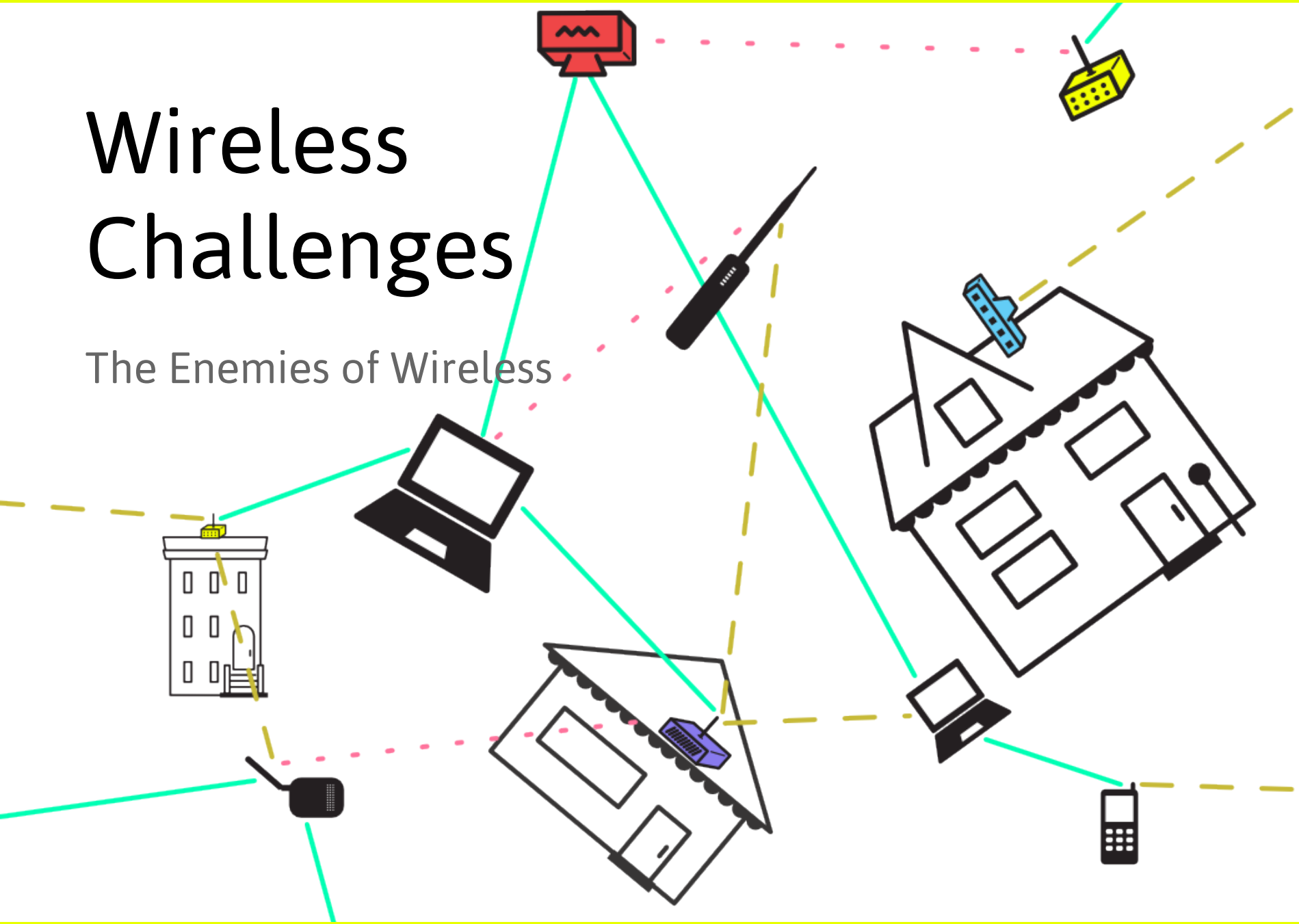
Wireless Challenges

The Enemies of Wireless



Goal:

Learn how to address wireless networking challenges so we can troubleshoot and improve networks together.

Why?

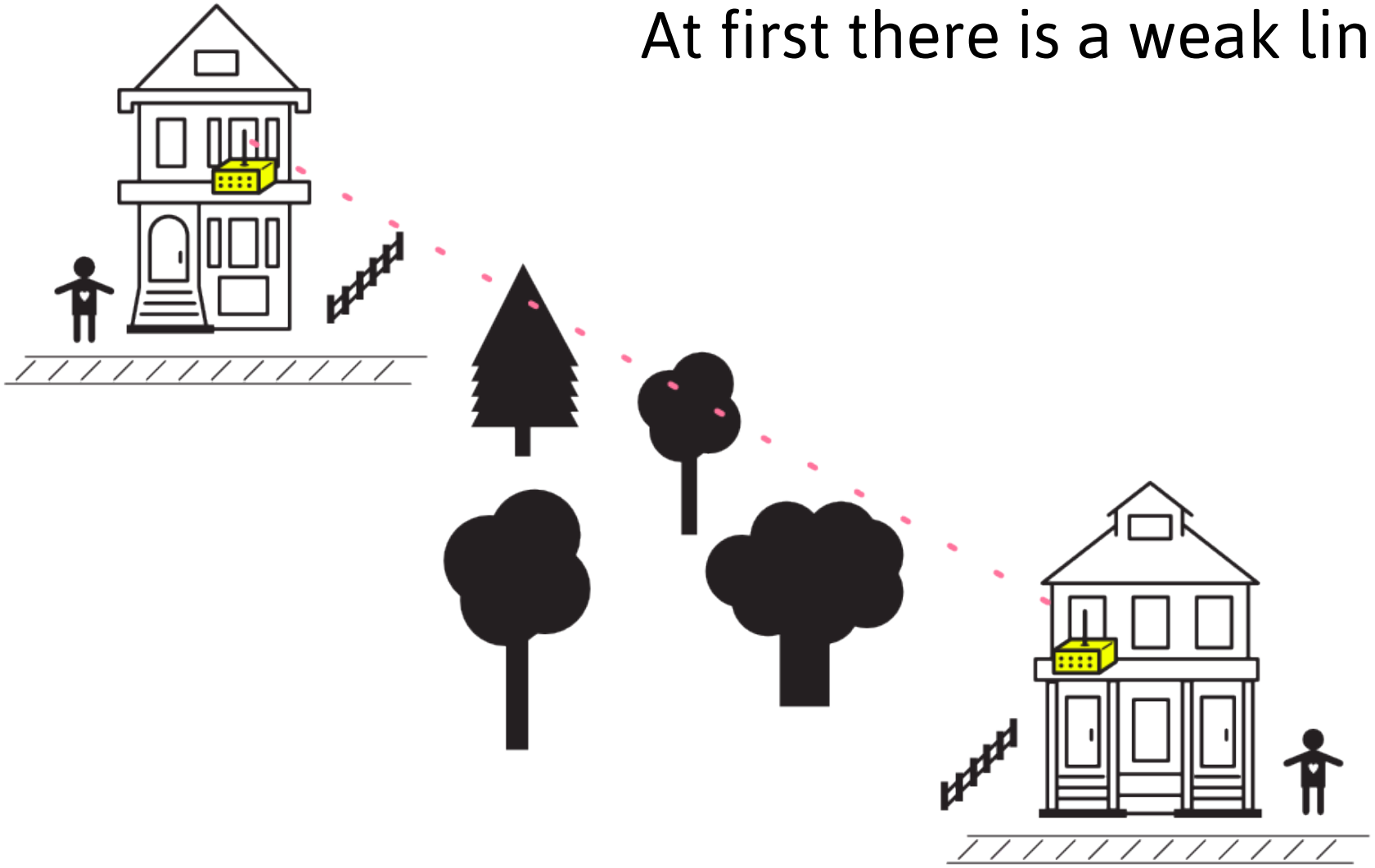
We need to plan according to real-world conditions and work around the obstacles in our environments.

