



HOW DOES THE INTERNET REALLY WORK?



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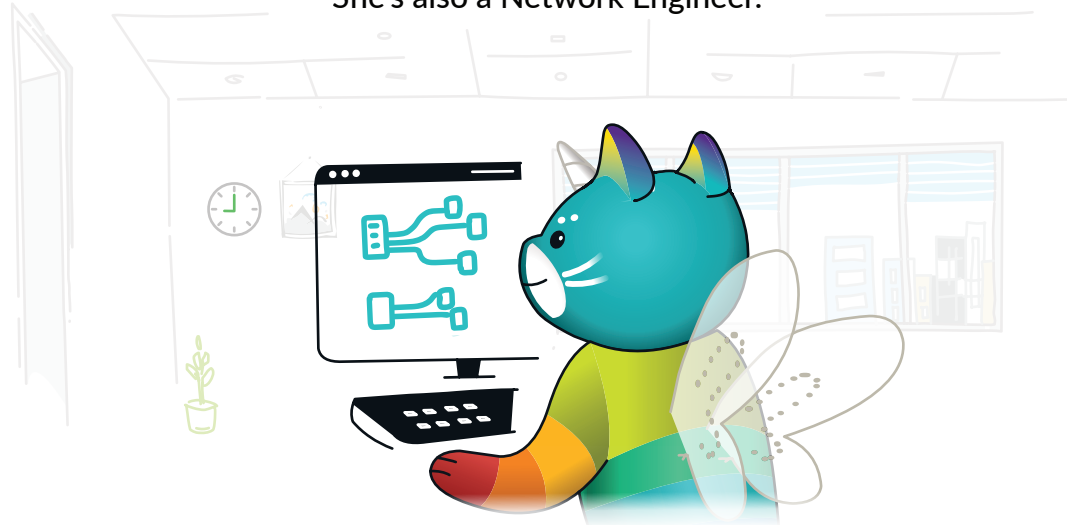


Meet J-Kitty.

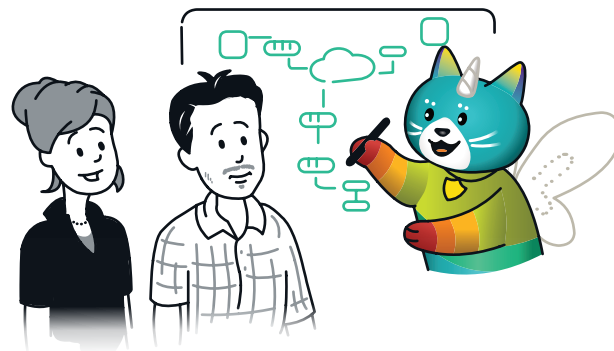


She's a magical, multicolored, flying, unicorn cat.
You know, like the kind you have at home.

She's also a Network Engineer.



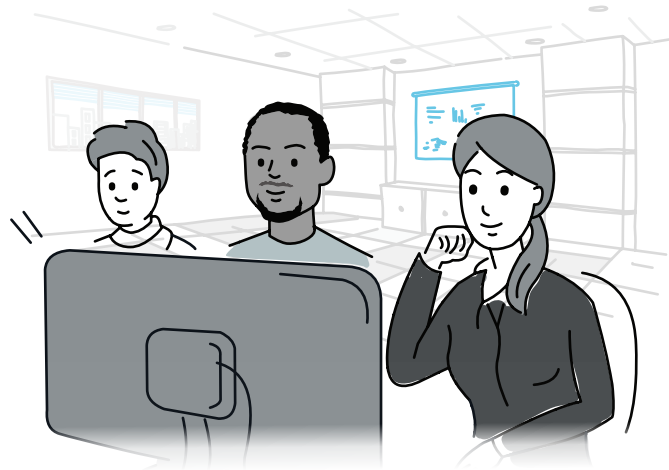
Network Engineers are the people who make the Internet work.



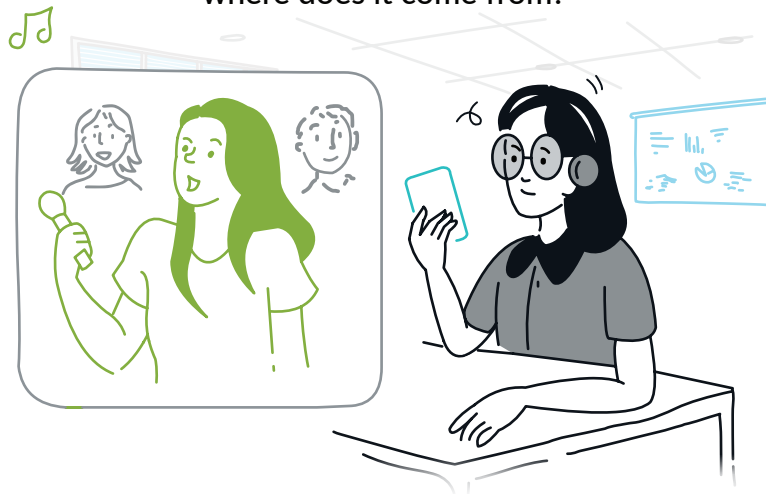
But wait—have you ever
stopped and wondered...
how does the
Internet work?



When you watch a video on your tablet...

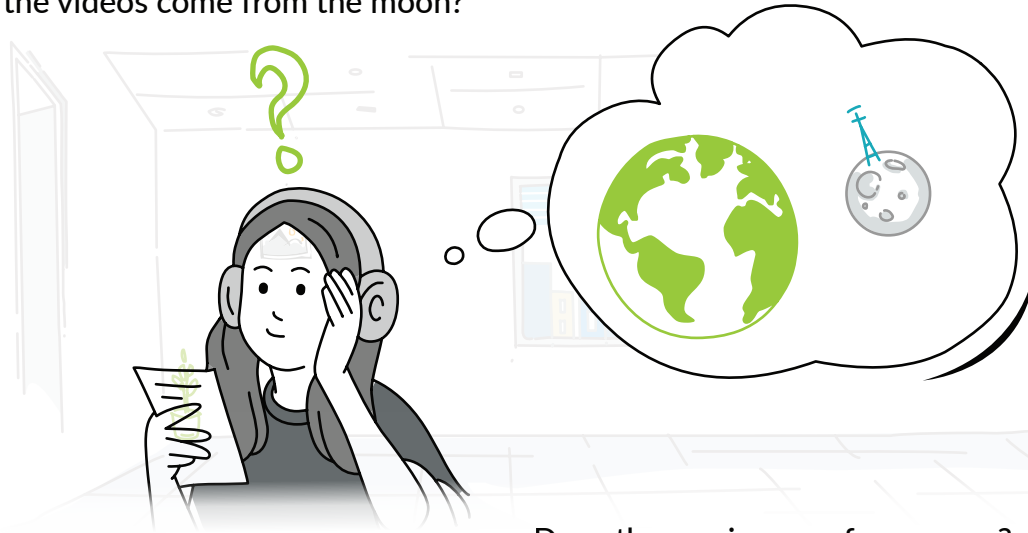


...or stream a song on your phone,
where does it come from?



