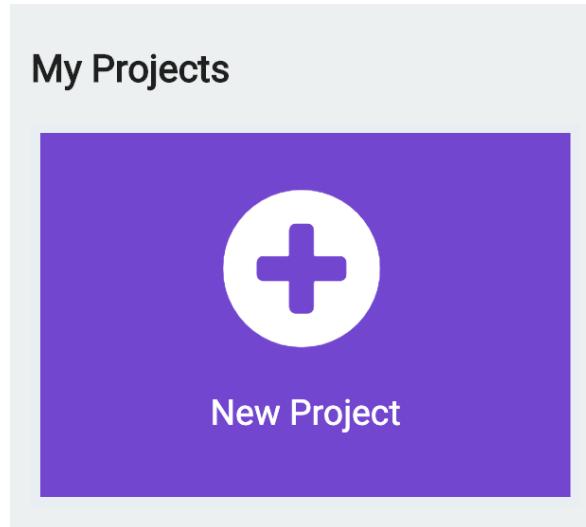
Starting with MakeCode

Open the start menu, then search for and open the program MakeCode Microbit.

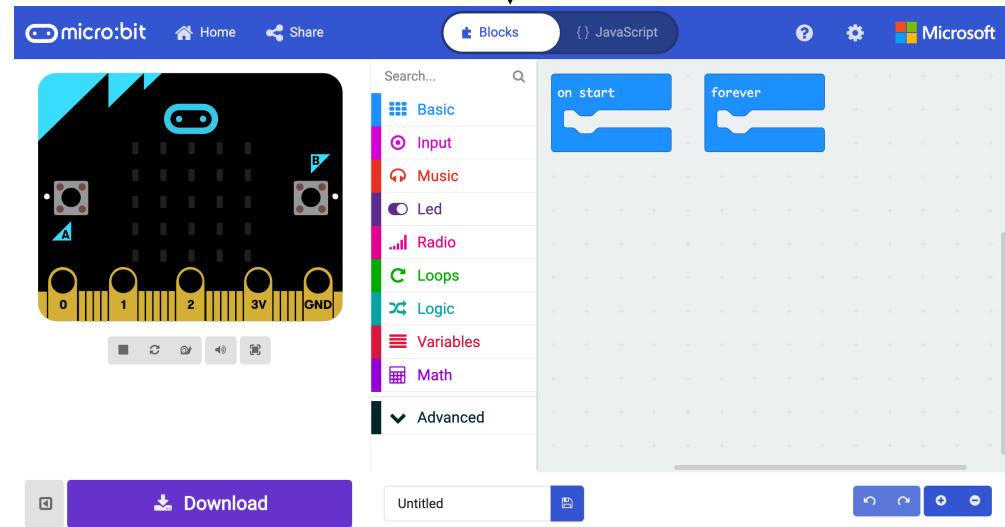


Starting with Makecode

On the
makecode.microbit.org
website, click on New
Project

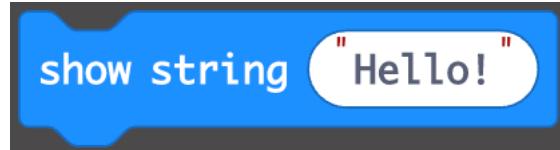
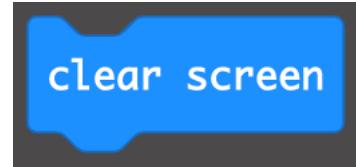
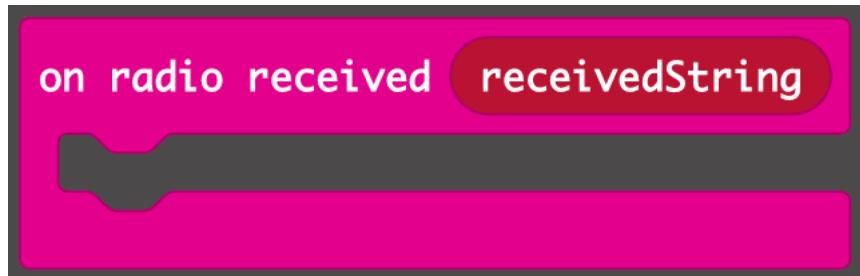


Once you enter the project page
you will see a micro:bit simulator on
the left, a code area on the right,
and a save and download area on
the bottom of the page.

