Ohio OARnet

How Do Networks Work?

activity book for kids of all ages

About OARnet

OARnet connects a diverse range of Ohio institutions—including higher education and K–12, research, health care, libraries, public broadcasting, emergency services, and government—to the digital world through its extensive, 5,500–mile, ultra–high–speed, fiber–optic network and secure, cost–effective technology services.

Through investments in cutting–edge innovations and the formation of public–private partnerships, OARnet helps Ohio remain technologically competitive, while enabling research, accelerating economic development, and supporting the next–generation workforce.

OARnet, founded in 1987, is a member of the Ohio Technology Consortium (OH–TECH), the technology and information division of the Ohio Department of Higher Education.

Credits

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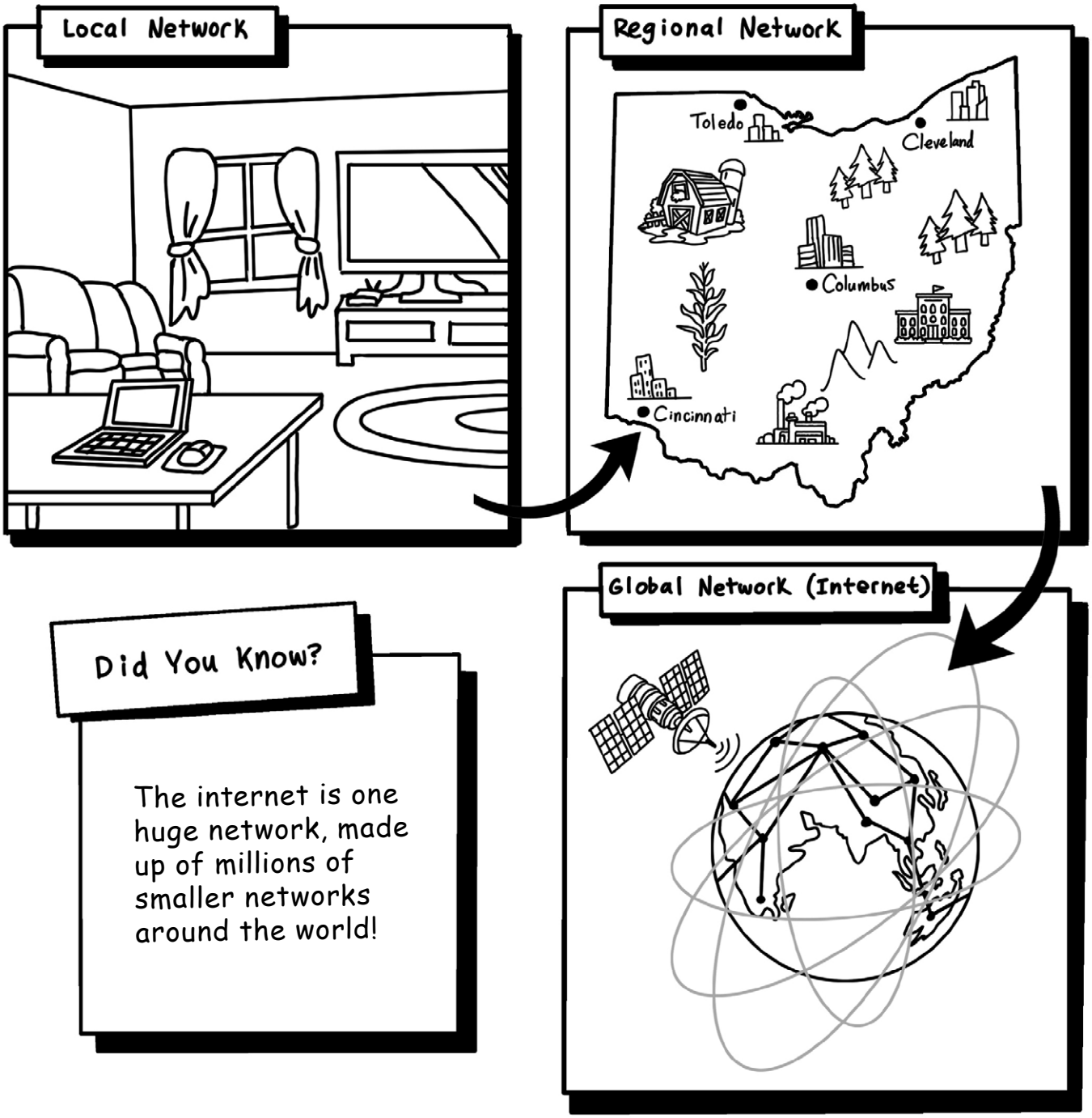
What is a Network?

A network lets digital devices—your phone, tablet, personal computer, or laptop—share information whether you're at home, school, or anywhere else. It allows you to quickly and easily stream videos, send messages, and play online games.



Did You Know?

The internet is one huge network, made up of millions of smaller networks around the world!

Traveling the Network Highway

Information moves across a network in small pieces called **packets** like cars on a highway, each carrying part of your file to its destination. When they all arrive, your computer puts them together, piece by piece.

Color each square to see how lots of small parts create a full picture—just like how packets of data make a file!

1 = Green 2 = Red 3 = Black 4 = Orange 5 = Yellow 6 = Blue

6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
6	6	6	6	6	6	6	6	6	5	5	5	6	6	6
6	2	2	2	6	6	6	6	5	5	5	5	5	6	6
2	2	2	2	4	4	6	6	5	5	5	5	5	6	6
6	2	2	3	6	6	6	6	6	5	5	5	6	6	6
6	2	2	2	3	6	6	6	6	6	6	6	6	6	6
6	2	2	2	2	3	6	6	6	6	6	6	6	6	6
6	2	2	2	3	3	3	6	6	6	6	6	6	6	6
6	2	2	3	3	3	3	3	6	6	6	6	6	6	6
6	6	2	2	2	3	3	3	3	6	6	6	1	6	1
6	6	6	2	3	2	2	3	3	6	6	1	1	1	1
1	6	3	3	3	6	3	2	2	2	6	6	1	1	1
1	1	3	6	6	1	3	1	2	2	1	6	1	1	1
1	1	6	6	6	3	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

What do the packets in this file add up to? _____

Information Highway Helpers

Along the network, various technologies help data packets travel to the right destination:

Switches connect devices within a local network and send data to the right device.

