

device or technology based on the Institute
of Electrical and Electronics Engineers (IEEE)
wireless communication standard 802.11
"The Standard for Wireless Fidelity"

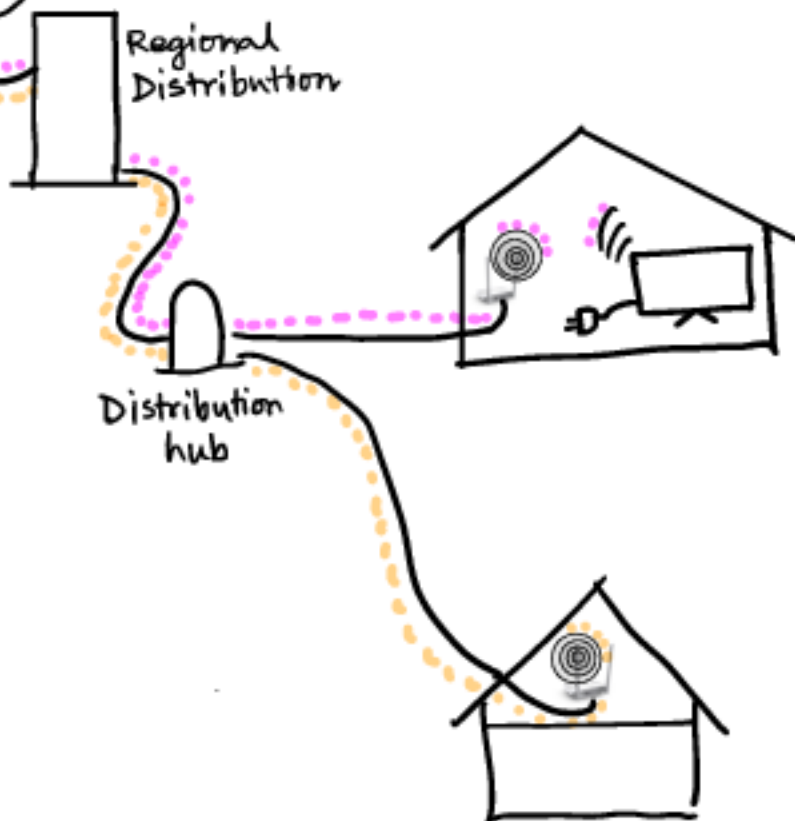
① How does Wifi connect your home to the Internet?