First, an example of a wireless challenge.

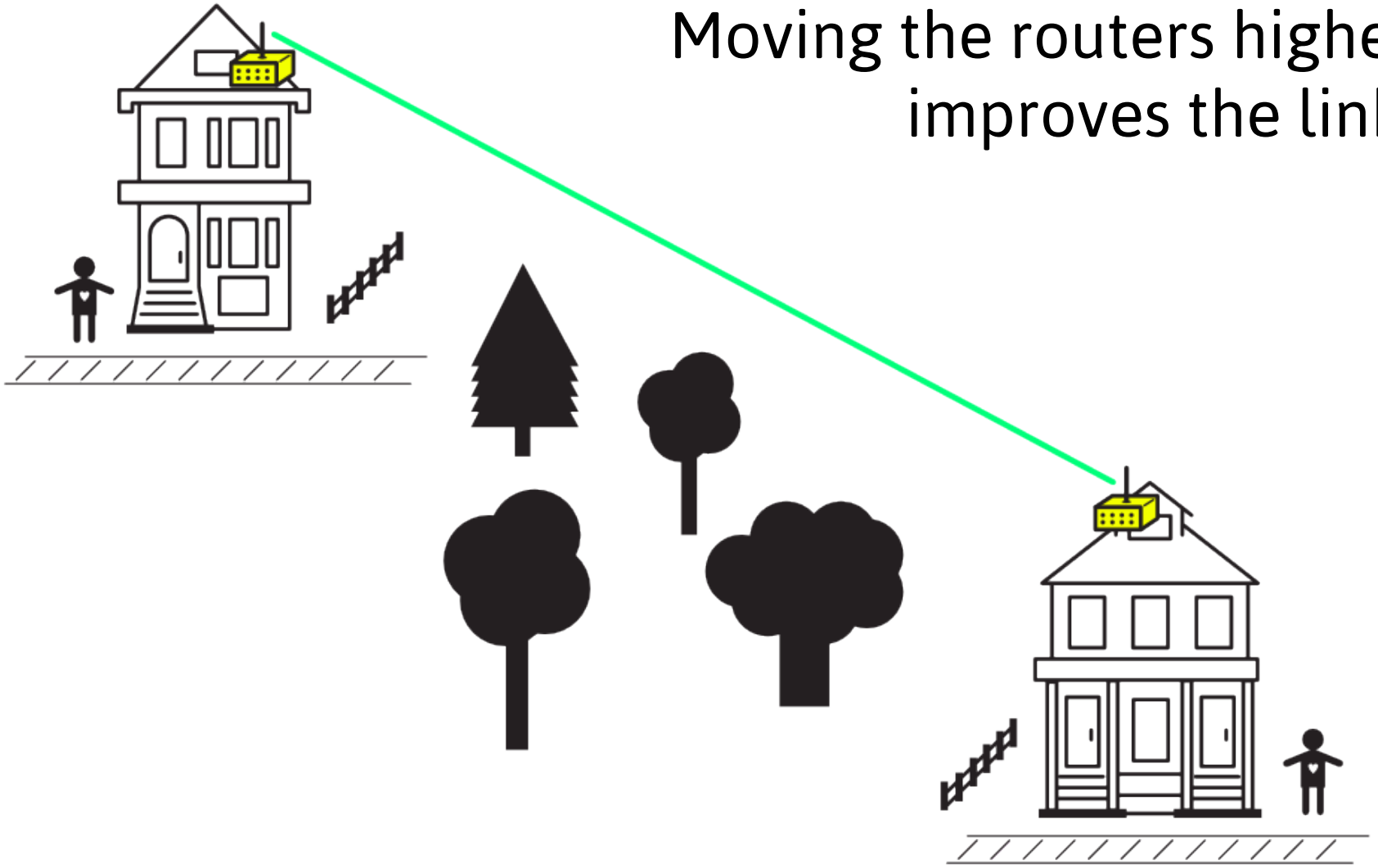
Two neighbors want to connect.

They place routers in windows.

At first there is a weak link.



Moving the routers higher improves the link.



We want to represent links in a consistent way in the flashcard problems and our solutions.

Wireless link quality

We use solid or dashed lines to show the strength of the link between two nodes.