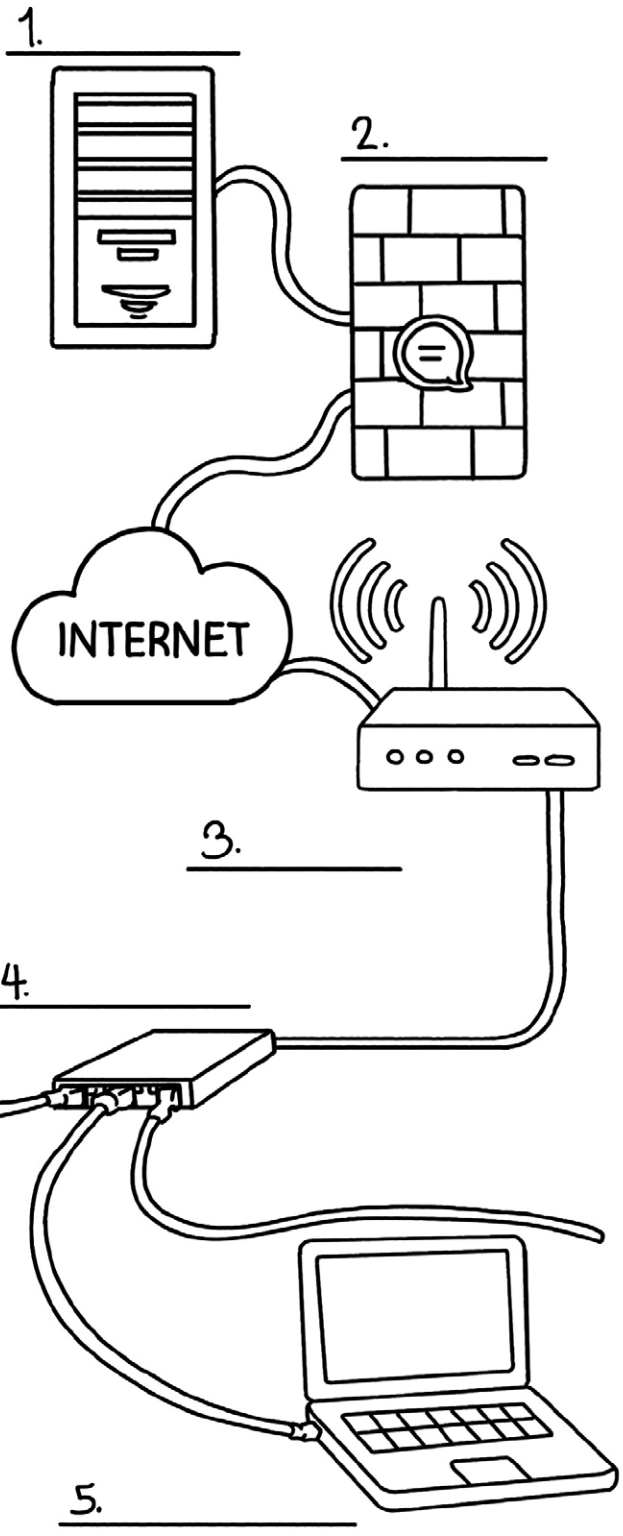
Routers help data move between different networks by sending packets to the next network on their path.

Firewalls are security tools that check network traffic and block data that could be harmful.

Servers store vast amounts of information and provide it when requested.

Endpoints are devices people interact with to access a network.

Fill in the blank!
Each blank is one of the technologies listed!



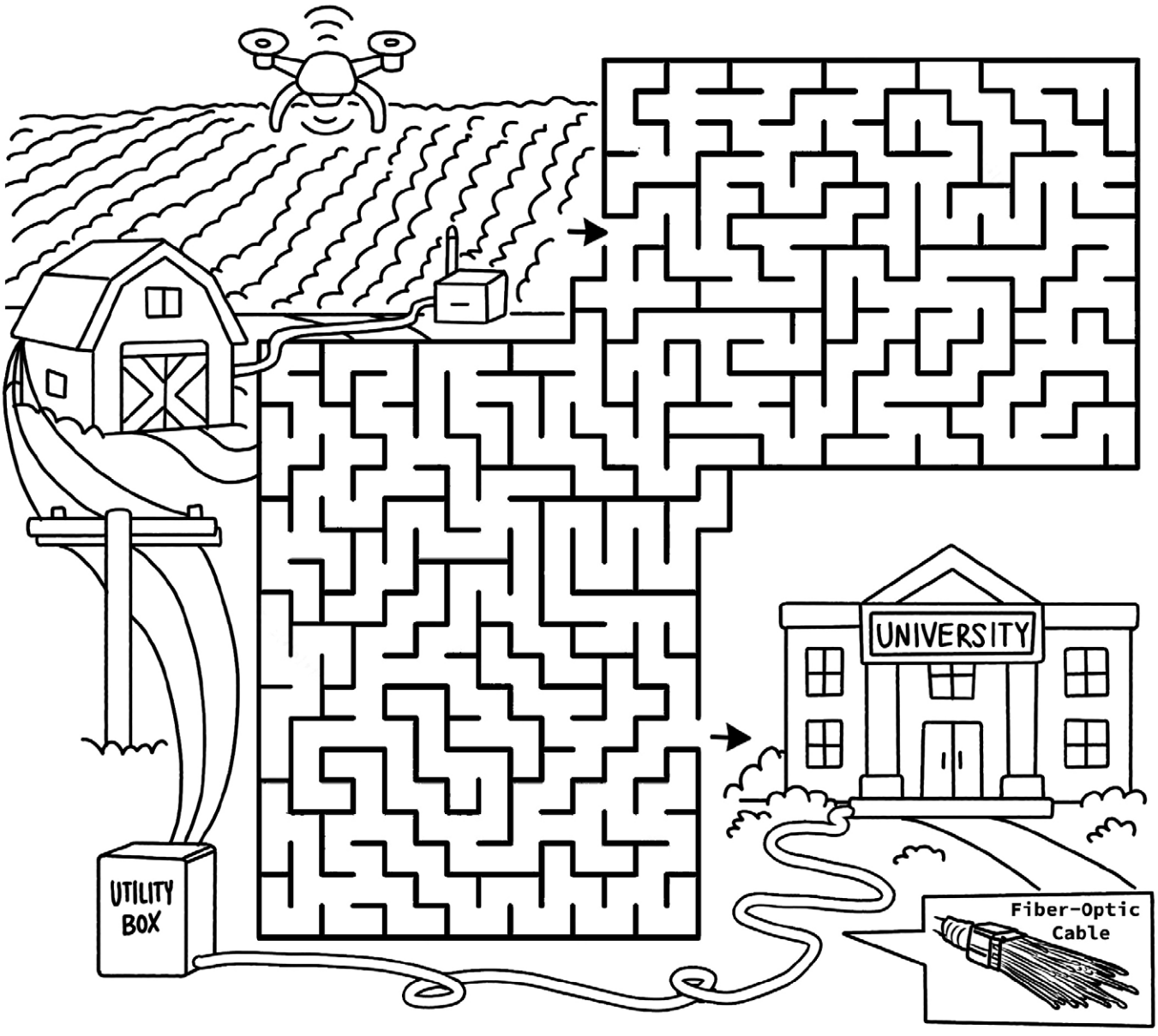
Did You Know?