Electricity

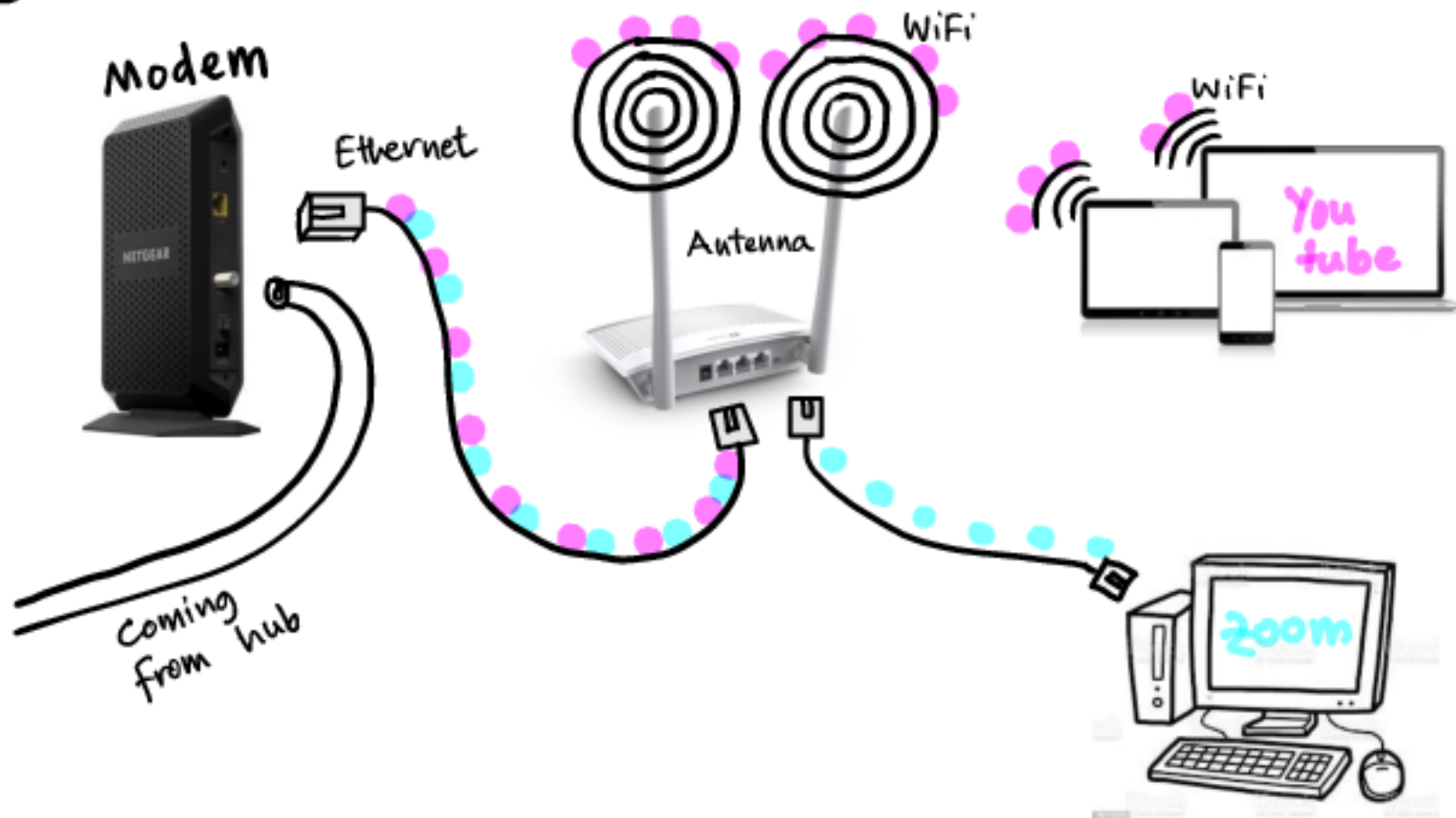


Internet

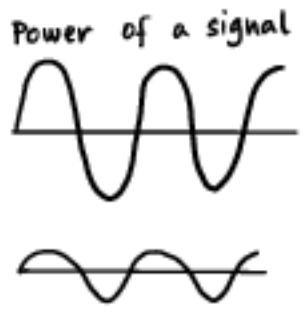