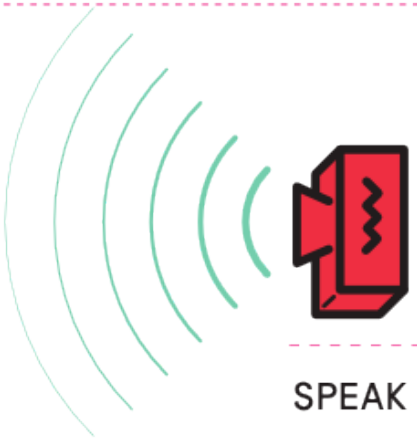
Wireless power

SPEAK POWER

LISTEN POWER

SPEAK POWER

LISTEN POWER



SPEAK POWER

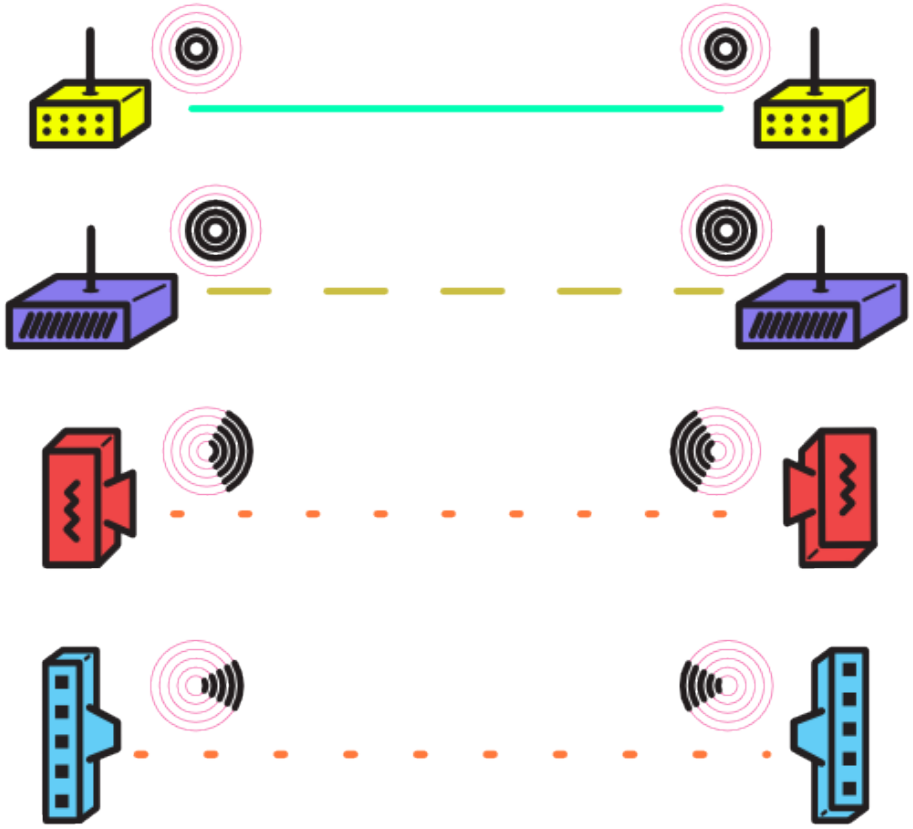
LISTEN POWER

SPEAK POWER

LISTEN POWER

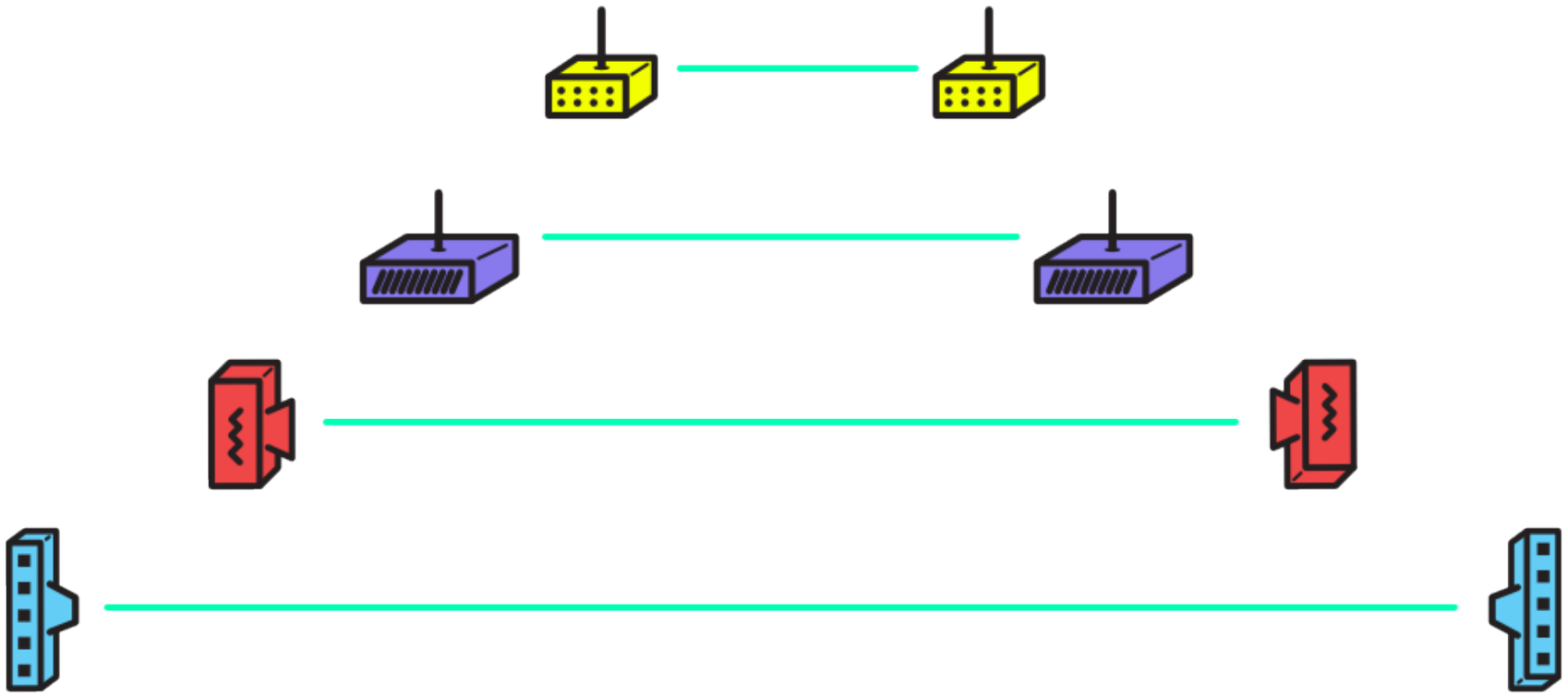
Routers speak and listen with different power.

Wireless power



We always want to use the lowest power level that creates a good link.

Links over distance

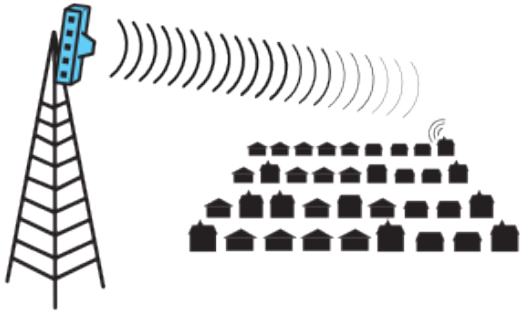


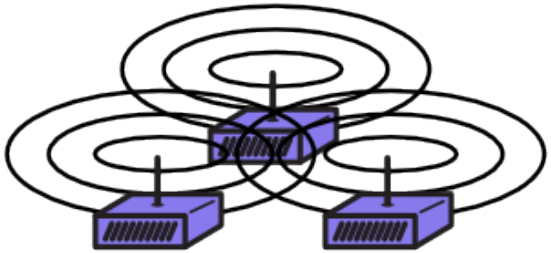
For some links, you will need routers that can reach further.