How do these things get
to your device?

Do the videos come from the moon?



Does the music come from space?

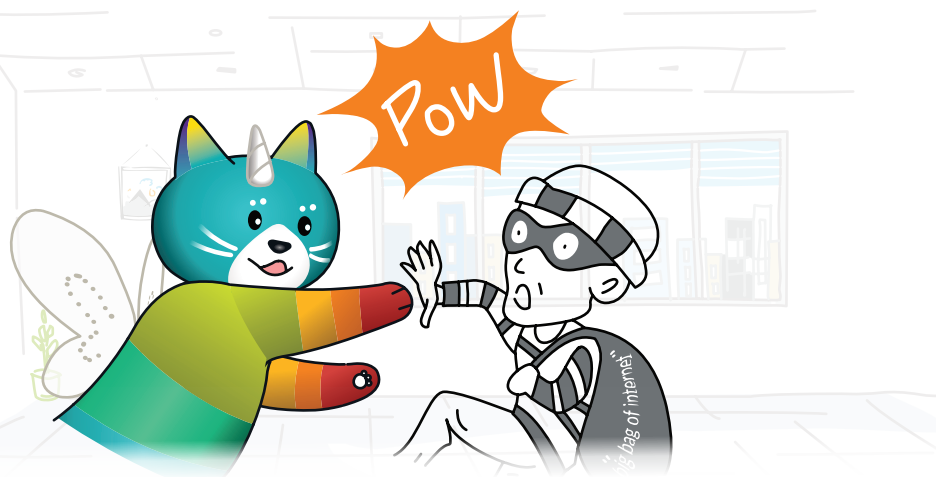
Maybe websites grow on trees, and are handpicked by farmers.



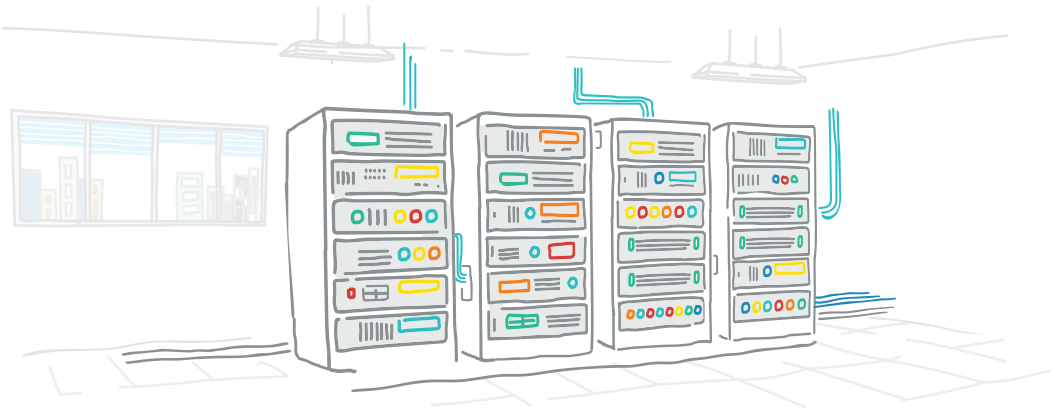
All that content must exist
somewhere, right?
But how do your phone and tablet
know where it all is?
It almost seems like magic!



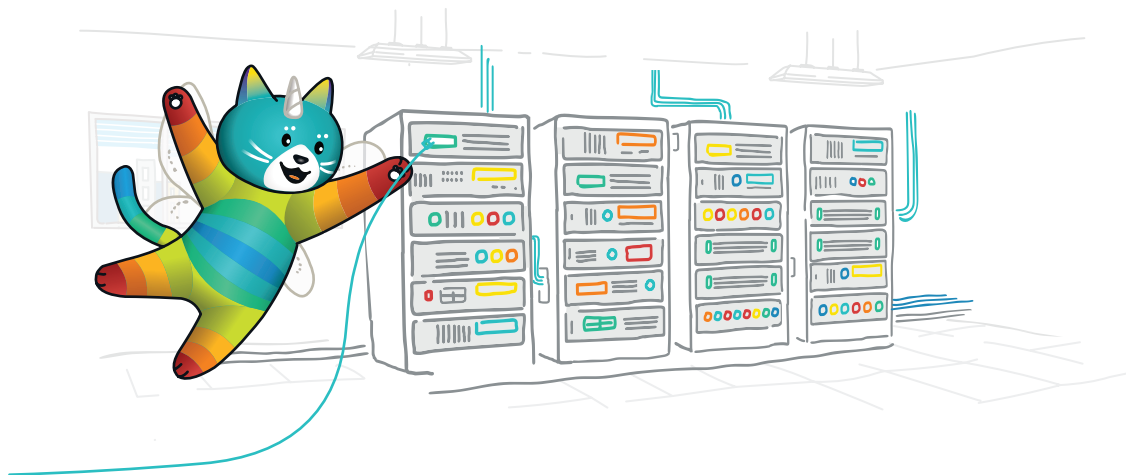
In fact, though, there's no
magic involved.



J-Kitty saves her magical powers for other things, like fighting crime.



The truth is that all the movies, music, videos, texts, and websites are stored in big buildings full of special computers called servers. They're like normal computers, but larger, louder, and way more powerful.



These buildings are called data centers, and they have many servers and the boxes that connect them together.

If you turn the lights off in a data center, these rows of flashing lights look like a spaceship!

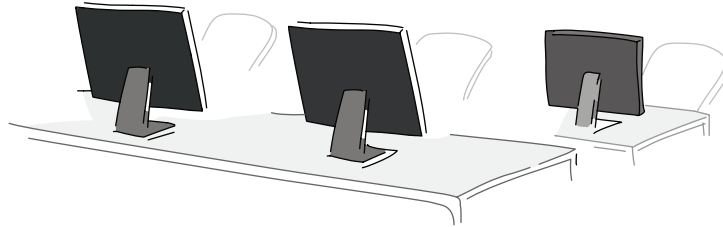


There's a rumor that J-Kitty gets her power from these glowing lights. But that's just a silly rumor. It's probably not real.