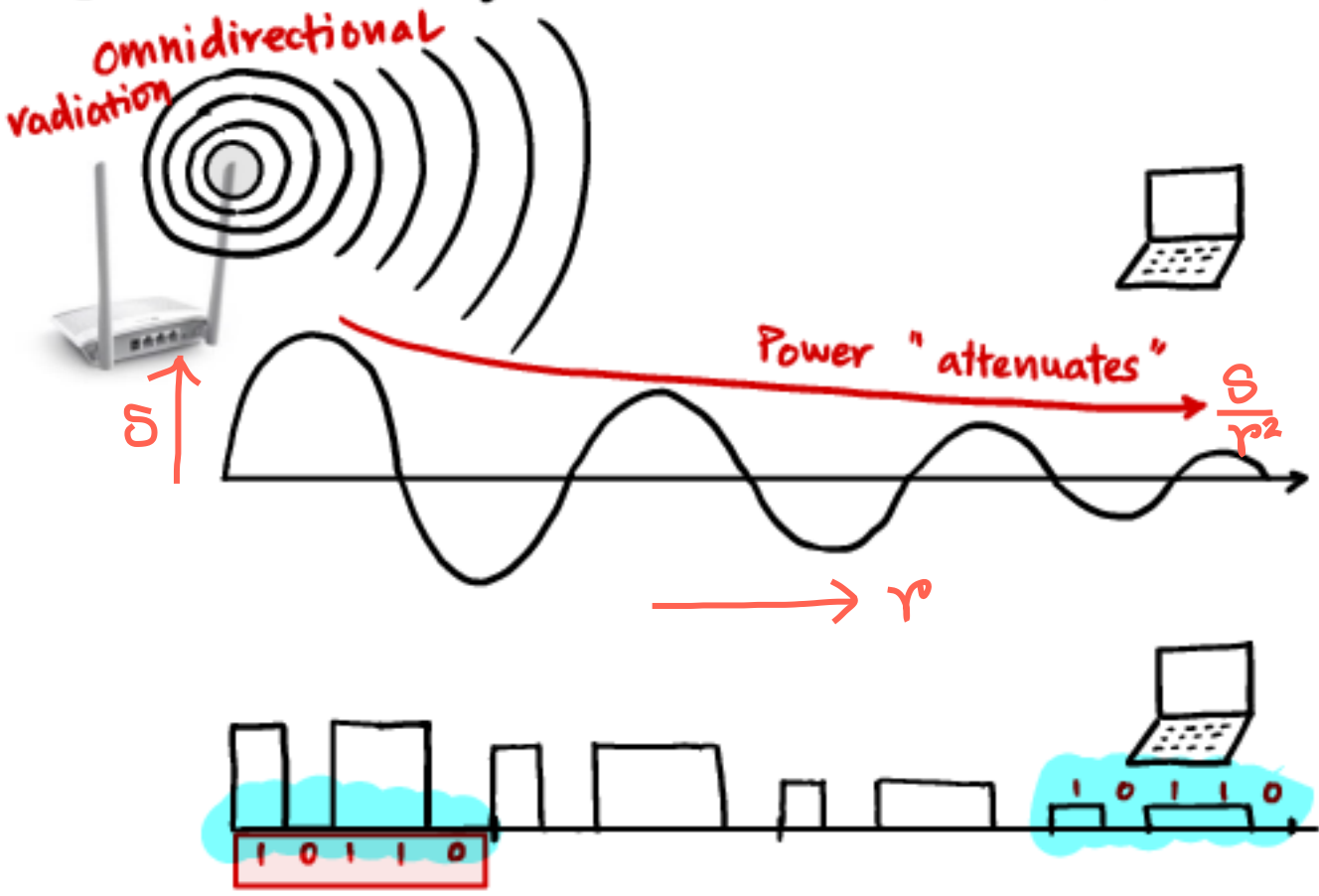
WiFi



② How does WiFi connect devices in your home?