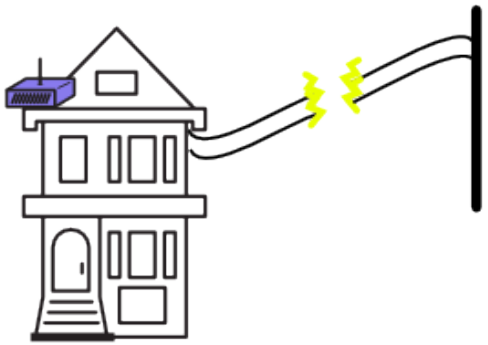
Wireless signals are affected by obstacles, such as physical objects and environmental conditions.

Obstacles can be:

+ Distance
+ Line of sight
+ Barriers
+ Interference
+ Weather
+ Electricity issues







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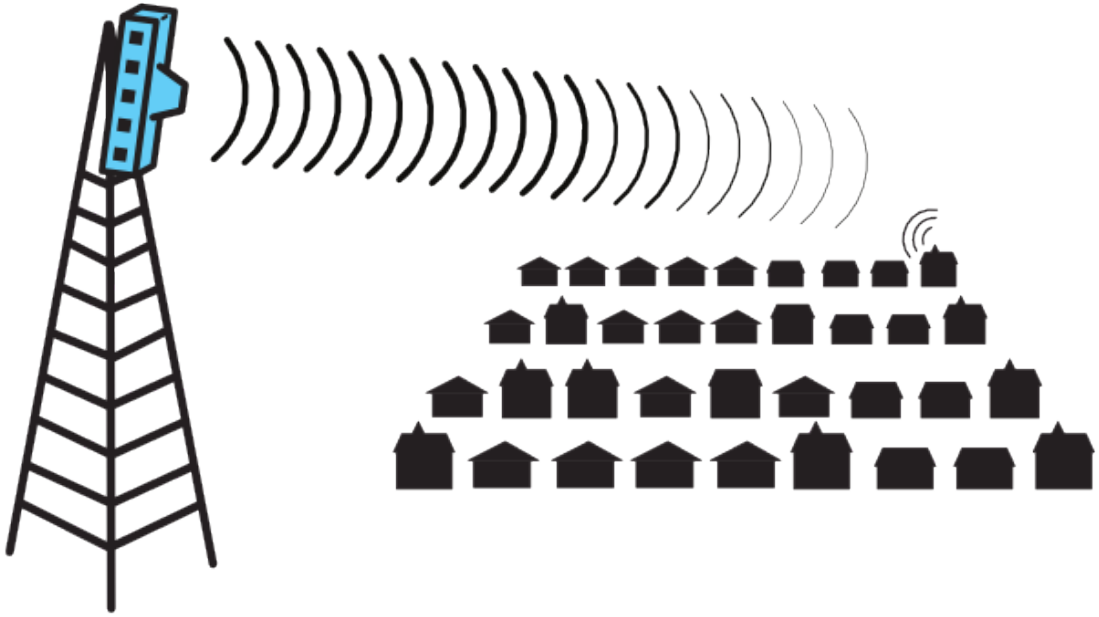
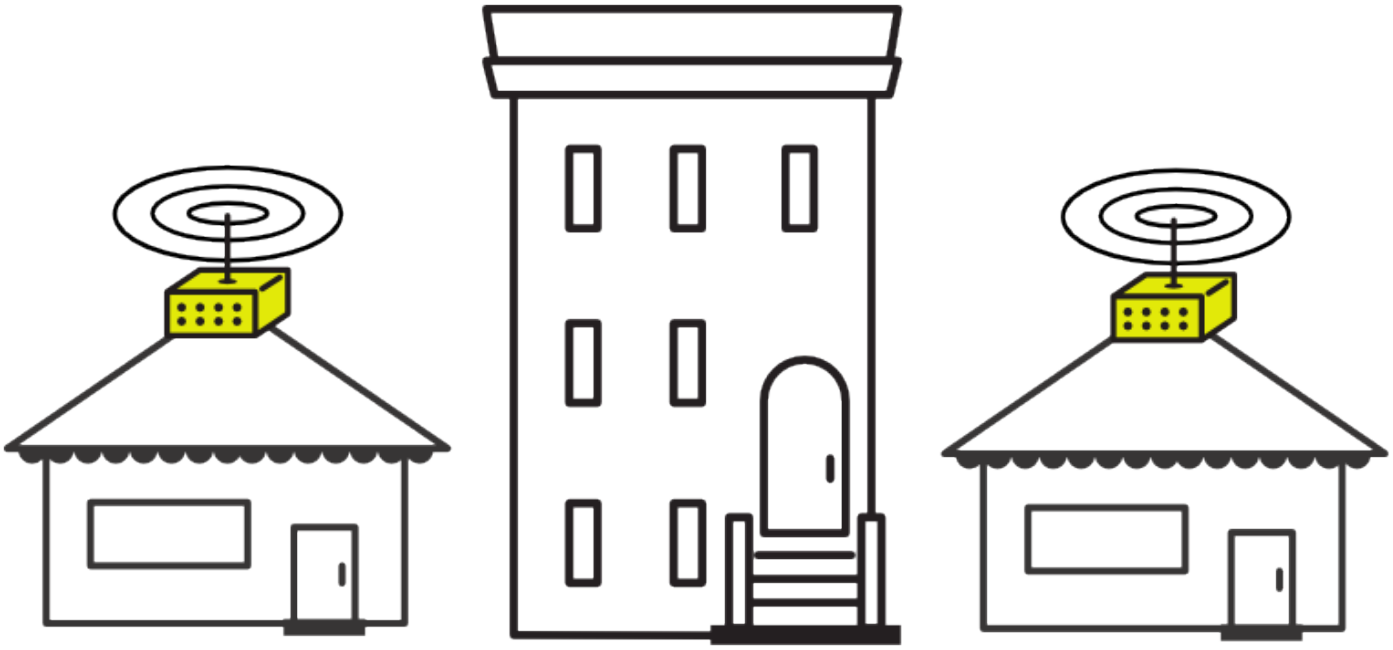
Distance