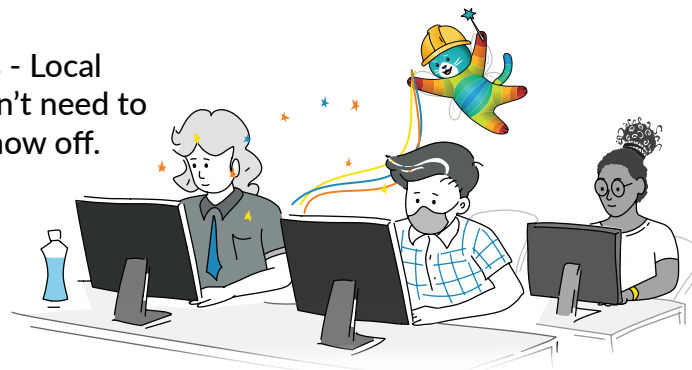
Anyway, some Network Engineers specialize in physically connecting all these servers together, and then connecting them to the Internet. It takes a lot of planning, but it's really satisfying when it works.

Okay, fine... but it's not like those servers are in your basement. How does your phone get to those servers?

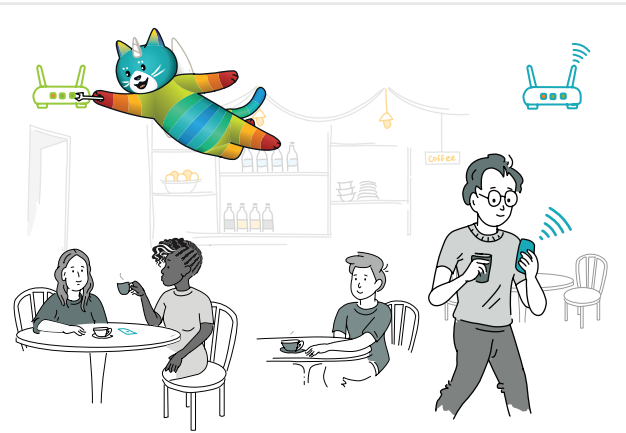
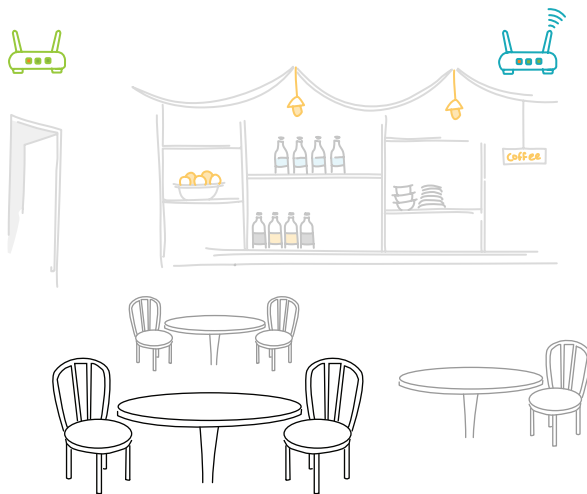


First, you need a local network, like in a school, a cafe, or an office.

Network Engineers call these LANs - Local Area Networks. Don't worry—you don't need to be able to fly. J-Kitty just likes to show off.

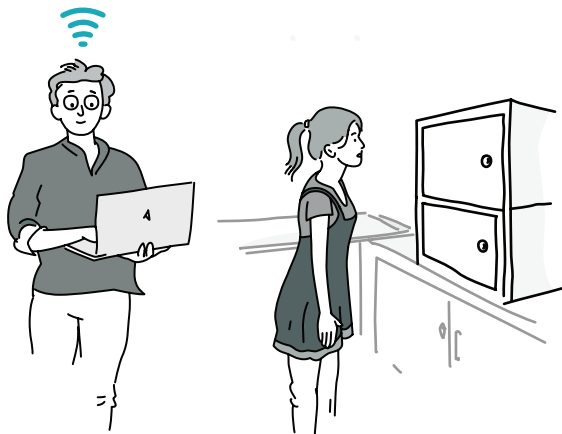


Many LANs are built with devices that connect with no wires at all!



Wi-Fi Engineers install "access points" so you can walk around a building, and always stay connected.

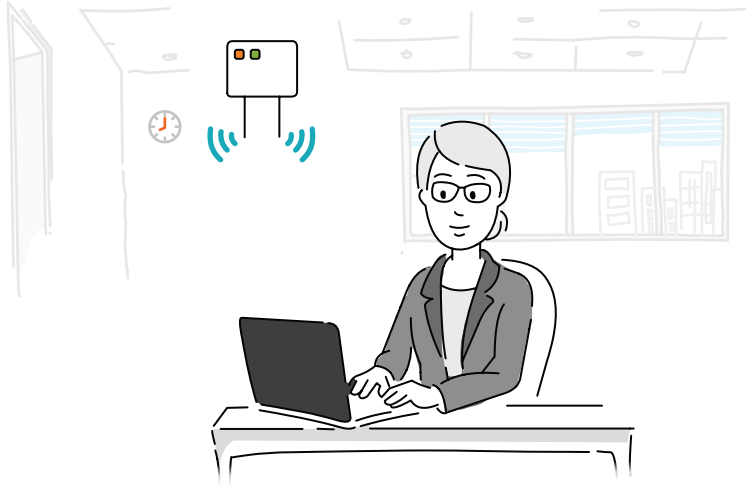
This takes a lot of careful planning, because the weirdest things can interfere with Wi-Fi.



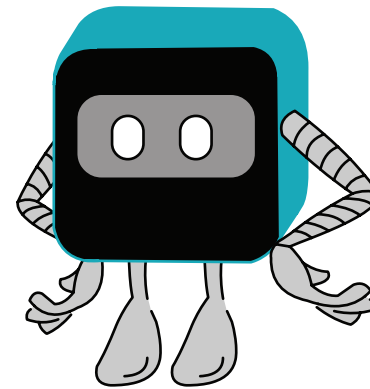
Even a microwave can break a Wi-Fi signal!



Some Wi-Fi networks are very basic.



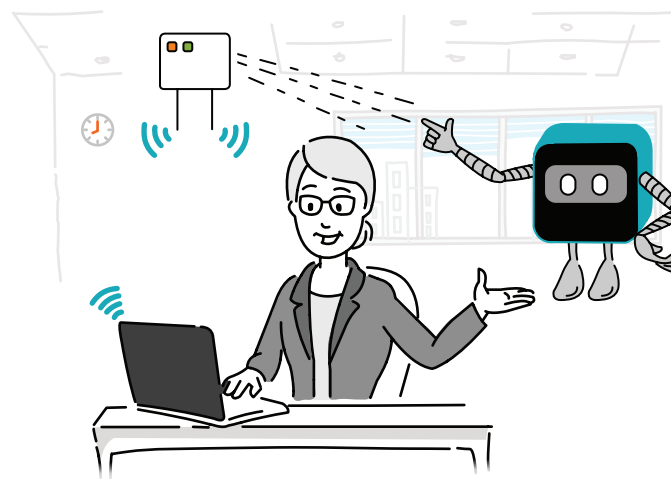
But, the most modern Wi-Fi networks have artificial intelligence.