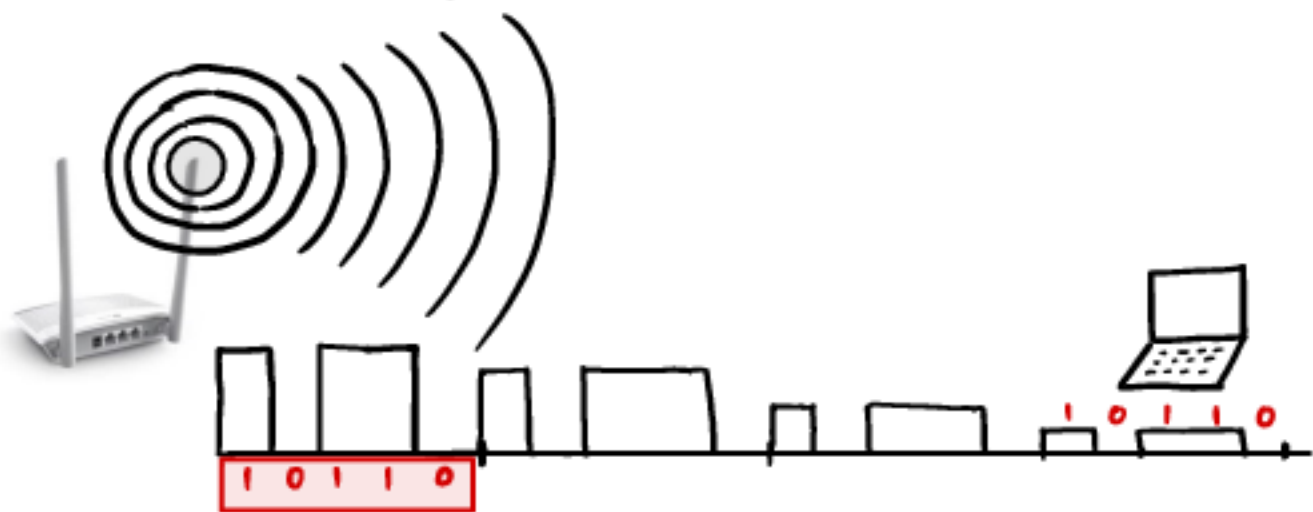


③ Understanding Wifi radiation and power

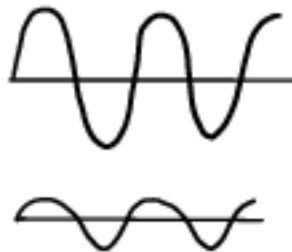


high-speed data transfer over short distances using radio waves

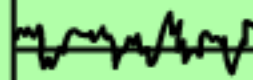
④ Understanding noise and bit errors





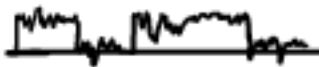
Power of a signal



Noise

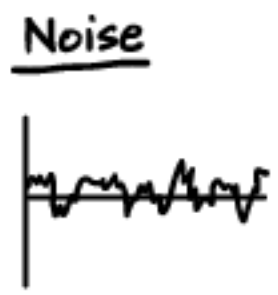



Transmitted

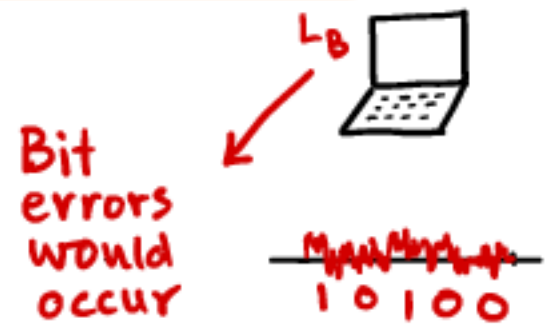
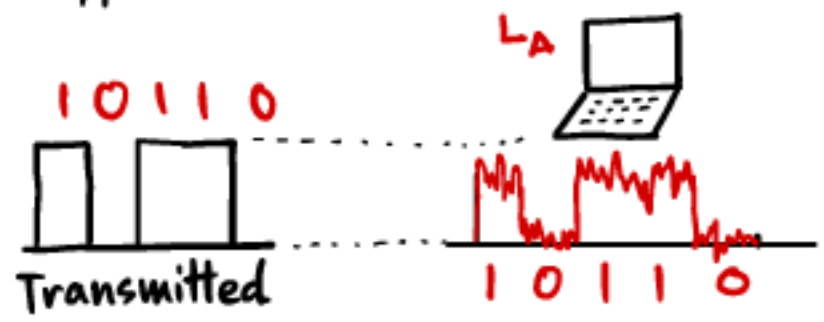

+

=

Received

Can you see the bits still?