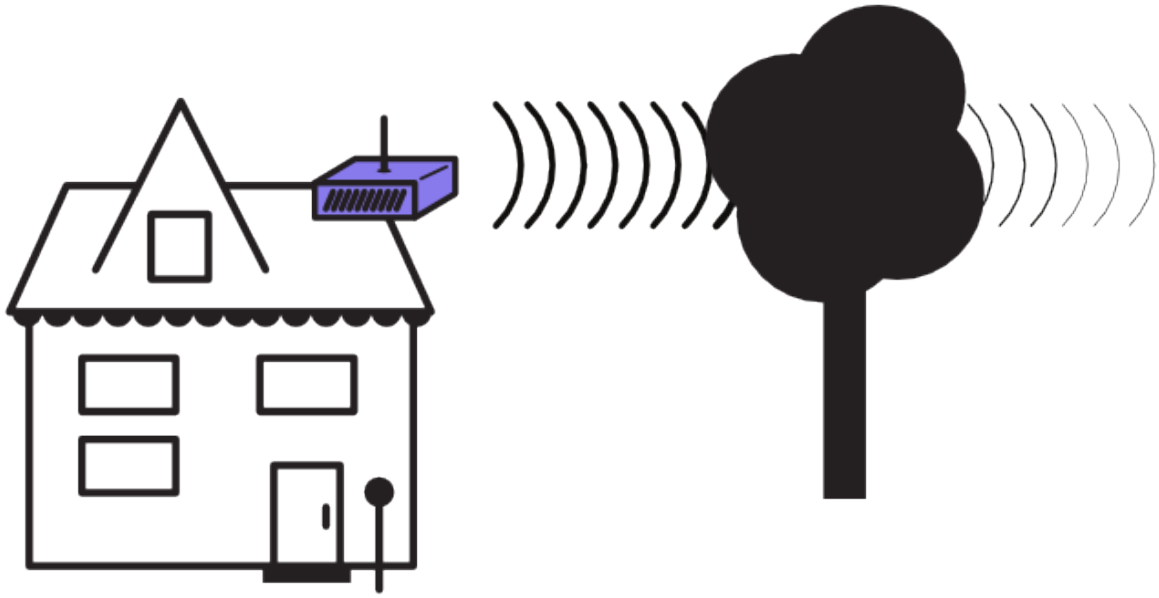
Wireless signals lose power the further they travel.

Line of Sight



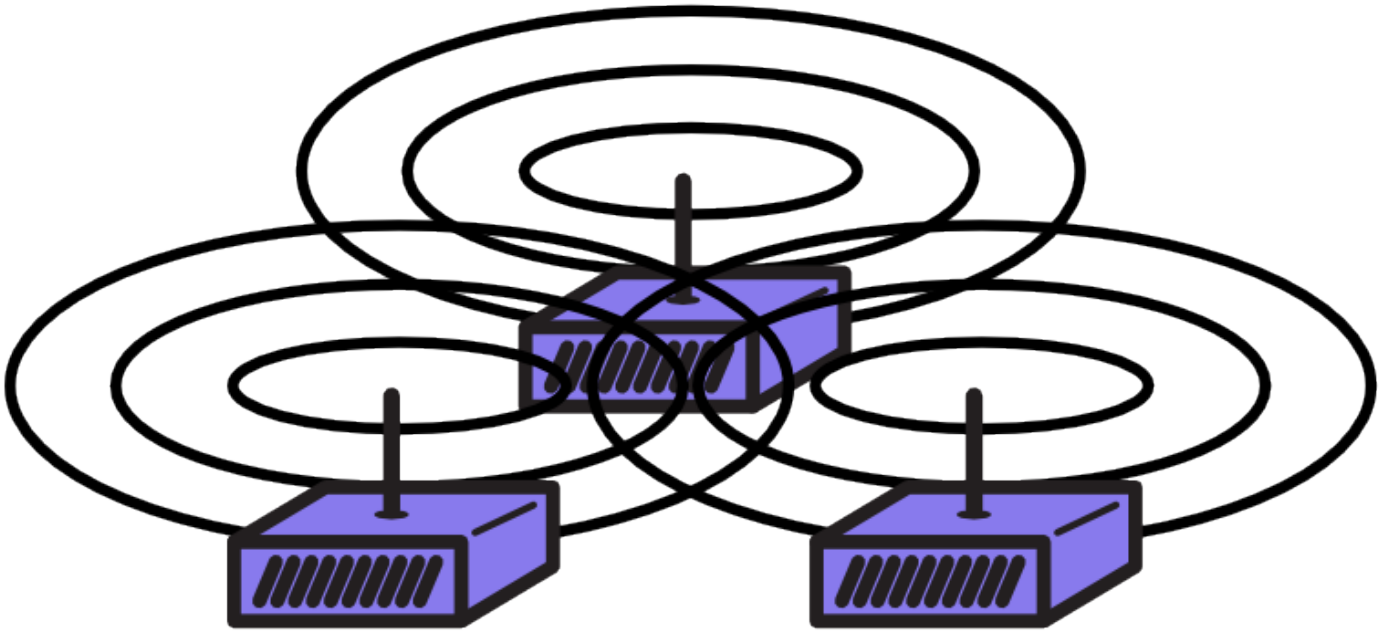
Wireless signals can encounter total barriers, preventing connections.

Barriers



Wireless signals lose strength through objects.

Interference



Routers can be too loud, making it much harder for them to hear each other.

Weather

Weather conditions can make wireless signals weaker.