Every device on a network has an **Internet Protocol (IP) address** that helps packets get to the correct destination, like a street address helps mail get to your home.

The Right Connections

The network transports data using **fiber-optic cables**. These cables are made of tiny glass strands, and they use flashes of light to send messages super fast from one location to another. To reach your computers, phones, and other devices, fiber-optic cable connects to copper transmission lines close to your home, where **Ethernet** cables and **Wi-Fi** then deliver the information directly to you.

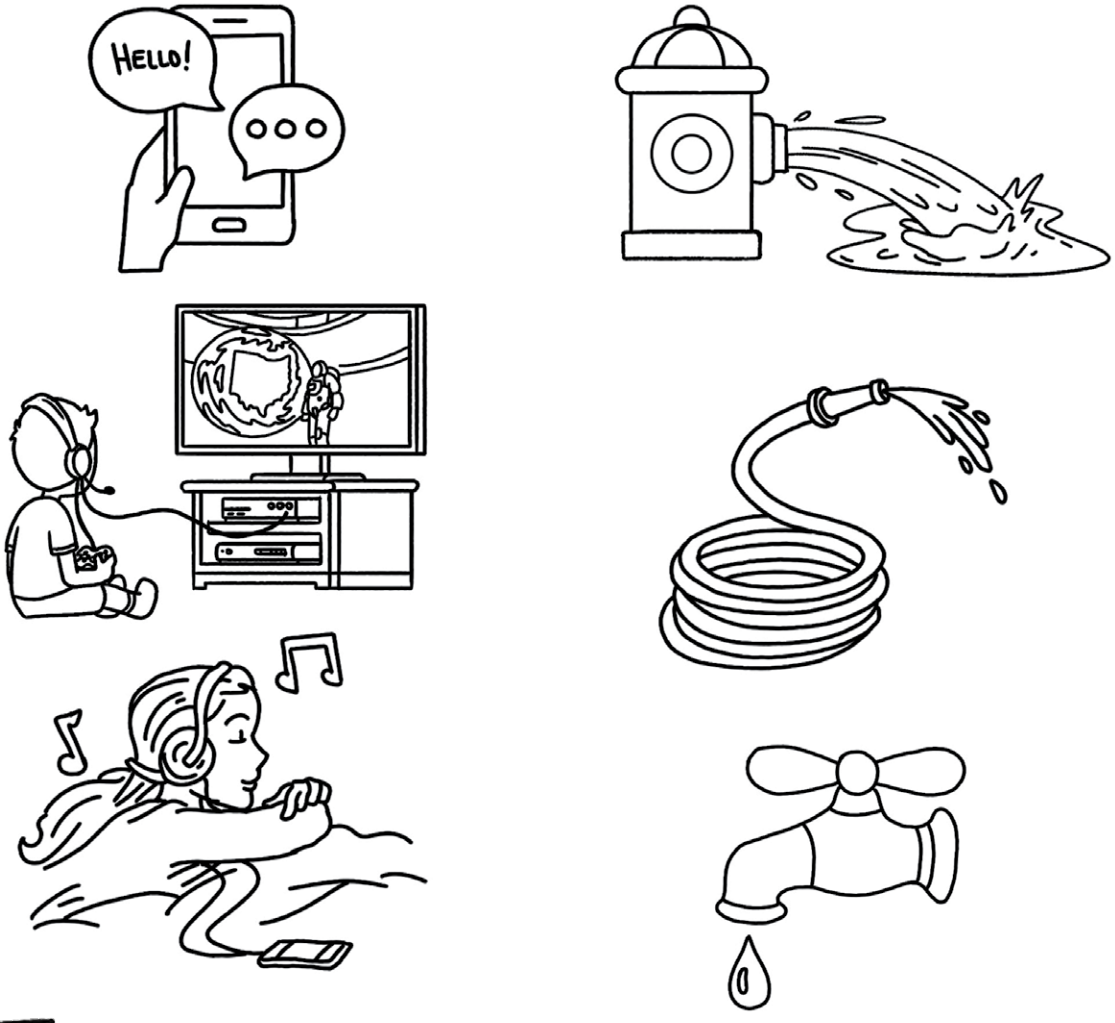
This drone is collecting important agricultural research data. Complete the maze to navigate the data from the farm through the network to the university lab for analysis!



All About Bandwidth

As more people use technology—from smart speakers and phones to laptops and streaming devices—to engage in activities online, the network must have enough bandwidth to deliver all of that data. **Bandwidth** is the capacity for the network to transmit data per second. Different digital activities require different levels of bandwidth.

You can think of bandwidth like the amount of water flowing through a pipe. Draw lines to match the digital activity on the left to the amount of bandwidth it needs on the right!



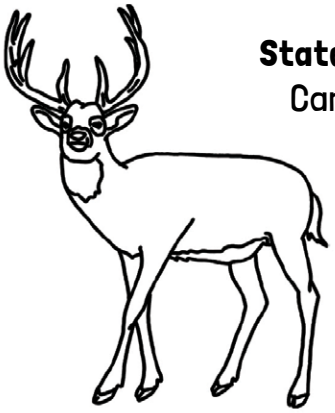
Did You Know?

Speaking of video games, did you know that you can explore all of Ohio's colleges, universities, and technical centers in an online game? Go to **highered.ohio.gov/universe** to discover Ohio's Universe of Opportunity!

Ohio's Own Network: OARnet

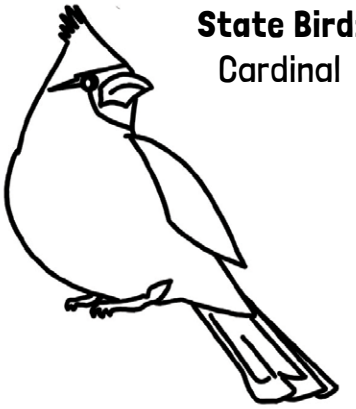
Ohio has its own special network called **OARnet**, a superfast system built on fiber-optic cable, with branches reaching every corner of the state. Engineers and technology specialists ensure that the network provides great service to the people of Ohio every second of every day.

Color the state and state symbols!