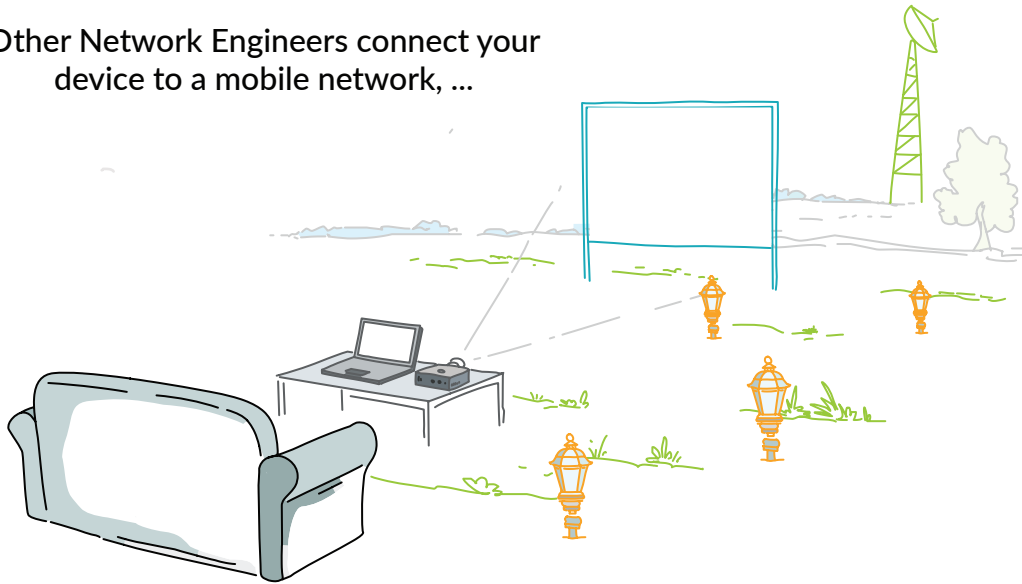
These networks can keep track of everyone's signal strength, where people move to, and how it affects their speed.



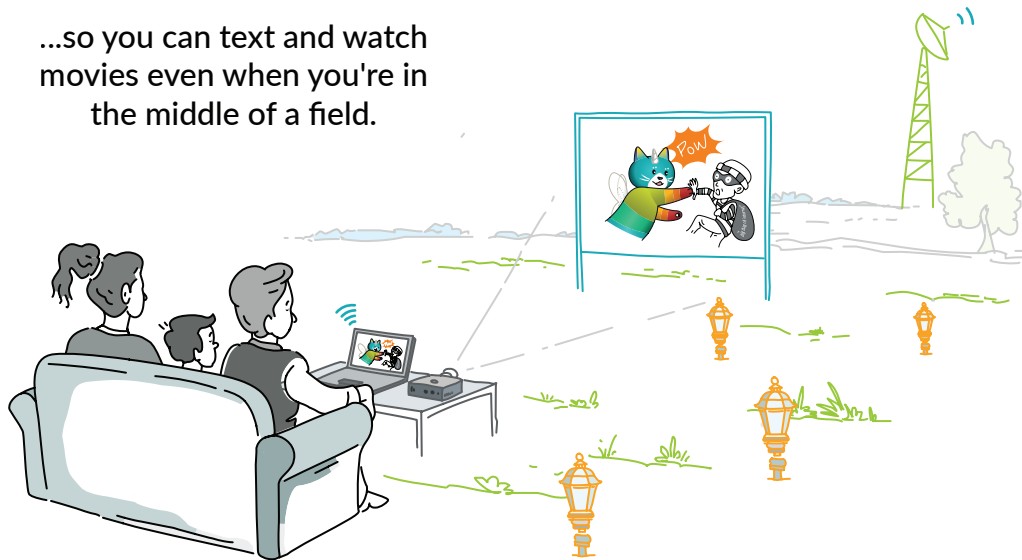
And if something goes wrong, the network fixes it—automatically!



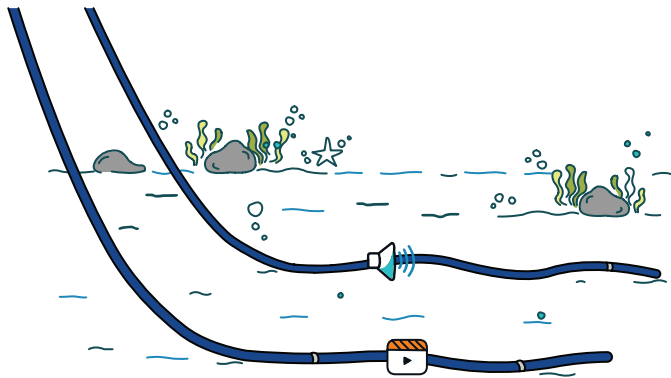
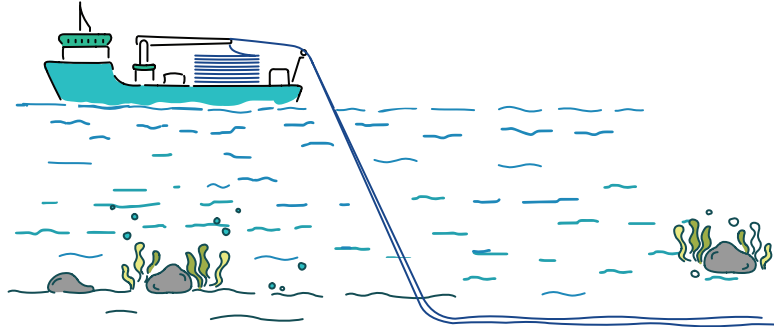
Other Network Engineers connect your device to a mobile network, ...



...so you can text and watch movies even when you're in the middle of a field.