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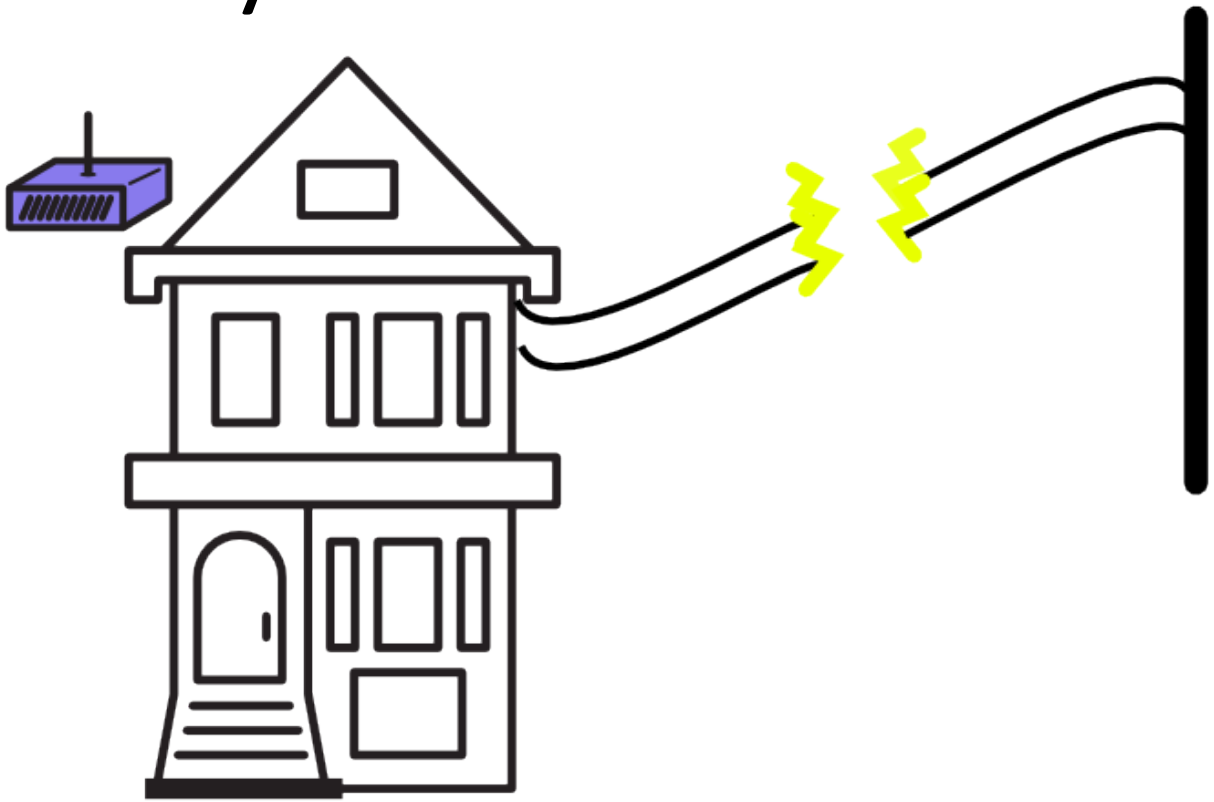
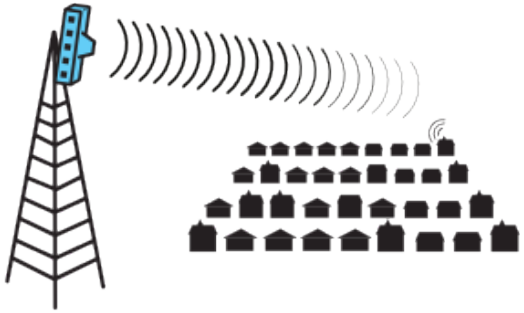
Electricity issues



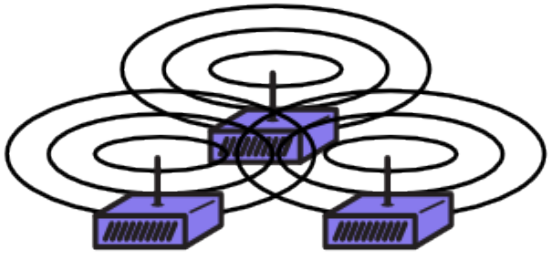
Routers need steady electricity to work well.



Distance

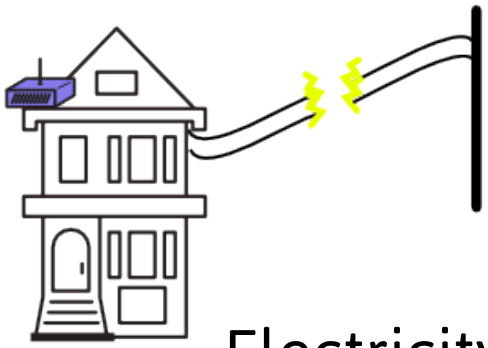
Line of sight

Barriers



Interference

Weather



Electricity

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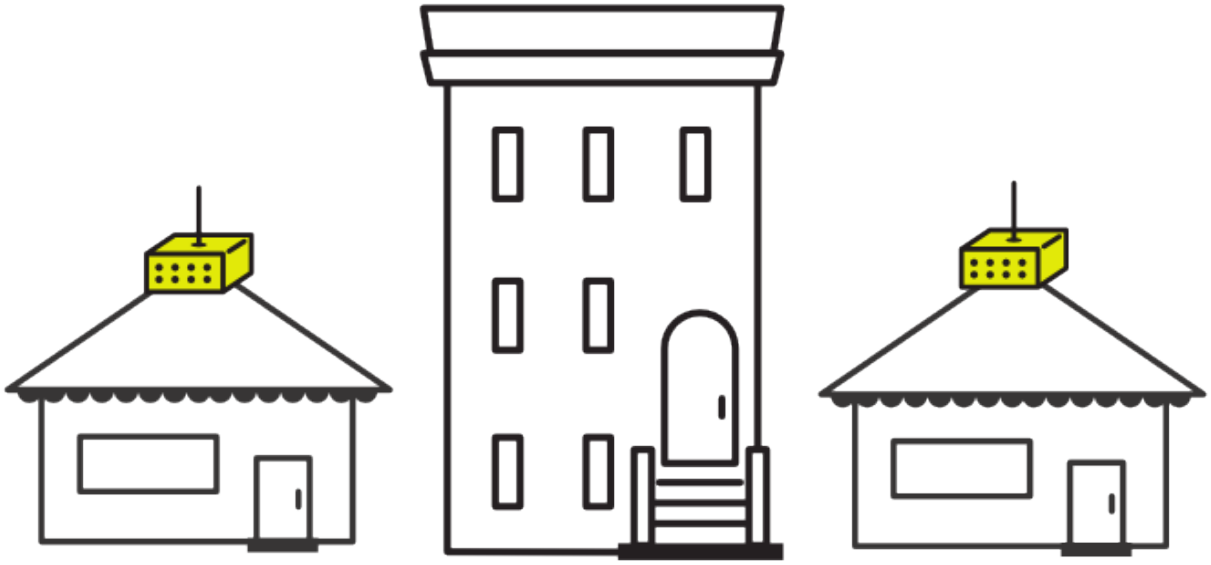
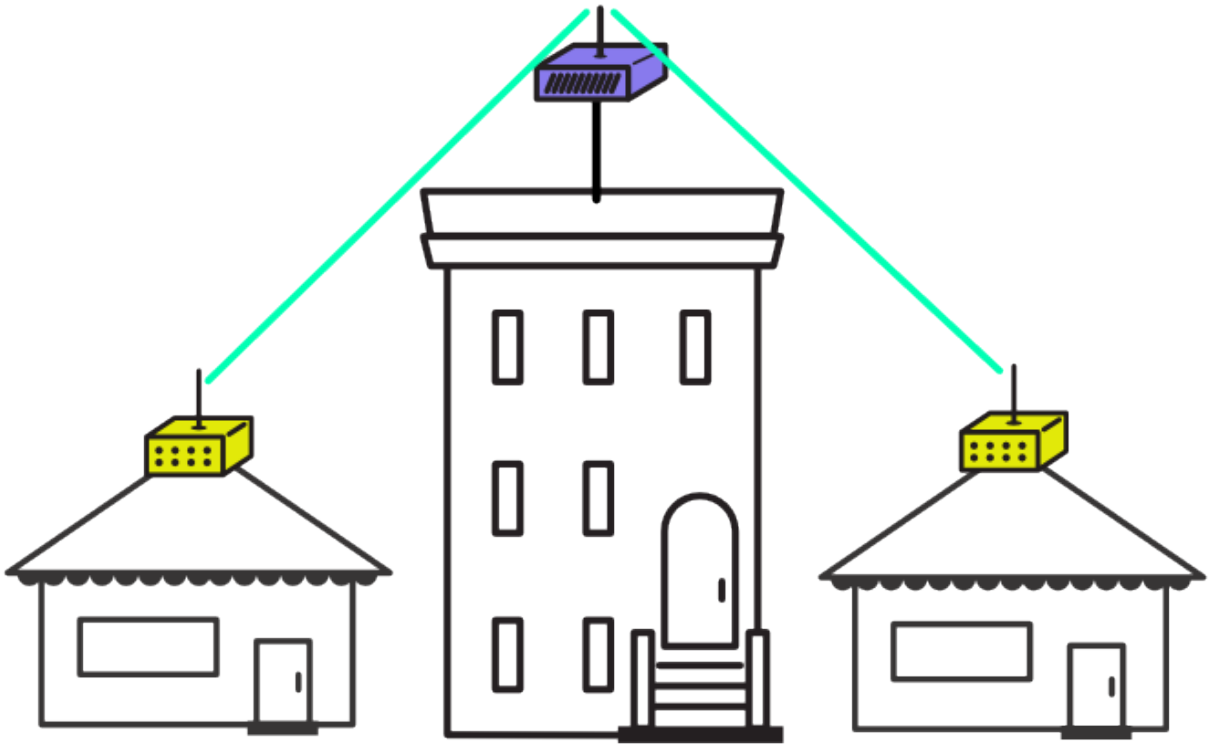
So, how do we use the flashcards to solve wireless challenges?