State Mammal:
White-tailed deer

State Flower:
Carnation

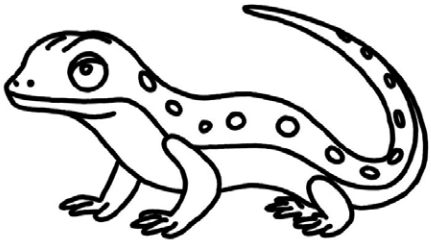


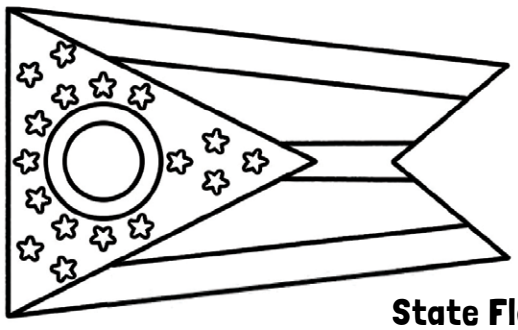
State Bird:
Cardinal

OARnet

State Tree:
Buckeye tree

State Amphibian:
Spotted salamander





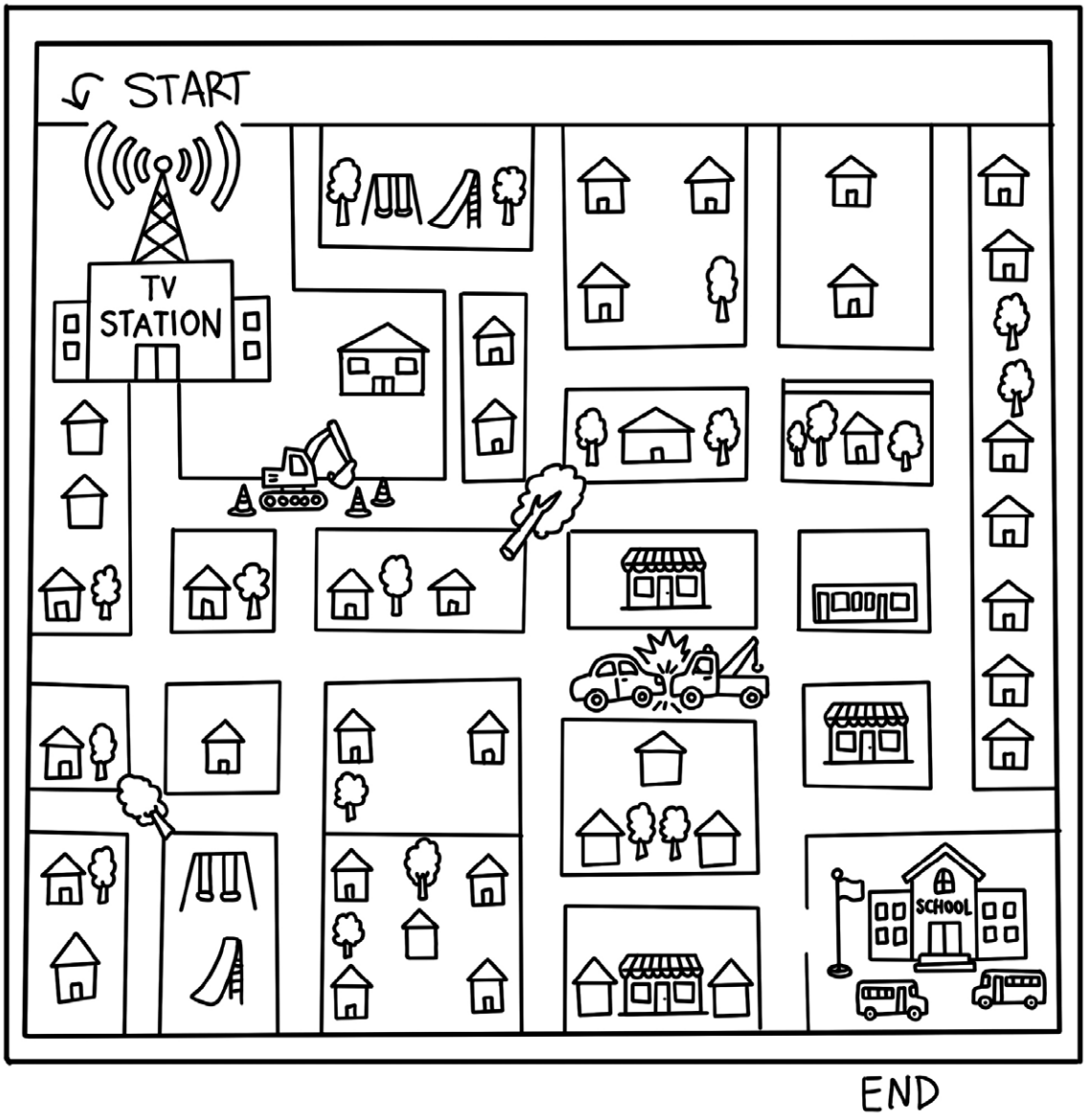
State Flag:
Ohio Burgee

State Network:
OARnet

Miles of Information

OARnet's network spans an impressive 5,500 miles. Laid end to end, that would reach from Boston to San Francisco and back! Whether you live in Toledo or Cleveland, Marietta or Marion, Cincinnati or Columbus, this fiber-optic structure is nearby, delivering bandwidth to the public services you depend on. The technical experts at OARnet even built in extra networking paths—what is known as **strategic redundancy**—to ensure that the network is always operating.

Oh no! The primary route for data getting from the TV station to the school is under maintenance. Good thing this network has backup paths. Can you find an alternative route to make sure the school can get its data?



Who Does OARnet Serve?