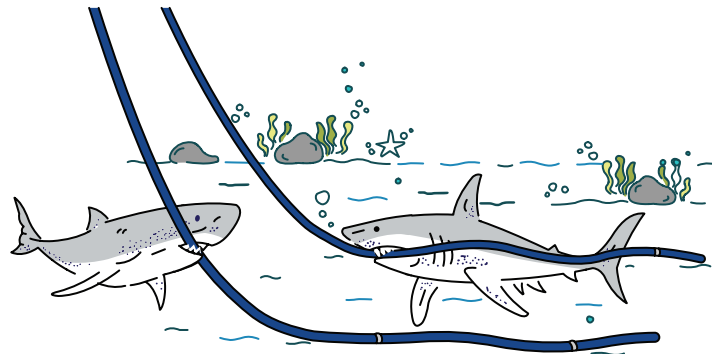


Some network engineers lay seriously long undersea cables that connect entire countries together.



The ocean floor is full of these cables.

Sharks REALLY enjoy munching on them.



And it doesn't stop there.
Ever wondered what's at
the other end of
your Internet connection?



Your phone line connects to an Internet provider,
but what happens then?



Your Internet provider connects to **OTHER**
Internet providers. The Internet is like a
network of networks.

When you connect to a website or a video,
you basically break out of your local network
to go to your Internet provider, who then goes
to the next Internet provider, and so on.
Your data goes through a lot of networks!



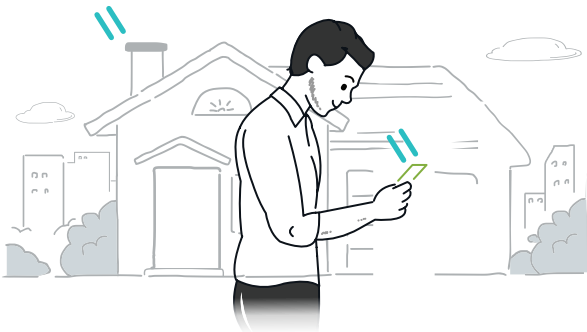
And, the **BILLIONS** of
machines on the Internet
can all talk to each other!



Pretty amazing!

But wait—how do all these machines talk to each other?

How does your Internet provider know where everything is?

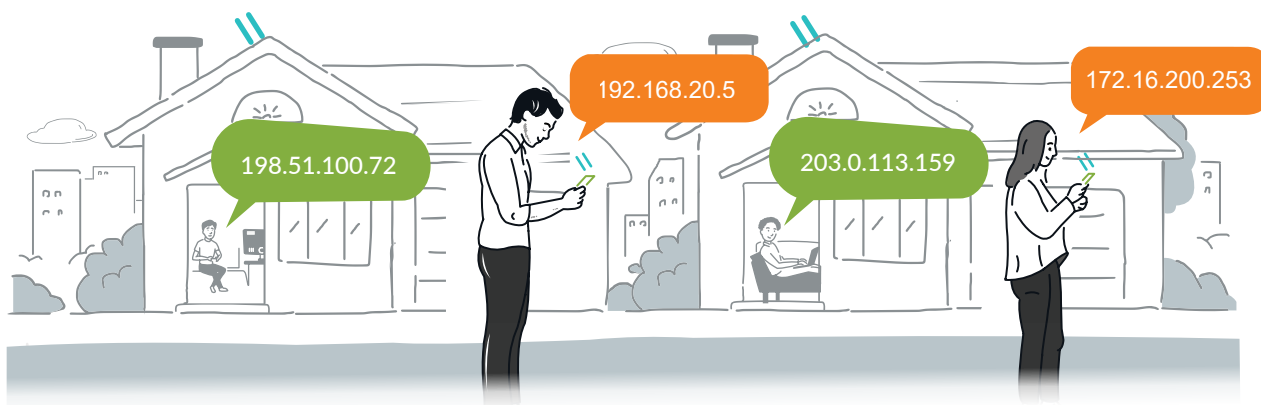


Here's the secret. You know how every house has an "address" for mail and packages?

No-4 Bo stree



Well, every single thing on the Internet—your computer, your phone, your game console, your TV—also has a special Internet address. They're called IP addresses, which stands for Internet Protocol.



The IP addresses are just long numbers, like this. Four numbers, separated by dots, each between 0 and 255. Maybe you've even seen one before, without knowing what it is.

198.51.100.72

203.0.113.159

192.168.20.5

172.16.200.253

Network Engineers do amazing things with IP addresses.

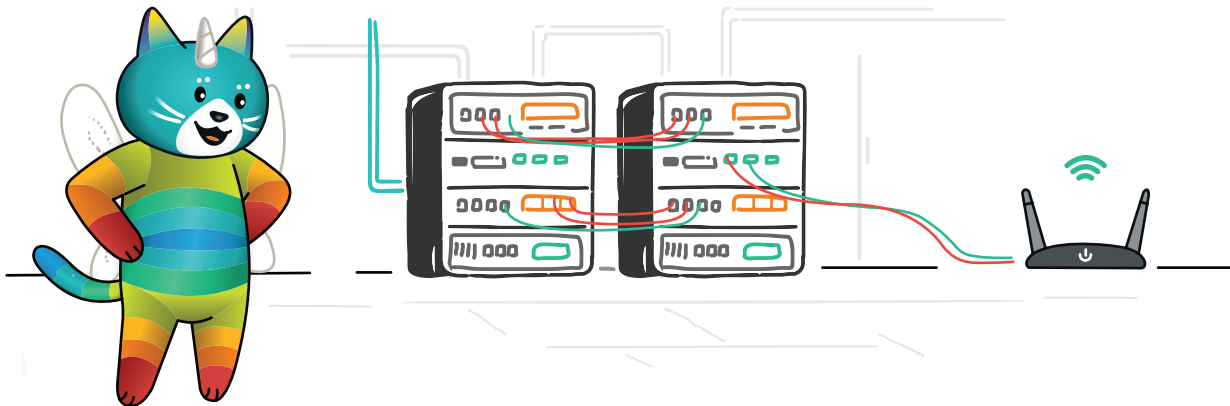


First of all, they make sure your computer gets an address automatically.

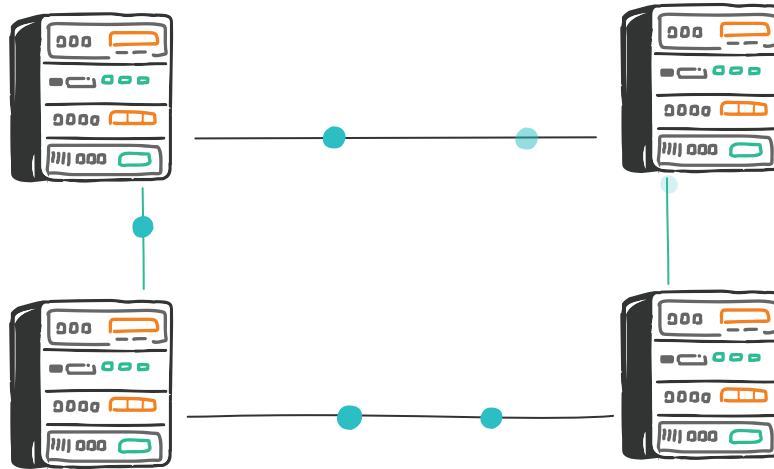
And, they help the network to learn where all the other IP addresses in the world are. That's billions of addresses!