Creating line of sight

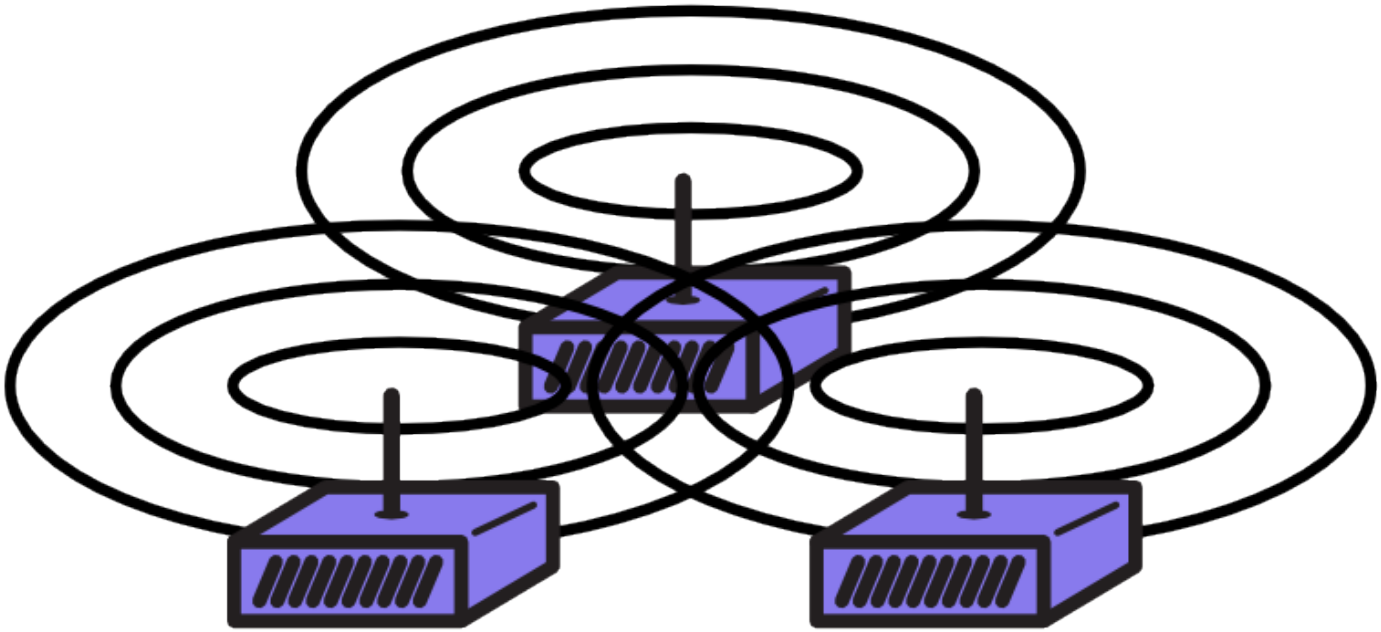


Creating line of sight

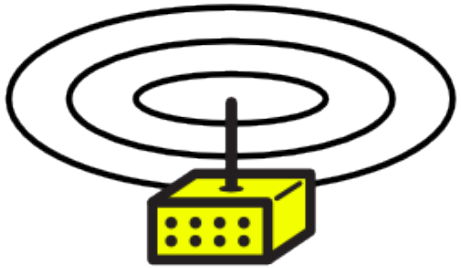


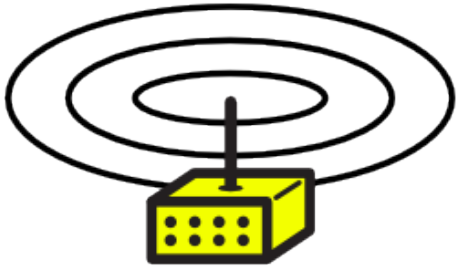
You can repeat the signal with another node.