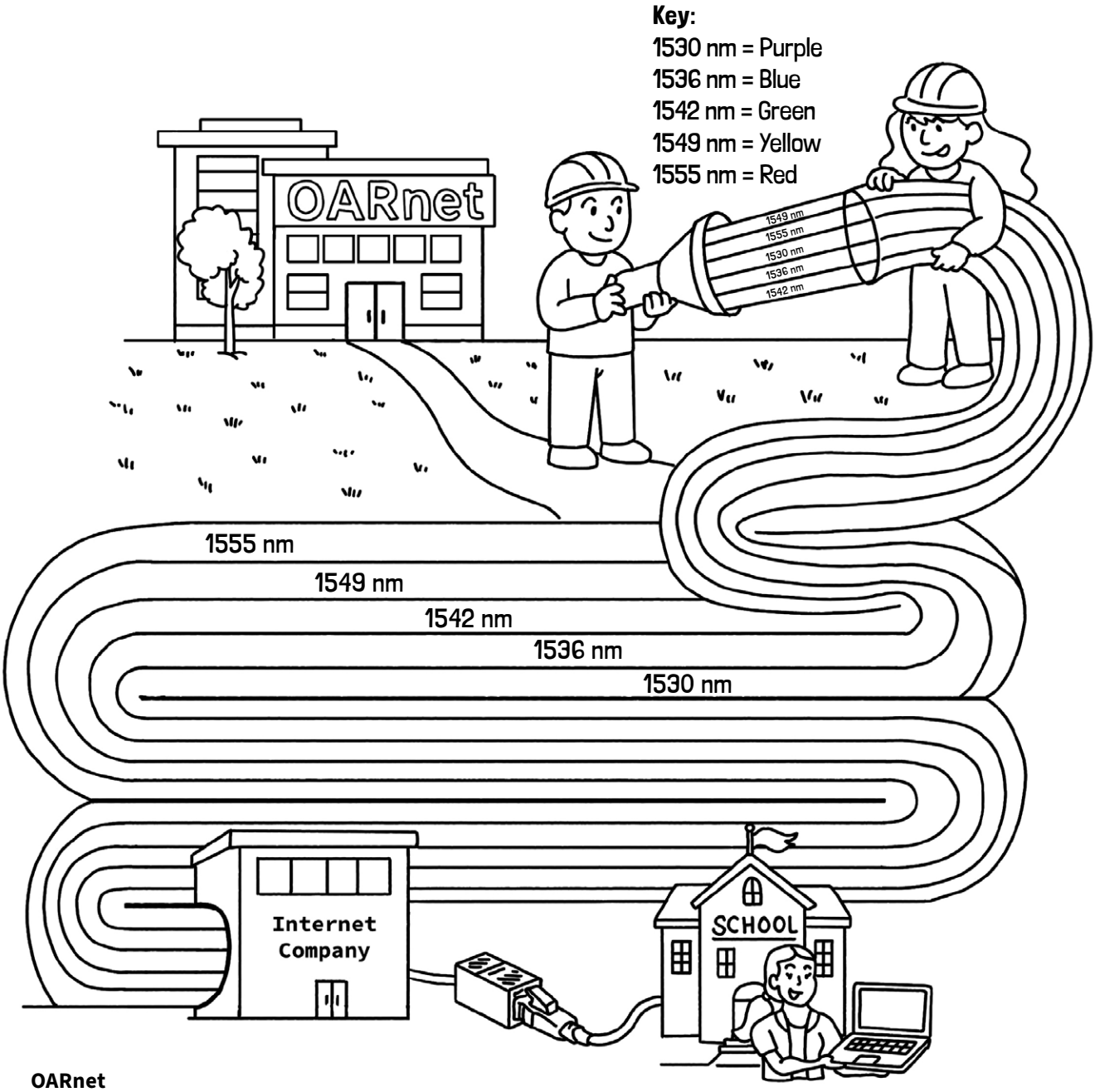
A huge variety of **organizations and people** across Ohio are part of OARnet: schools and universities, local and state government agencies, hospitals, libraries, research labs, public radio and television stations, and emergency responders. Every Ohioan benefits from the network's high-speed internet and other important technology services.

Color this town and its residents in Ohio!

The Power of Teamwork

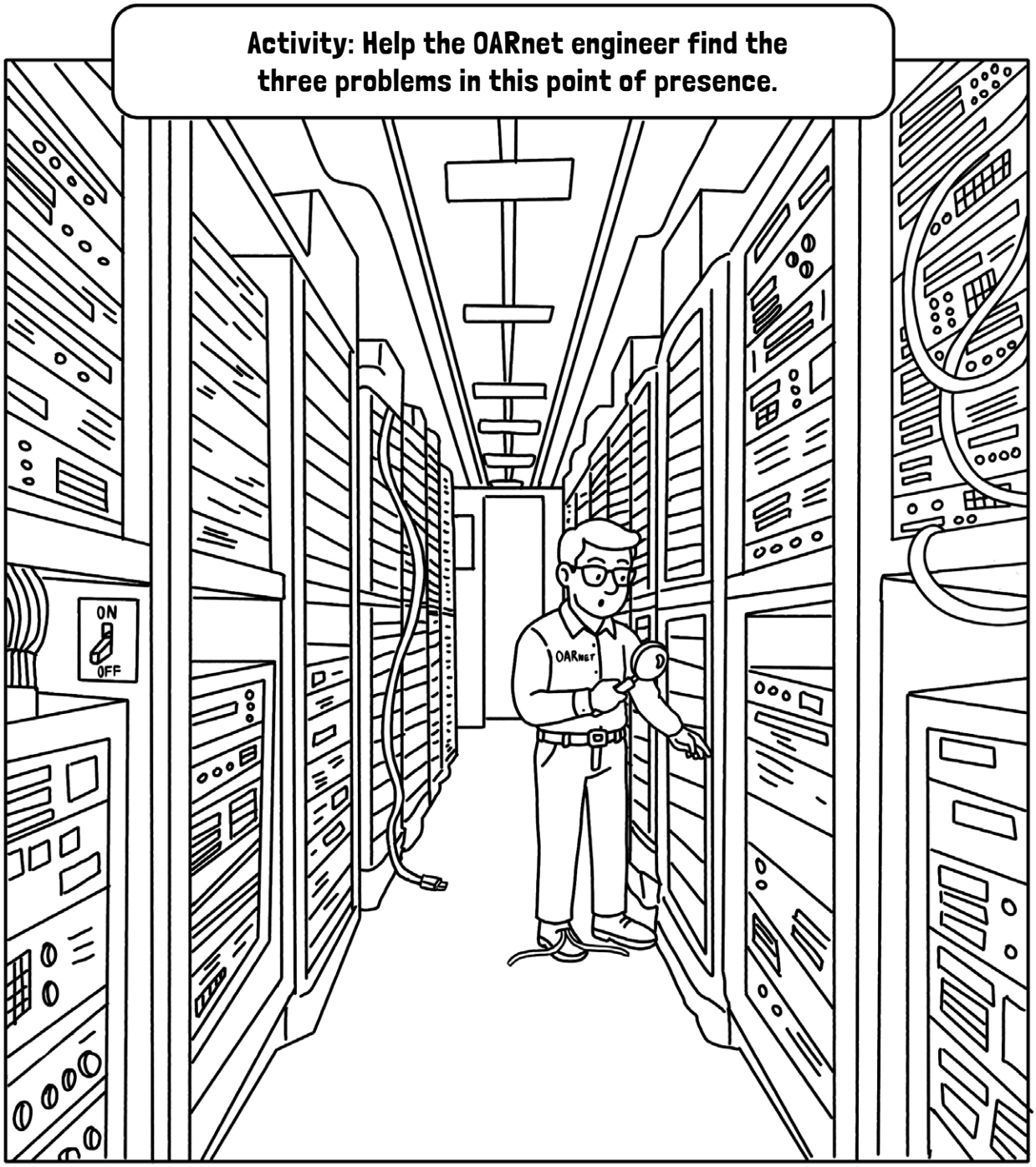
Connecting millions of Ohioans to the statewide network and providing access to important digital technologies and services is complex work. OARnet's many partners and collaborators—from government agencies to private businesses—help keep the network running. This **public–private partnership** is one of the things that makes OARnet so special!