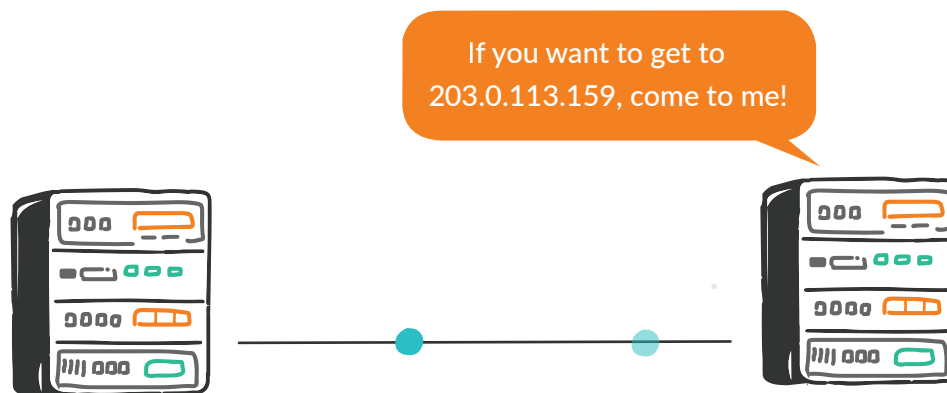
That's where routers come in. Routers are boxes that connect networks together, and learn how to get to different IPs. Routers are the boxes that power the Internet.



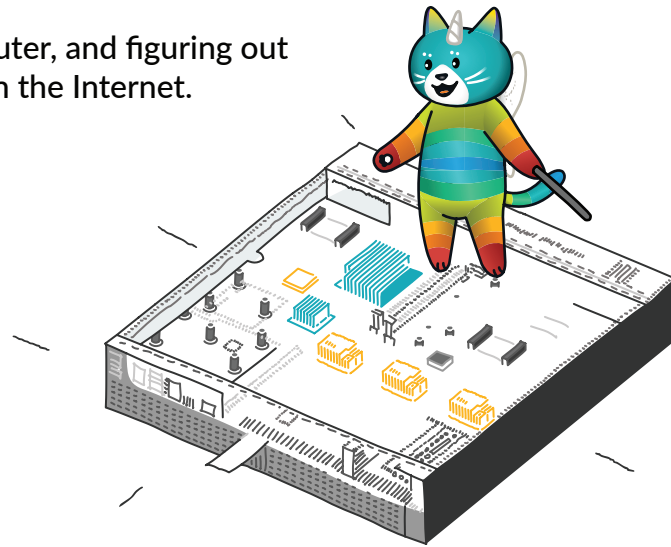
Network Engineers at your Internet provider use a "routing protocol" to get all their routers to "talk" to each other, and learn where everything is.



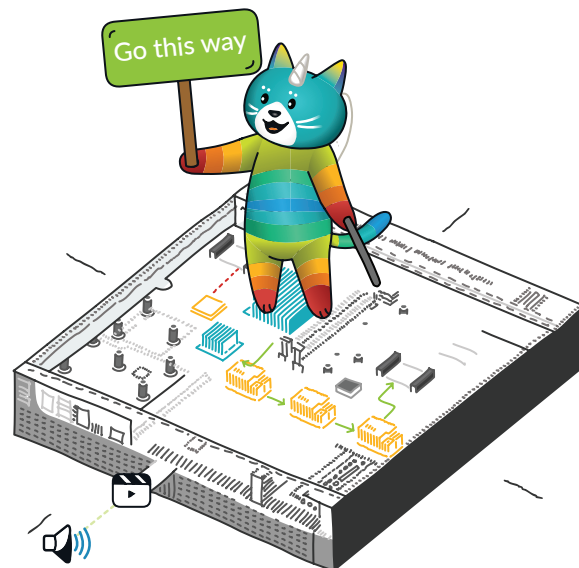
These protocols are like a language that only routers can speak. Protocols can help routers decide which is the best path to get what you want.



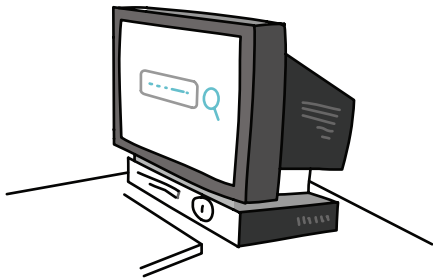
Imagine being inside an Internet router, and figuring out how to get to everything on the Internet.



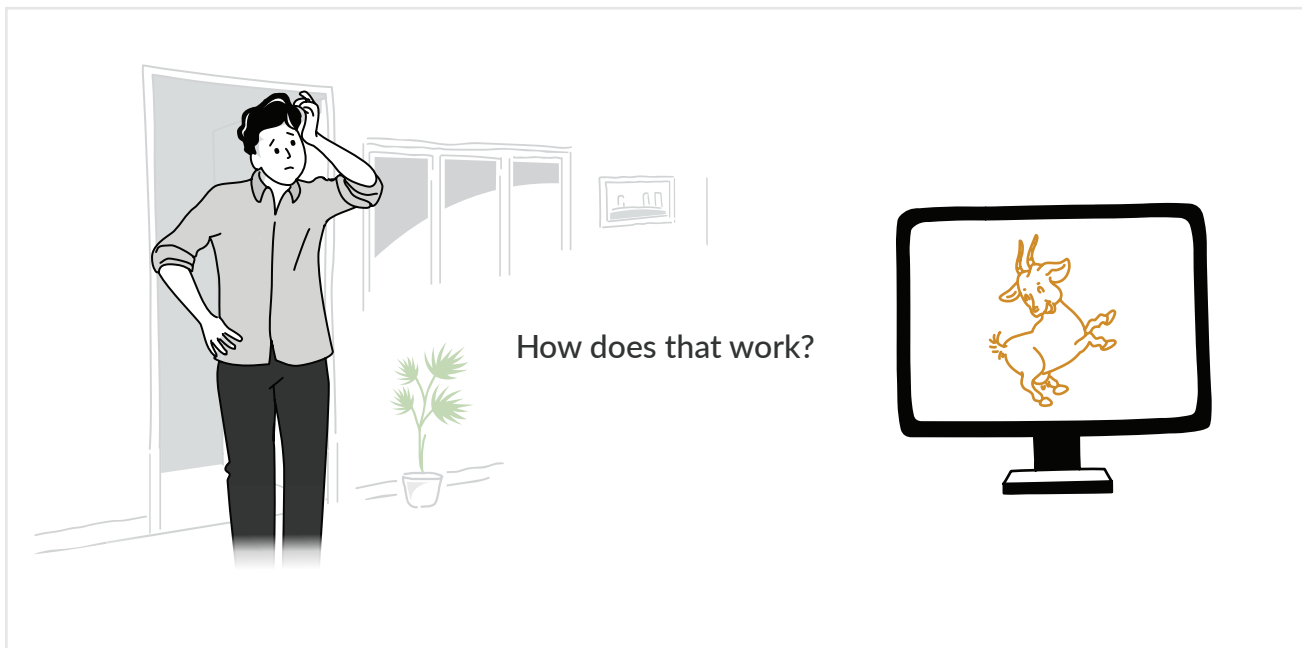
When you control which way people get to different websites, it's like you control the Internet!