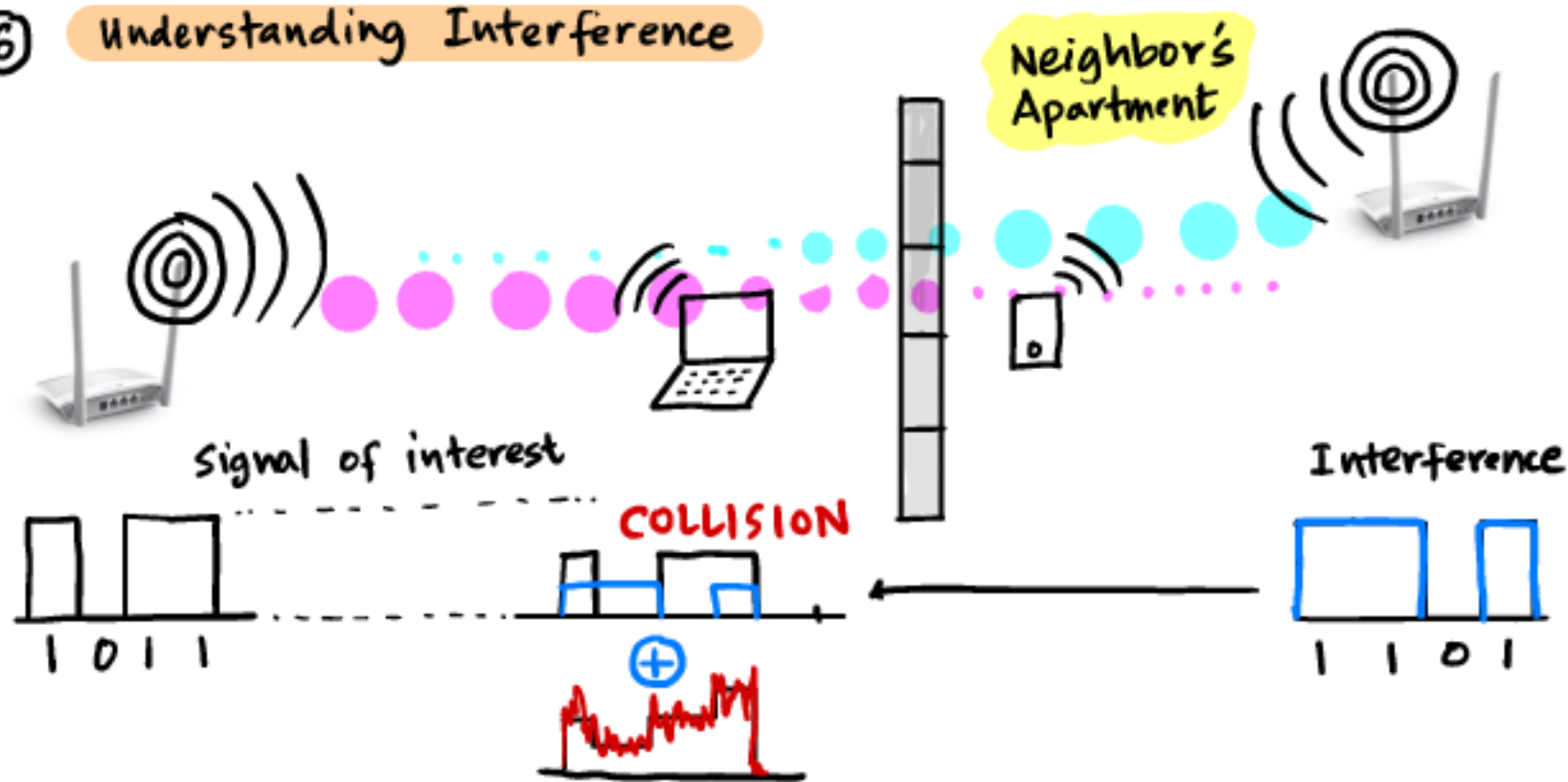
⑤ Bit errors with distance



What happens when the laptop moves closer or further?



⑥ Understanding Interference



- What does laptop receive?
- How to reduce bit errors?

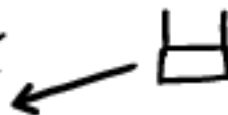
⑦ Lot of WiFi technology focussed on minimizing collisions

You



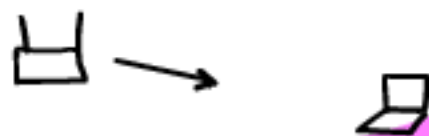
Collision

Neighbor

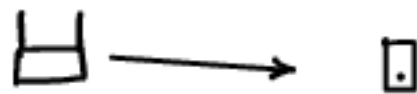


When will collision happen at phone but not at laptop?