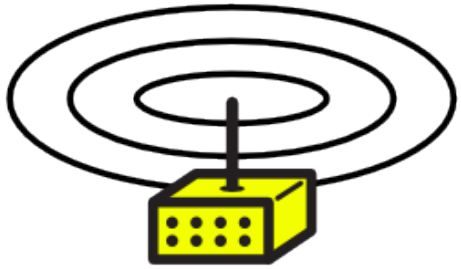
Reducing wireless noise



Reducing wireless noise

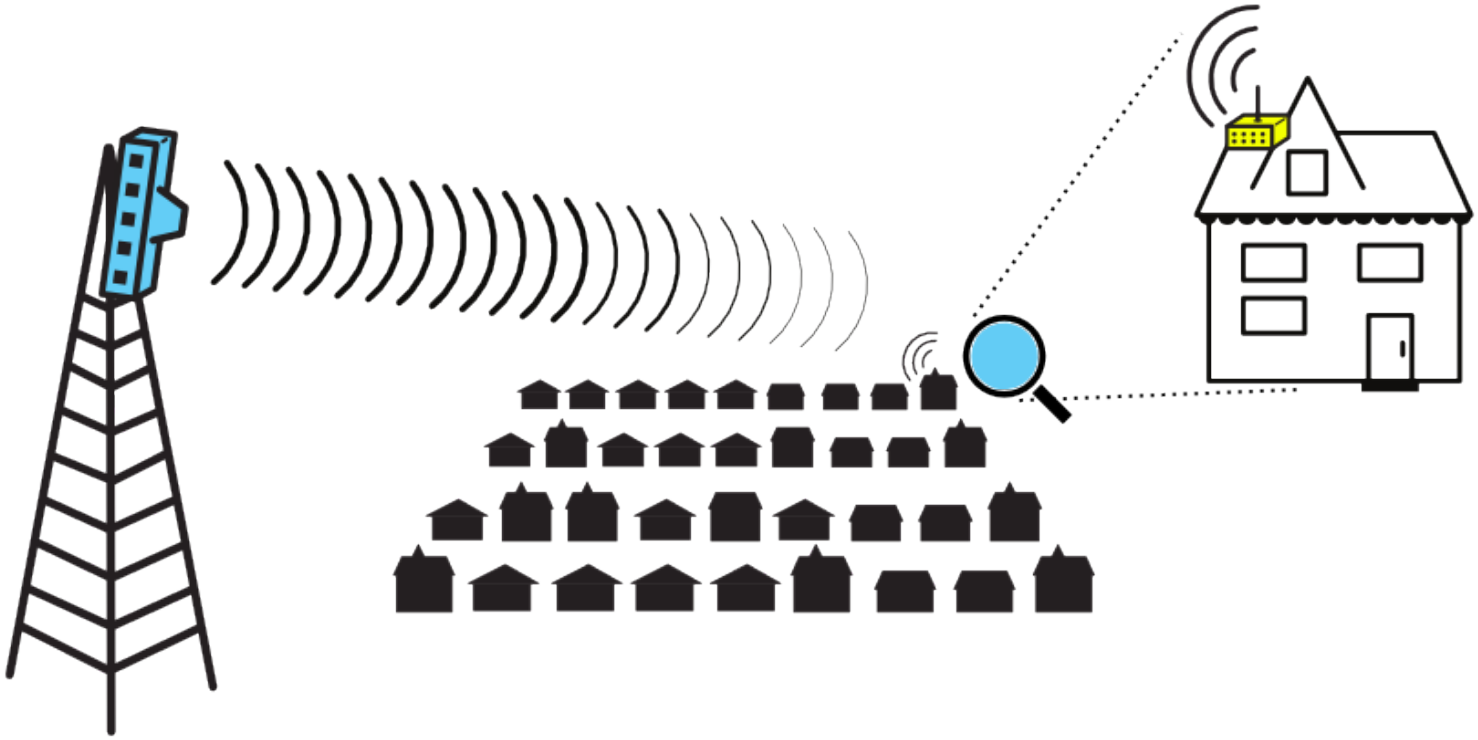




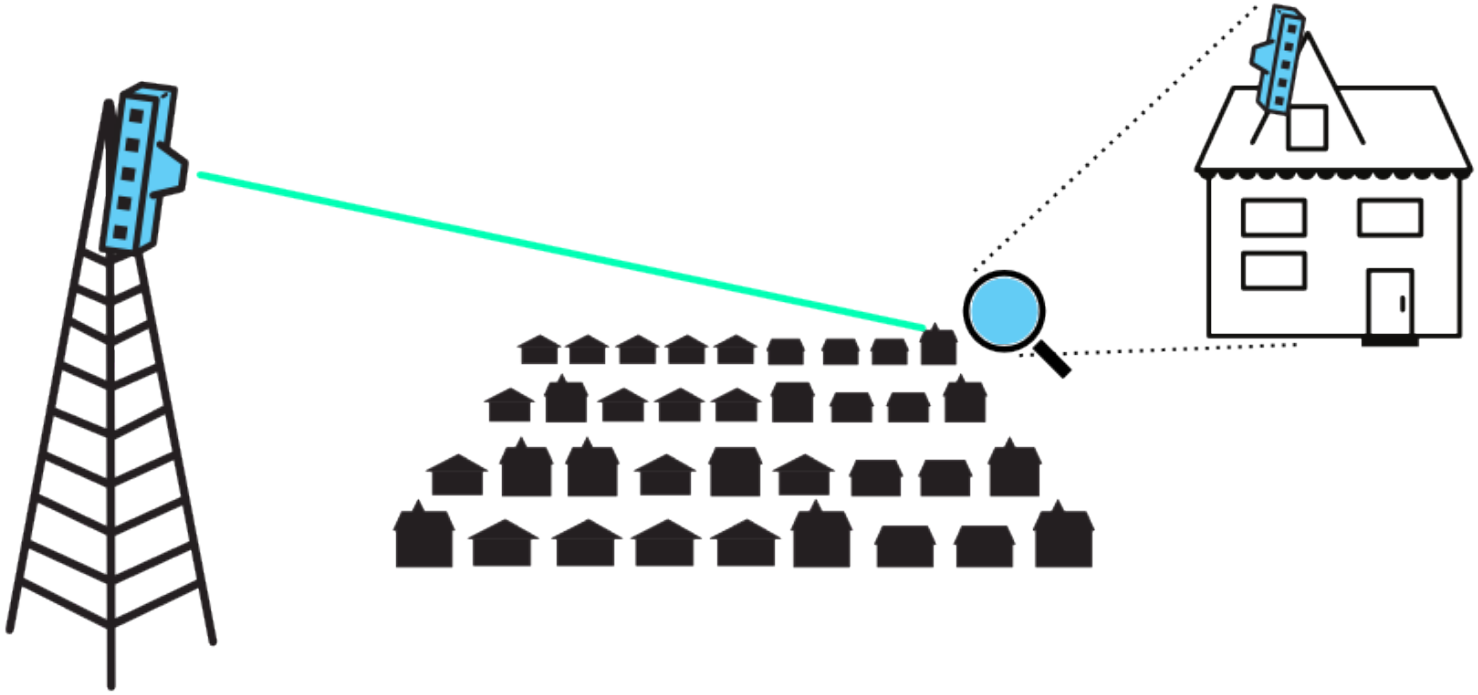


Give routers enough space and reasonable power, so the signals are not too loud.

Solving distance problems



Solving distance problems



With matched focused routers, we can achieve very long distance links.

Always consider the environment when you plan your network, but keep in mind other obstacles may come up while building the network:

+ Other sources of interference,
  such as microwave ovens
+ Vegetation and weather changing by season
+ Things you can’t predict!