But wait—when you go to a website, you don't type an IP address.



You type a website name—something like GreatGoatVideos.com
(You know, popular websites like that.)



Behind the scenes, there's a BIG list of website names and their IP addresses.

It's called
DNS - Domain Name System.

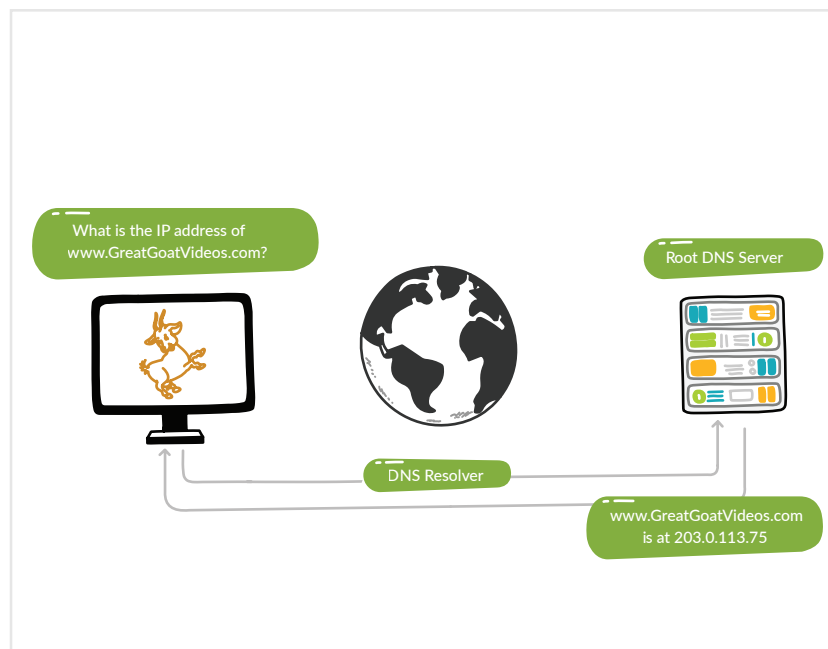
IP ADDRESS	DOMAIN NAME
198.0.2.0	greatgoatvideos.com
198.51.100.0	bestgoatfails.com
203.0.113.0	example.com
192.0.2.1	example.net

There are DNS servers all over the world, which all work together to make sure you can visit any goat-based website whenever you like.

(And also other websites too, I guess.)



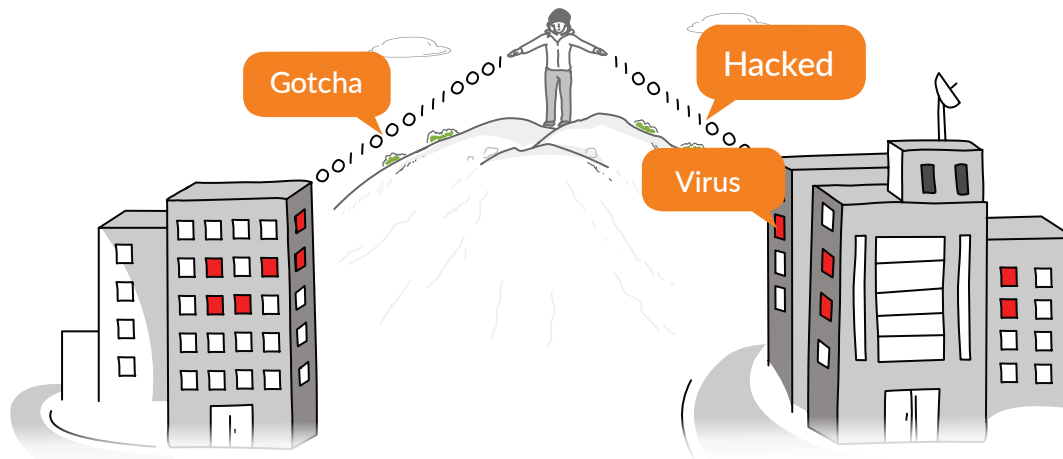
Some engineers specialize in running this big network of DNS servers.



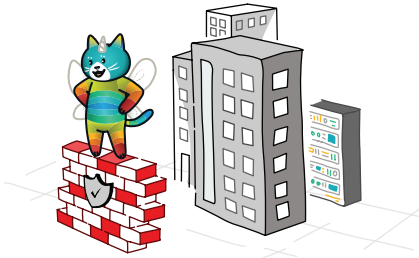
But it doesn't stop there—networks are always under attack from hackers and criminals. Sometimes, a network will be attacked on purpose.



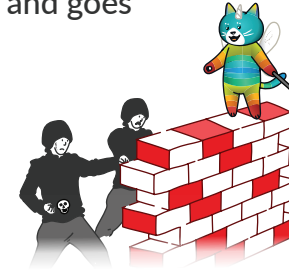
Other times, criminals attack random networks just to see which ones they can get into.



That's where network security engineers step in.



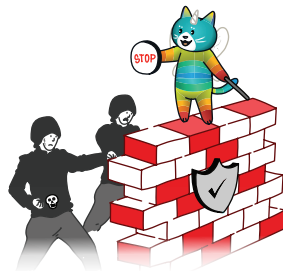
These heroes use powerful tools to stop hackers. For example, firewalls control what comes in and goes out of the network.