⑧ Wifi : Each participant must take turns

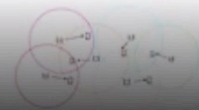
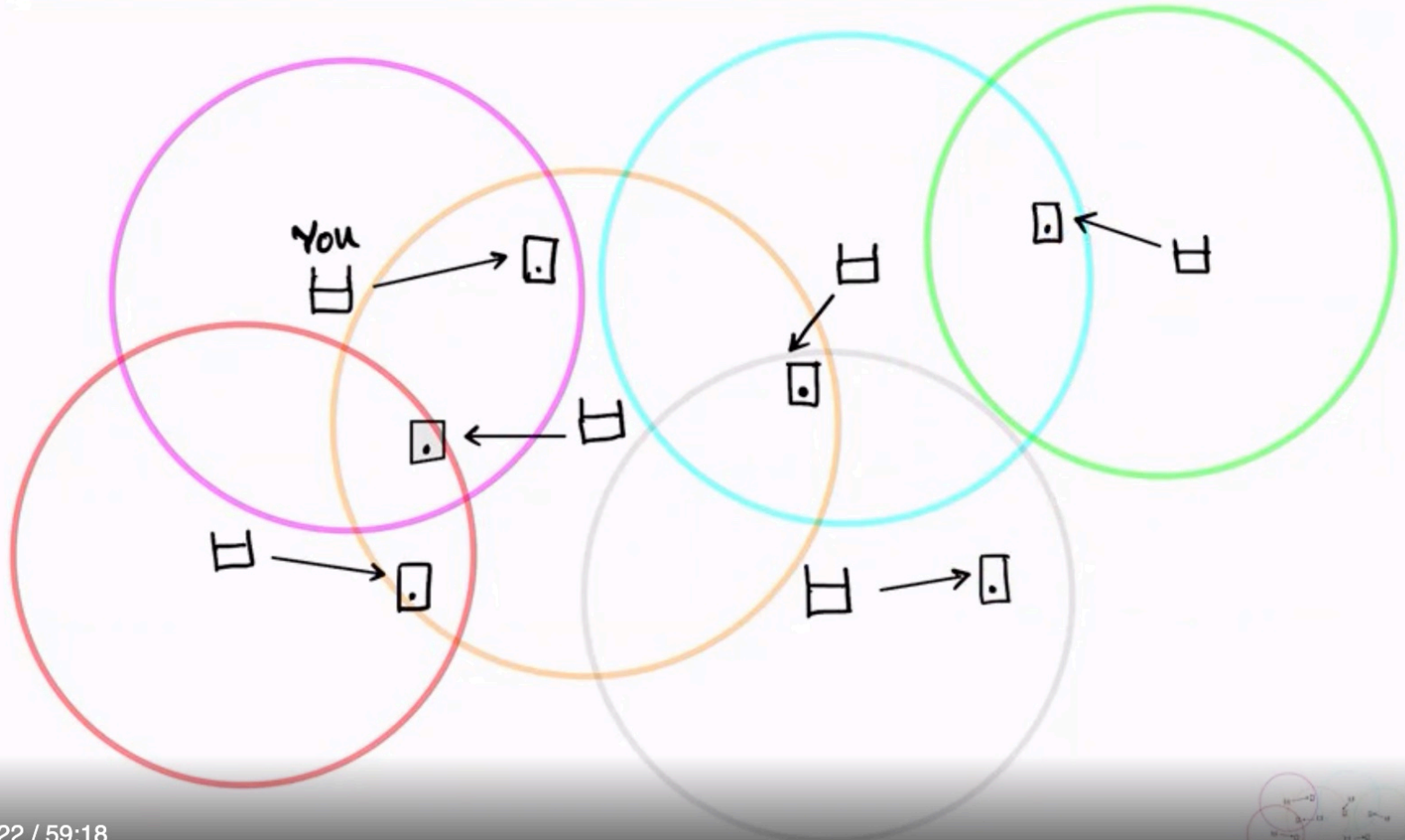


Round robin happens at the time scale of 100 microseconds.