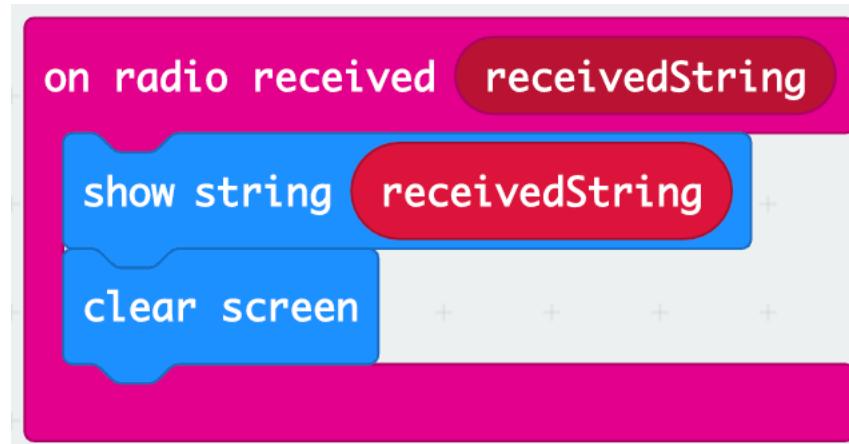


Coding our micro:bits

Find these blocks on MakeCode micro:bit and drag them in.
See if you can work out how they're assembled!



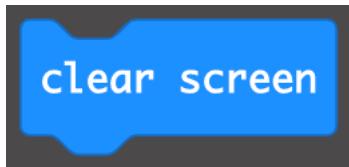
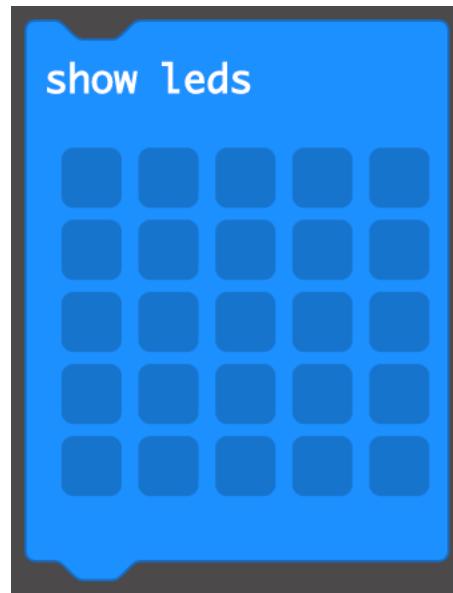
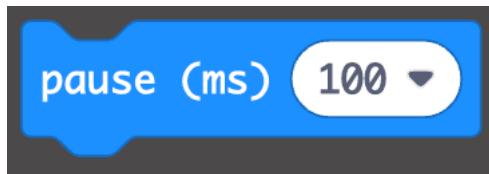
Coding our micro:bits