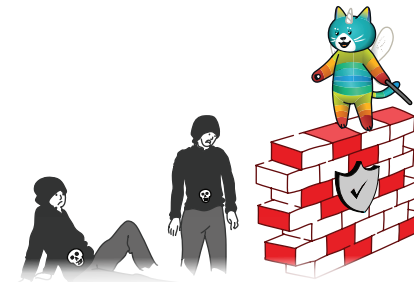
And, network security software can identify viruses, block bad websites, and stop an infected user from taking down the rest of the network.



Security network engineers are the people who keep you safe when you're online.



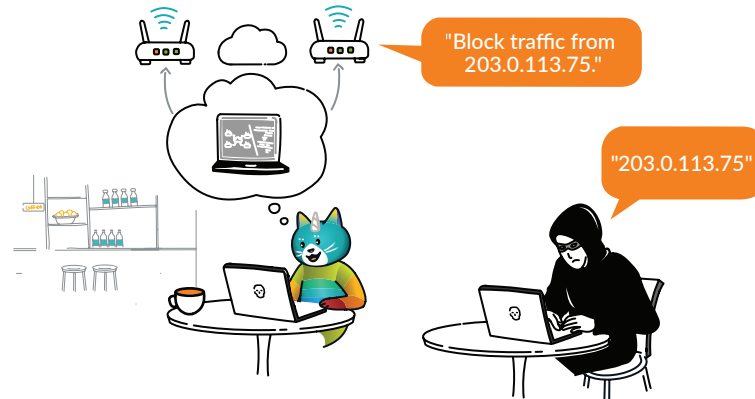
It takes a lot of work to beat the bad guys—but it's a great feeling when you do!



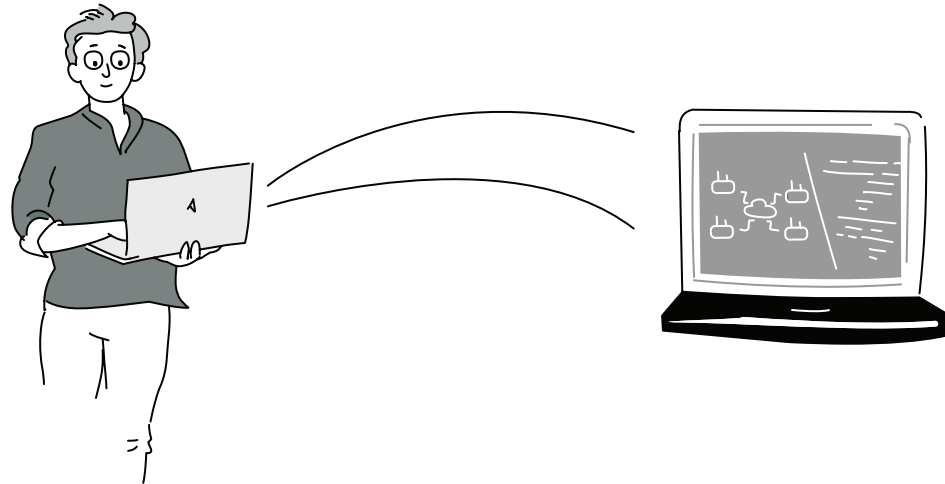
And there's more—some Network Engineers specialize in using code to automate everything.



They combine networking knowledge with programming to do things that would take a human weeks to do.



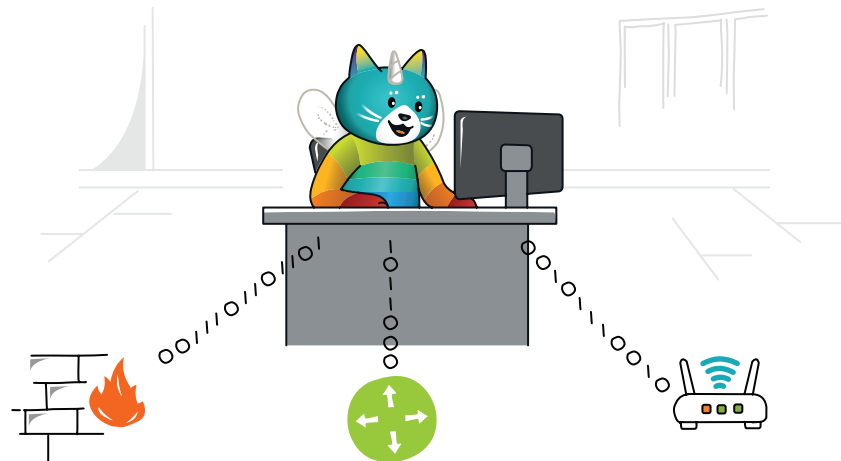
Network Automation Engineers can set up ten thousand routers, in a matter of seconds!



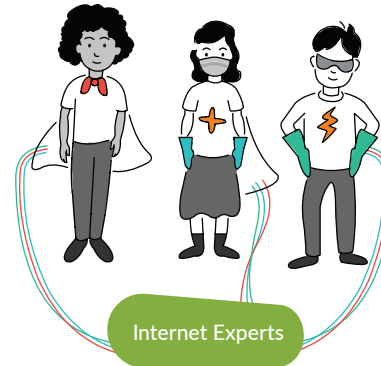
Some of these engineers even write the software that runs the routers, firewalls, Wi-Fi, and artificial intelligence that keeps the Internet working.



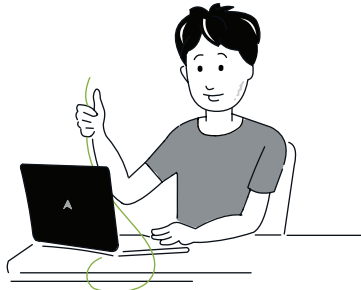
Writing code is one of the most creative and artistic things you can do in tech. Combine it with networking, and you can do anything!



There's so much going on behind the scenes of the Internet. And here's the cool thing—none of it is a secret. It's in your power to learn and master every single bit of it!



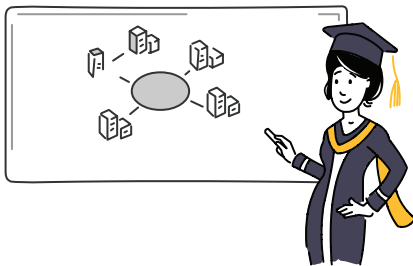
Whether you like getting out and about, being hands-on and building things...



...or if you like sitting in a cafe writing code...



...or if you like designing cool things...



...or even if you like the idea of being the protector and guardian of Internet security.

There are so many different, fun, important, and creative things you can do in networking.

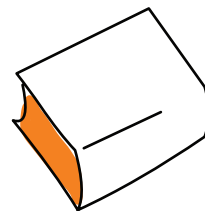


At Juniper Networks, we make these very same devices and the software that powers the Internet.

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