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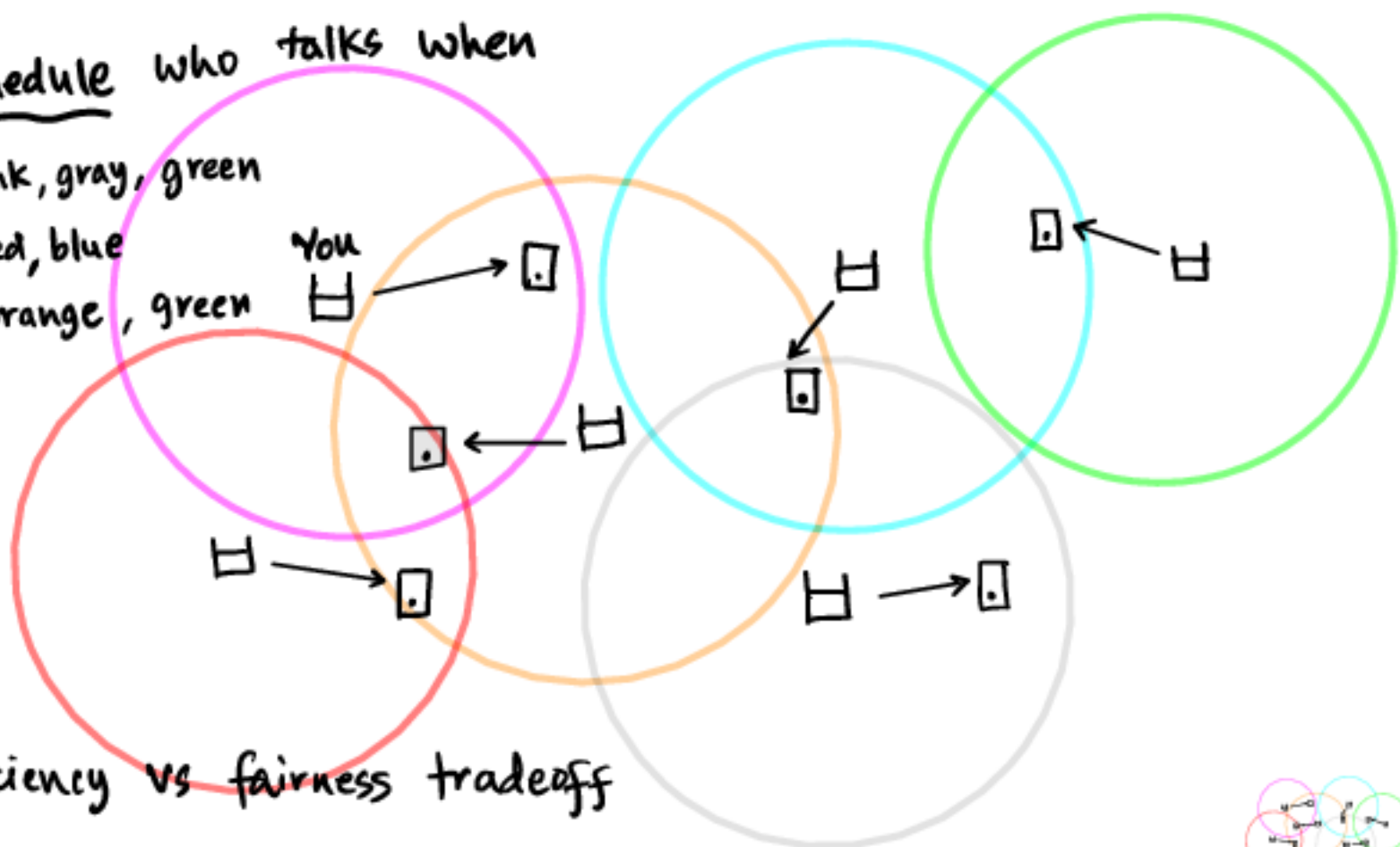
But who should wait and who should talk?