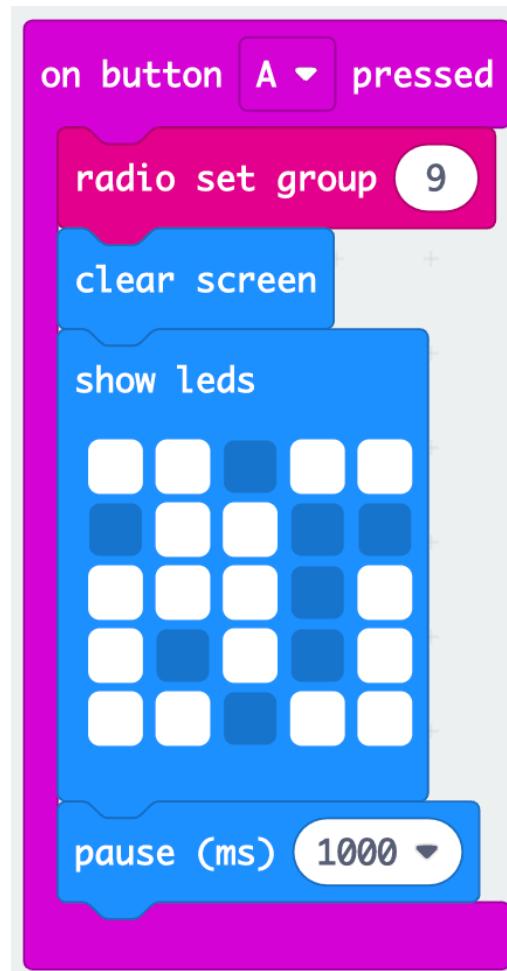
Note: the “receivedString” can be dragged out from above and dragged into the “show string block”!

Coding our micro:bits

Find these blocks on MakeCode micro:bit and drag them in.
See if you can work out how they're assembled!