Help OARnet get the right wavelengths of light into the fiber-optic cable. Look at the numbers on the cable strands and use the key below to color them in and light up the network!



Working Hard for Reliability

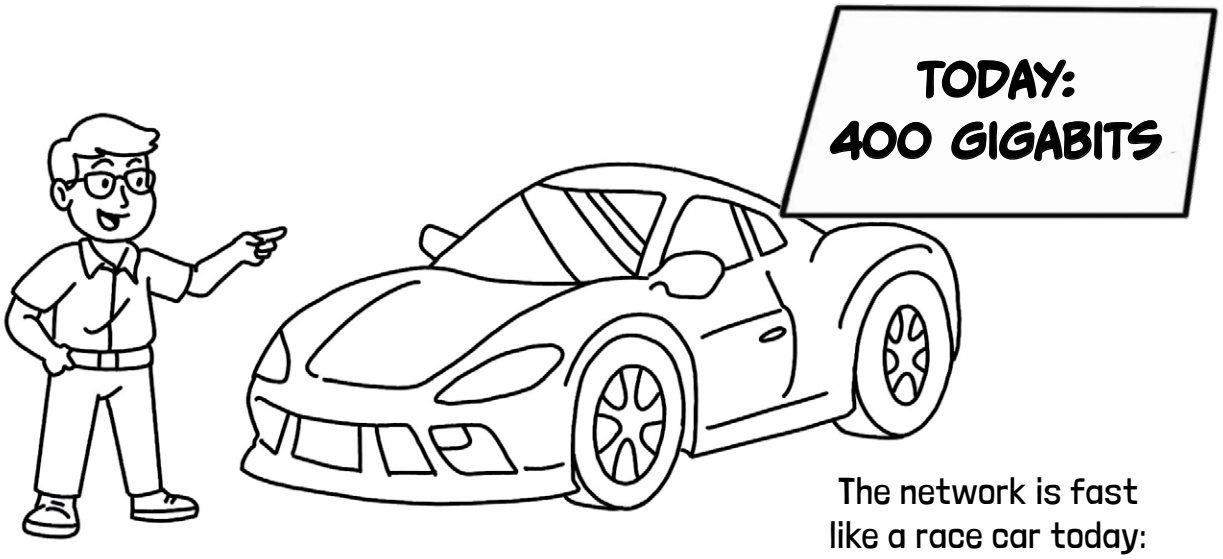
OARnet depends on a lot of complex computing equipment in facilities like data centers and **points of presence**, where OARnet connects to other networks. When something goes wrong, OARnet engineers diagnose and fix the problem—usually before anyone using the network even notices.



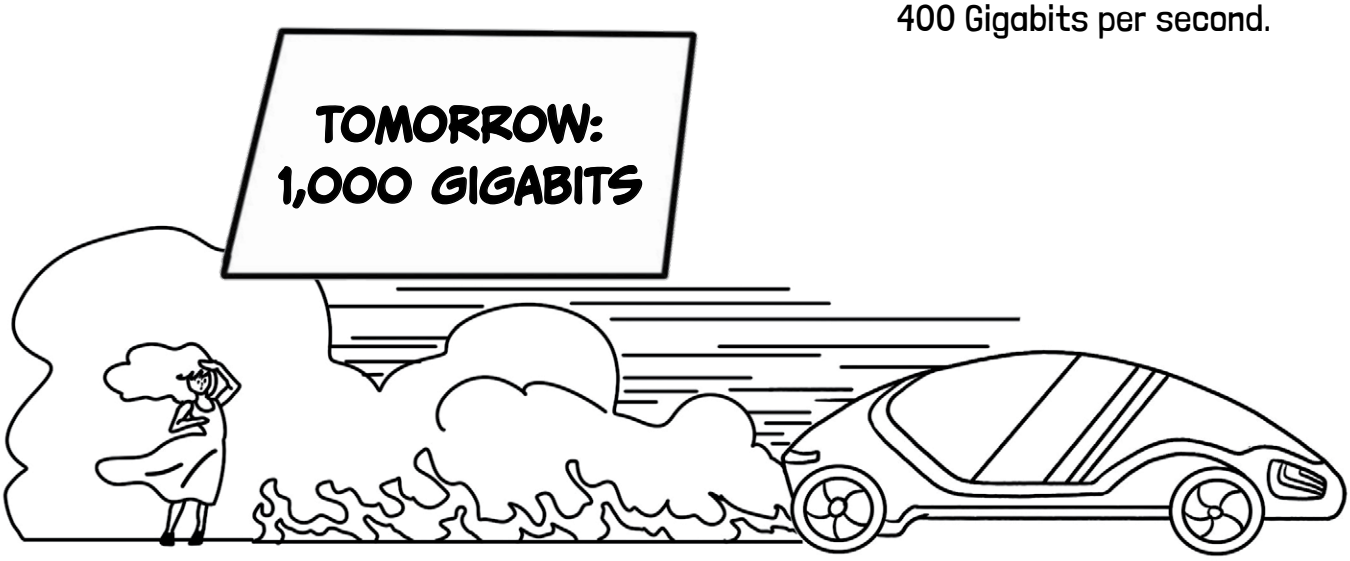
A Network for the Future

OARnet doesn't just think about what you need today to connect your digital devices to the network and a whole world of information, but about what you might need tomorrow. OARnet is constantly updating the state network infrastructure to ensure that when the next wave of technology arrives in your home, school, or workplace, the bandwidth is there for you to make the most of it.

Color the page!



The network is fast like a race car today: 400 Gigabits per second.