9 But who should wait and who should talk?

schedule who talks when

- t_1 : Pink, gray, green
- t_2 : red, blue
- t_3 : orange, green

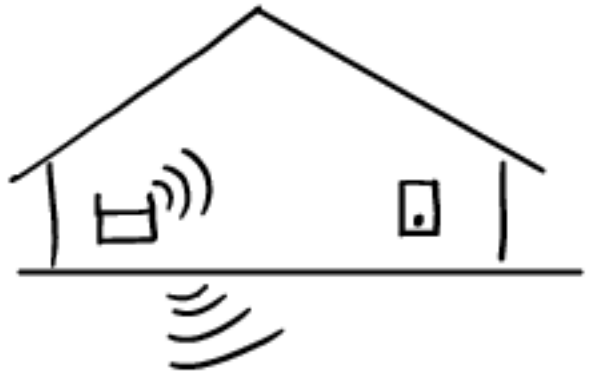


efficiency vs fairness tradeoff

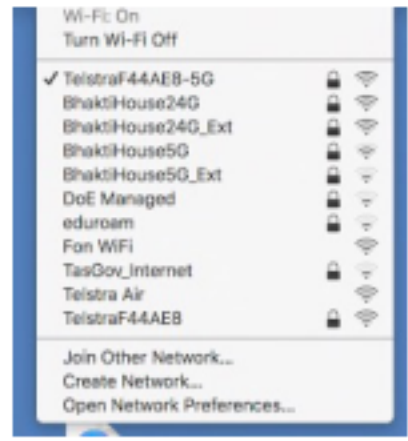


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Overhearing Wifi and Security



Associate to a WiFi router or access point or base station.



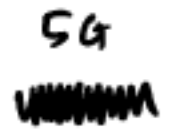
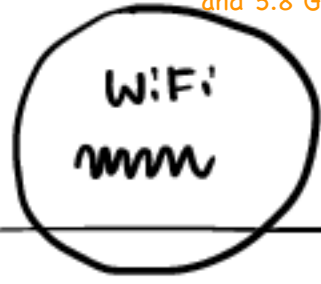
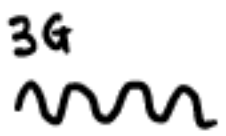
- * ensure you are using the official Wi Fi
- * stick to https (s - secure)
- * don't transmit sensitive info (wait till you are on a secure connection)
- * use VPN

②

Wifi in society

A 1985 ruling by the U.S. Federal Communications Commission released the bands of the radio spectrum at 900 megahertz (MHz), 2.4 gigahertz (GHz), and 5.8 GHz for unlicensed use by anyone.

- Wifi is free spectrum

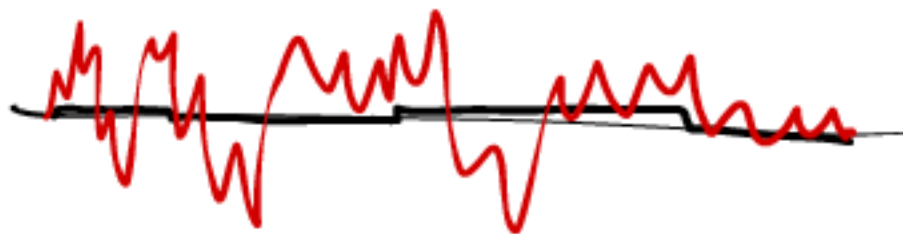
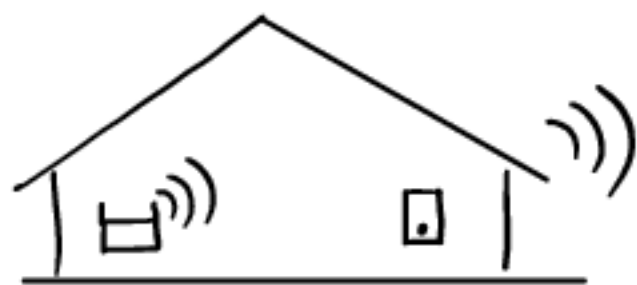


- Wifi and digital divide

- Wifi and family life (tech free family evenings)



⑫ So why not use Wifi when I am driving?



Motivates our next topic

A hand-drawn banner with a black outline and a white background. The banner is slightly curved at the bottom. Inside the banner, the words "Cellular" and "Networks" are written in a bold, rounded, cyan-colored font with black outlines. "Cellular" is on the top line and "Networks" is on the bottom line.

Cellular Networks