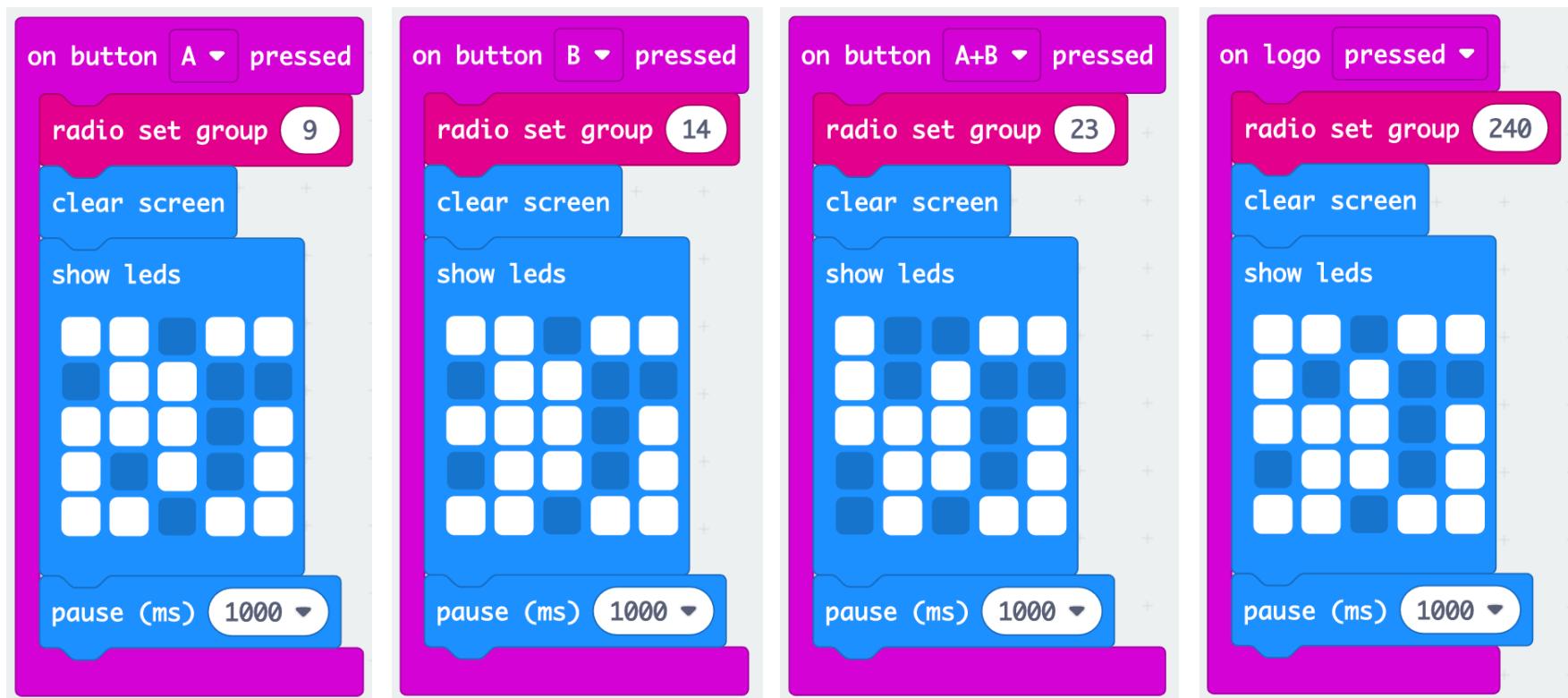


Coding our micro:bits



Coding our micro:bits

You will need to build three more of these, changing the “on button _ pressed” block for each.



Coding our micro:bits

You will need to set the "radio set group block to the following values:

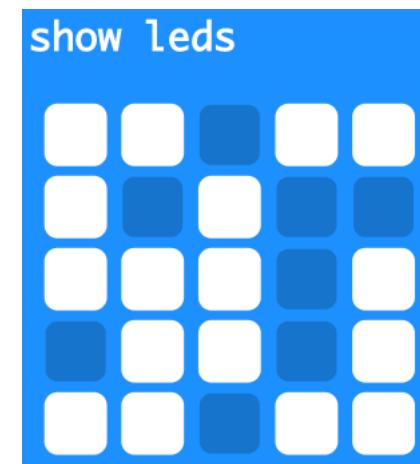
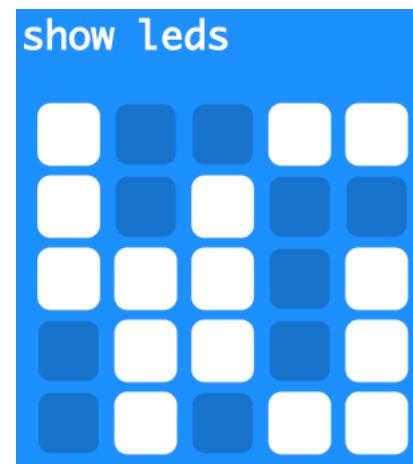
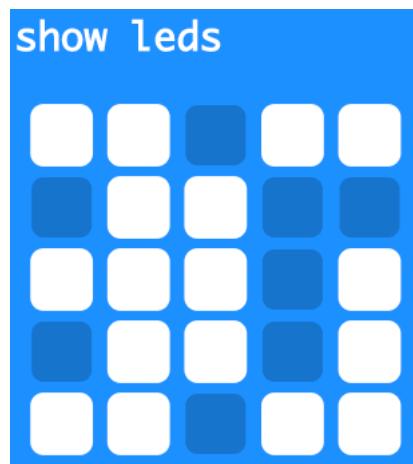
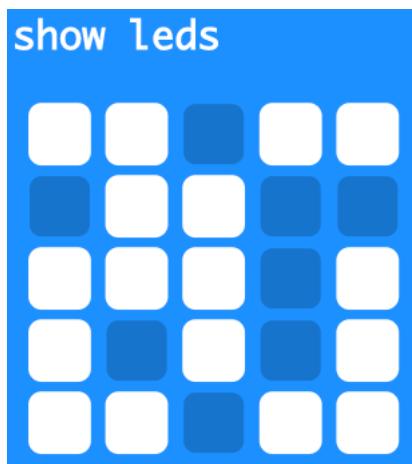
2G – 9

3G – 14

4G – 23

5G – 240

And the LEDs can be made to spell each network like this:



Coding our micro:bits

Once you have finished building your program, connect your micro:bit to the computer using the USB cable.

The program can be downloaded onto the micro:bit by clicking the download button.

Wait for the download to finish before disconnecting the USB.

Using our micro:bits

Now you have a programmed micro:bit tuned into the frequencies of each mobile network!

There are four micro:bit transmitters around the room broadcasting secret messages.

Tune your micro:bit to the right channel and copy down the message you receive from each transmission tower!