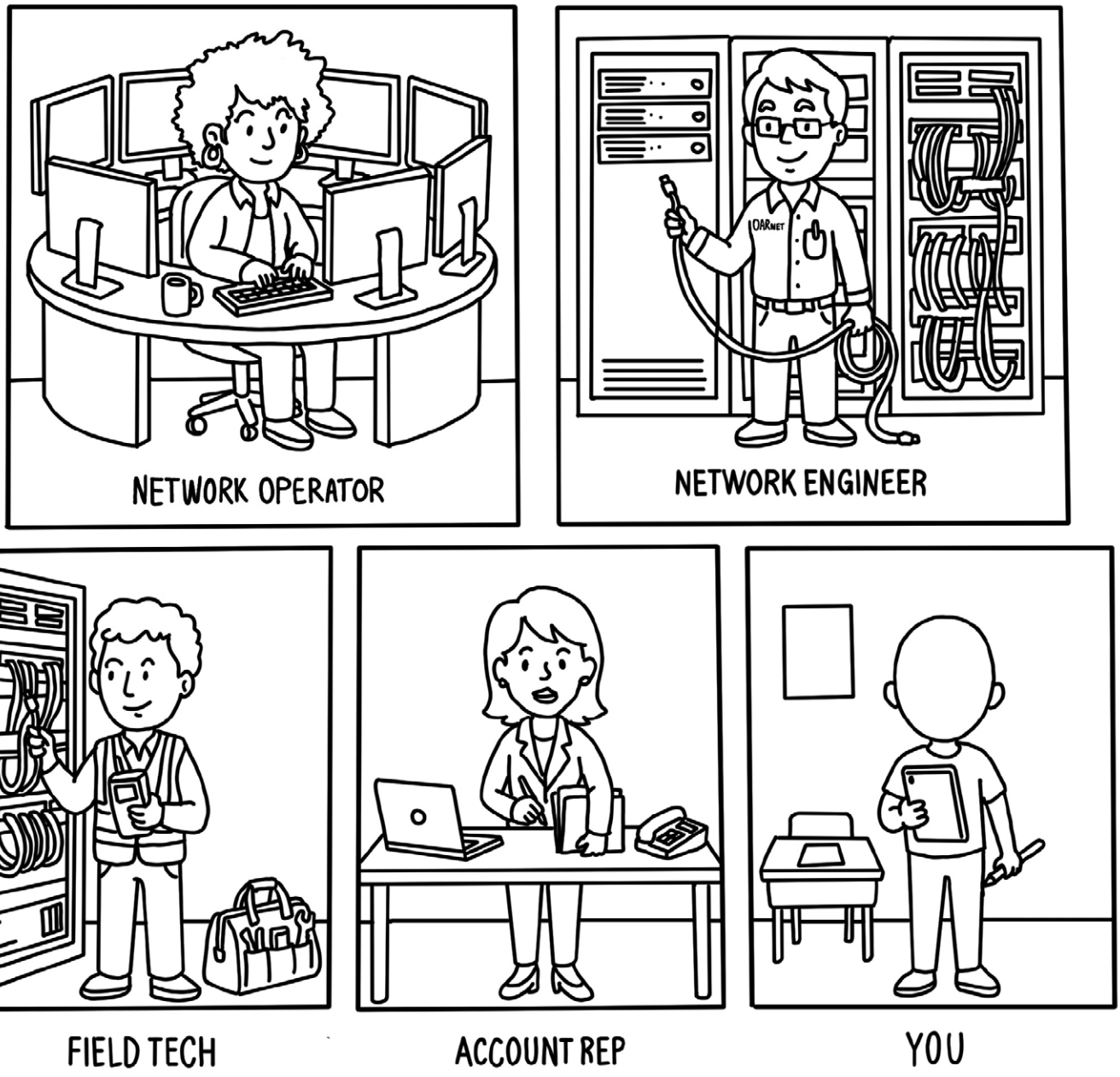
But it's getting even faster!

Before too long it will be nearly three times as fast: 1,000 Gigabits per second!

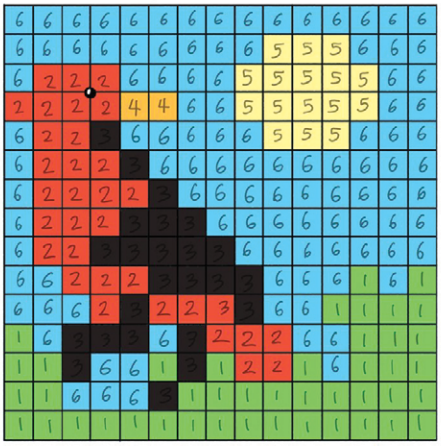
The People of OARnet

The network relies on advanced technology to do its job. But the real magic is the **people** who work at OARnet to ensure that it runs smoothly. Network designers, field engineers, operations specialists, and business managers build, upgrade, monitor, and fix the network, and ensure that Ohioans stay connected.

OARnet even employs students to help run the network.
Draw yourself as a member of the OARnet team!



Answer Key



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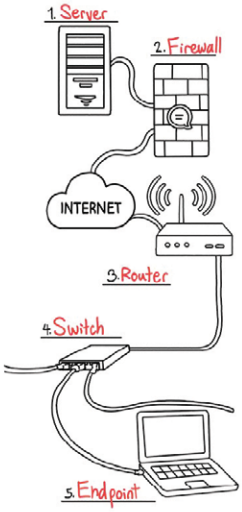

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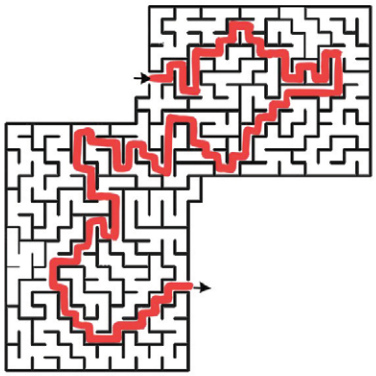

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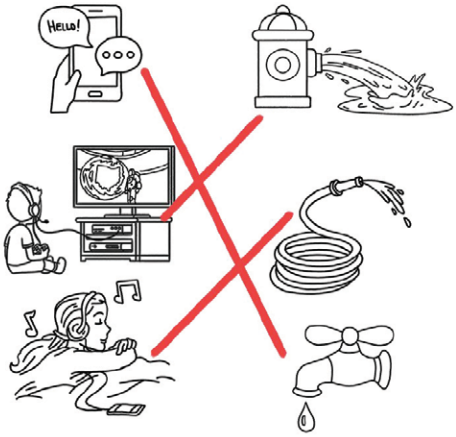

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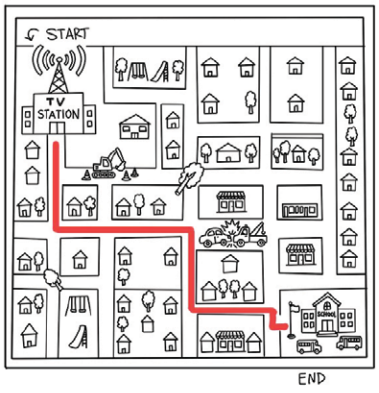

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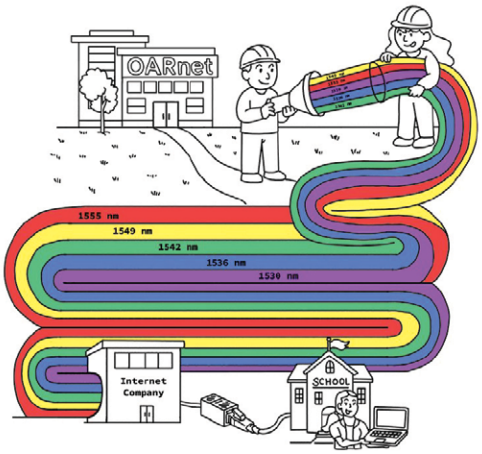

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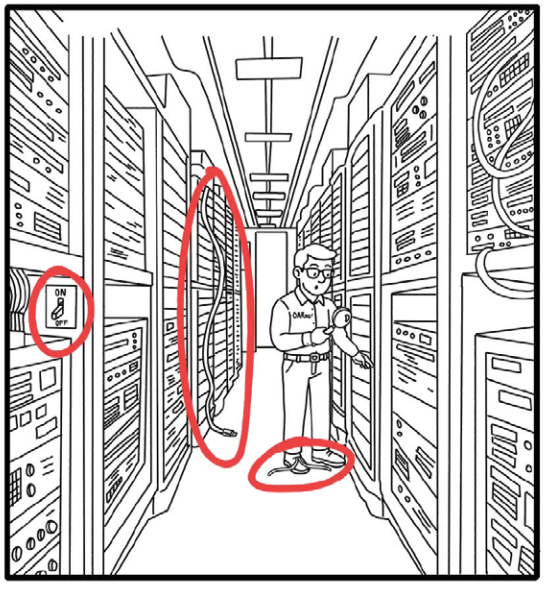

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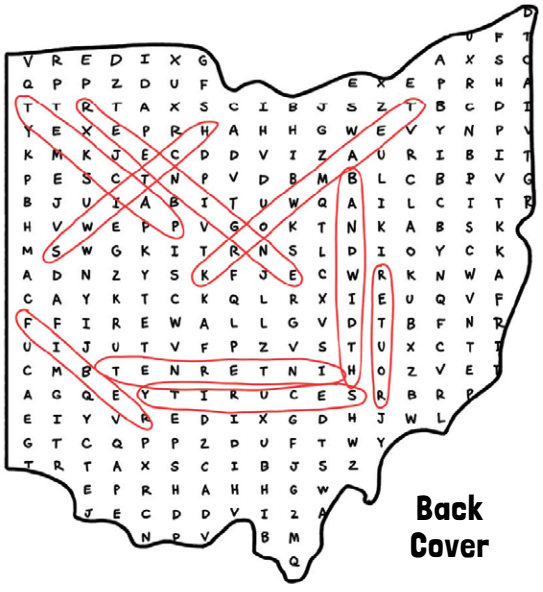
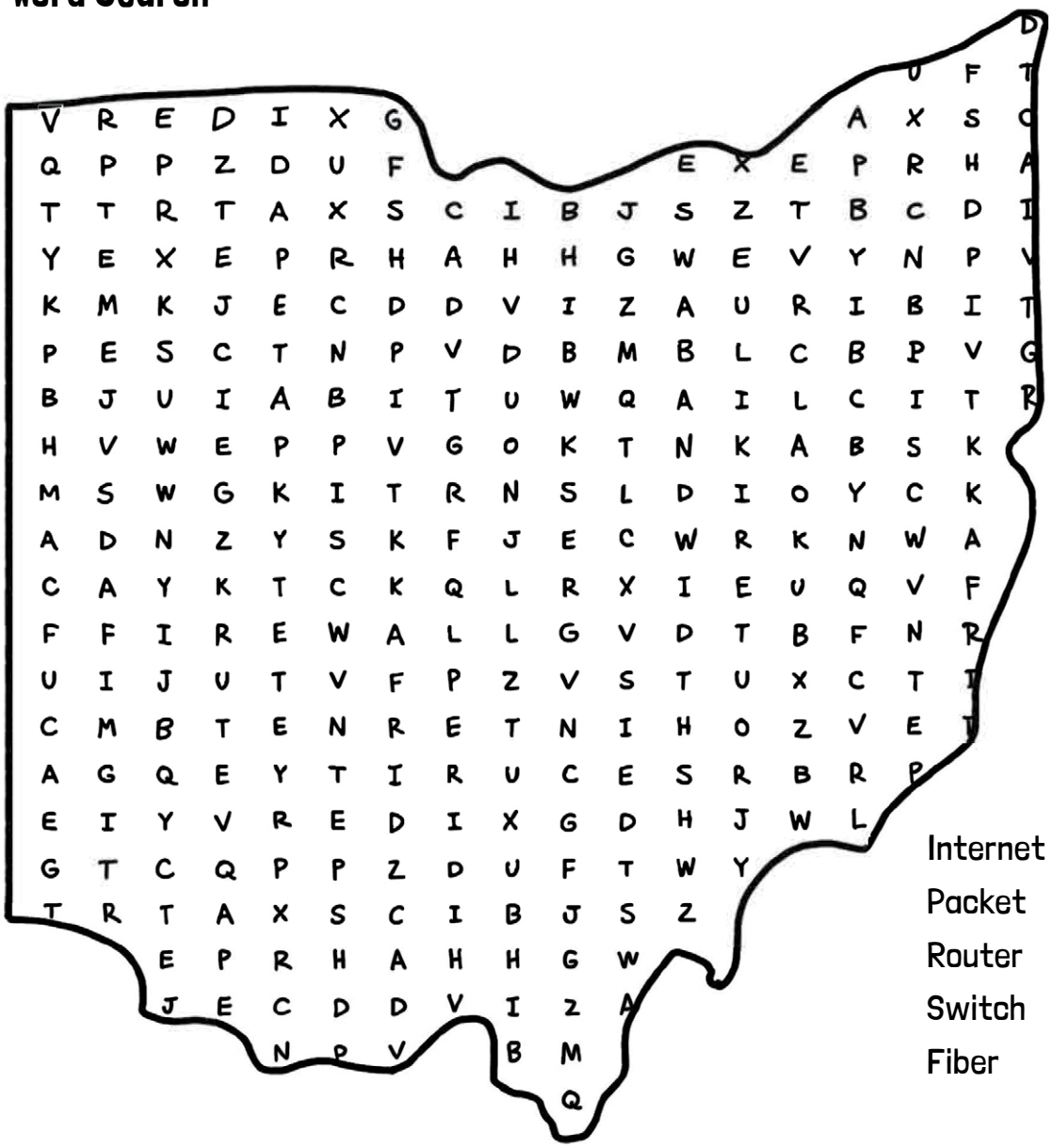


Back Cover

Word Search



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