

How Waves Are Used for Communication

Waves Are More Than Just Ocean Water

When you hear the word “wave,” you might think of the ocean—water rising and crashing at the beach. But waves aren’t just found in the sea. In science, a **wave** is a way to move **energy** from one place to another. Waves can travel through different materials, like air, water, or even empty space.



We experience waves in many ways every day. When you hear someone speak, you’re hearing **sound waves**. These waves move through the air and reach your ears. When you turn on a light, you see **light waves**. These waves travel from the light bulb to your eyes. You don’t have to see or touch a wave to know it’s there—waves are constantly moving around us.

Some waves do more than just help us see and hear. Certain kinds of waves can be used to **send messages**. For example, have you ever watched a video on your tablet or talked to someone on the phone without using any wires? That’s possible because of **waves used in communication**. These waves travel through the air or special cables and carry information like sounds, pictures, or text.

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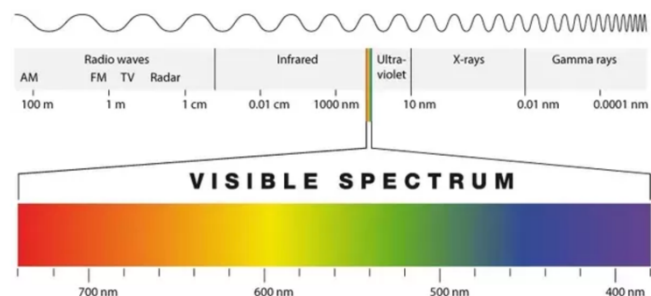
Types of Waves Used to Send Information

Not all waves are the same. Some need a material to travel through, like sound waves moving

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Radio Waves

Radio waves are one of the longest types of electromagnetic waves. They are invisible and move through the air all around us. Even though we can’t see or feel them, radio waves are used every day in many devices. When your phone is using Wi-Fi, you are relying on radio waves to send and receive information.



Because radio waves can **travel through air and even through walls**, they are perfect for wireless communication. When you make a phone call or stream a video over Wi-Fi, your device is sending and receiving radio waves. These waves carry the information from your device to a nearby tower or router, which then connects it to the internet or other devices.

Light Waves

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Fiber optic cables are thin strands of glass or plastic. Light waves are sent down these tiny tubes to carry information. Because light moves **extremely fast** and stays strong over long distances, it's perfect for sending signals through cables—like internet or cable TV.



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Example 1: Radio Waves in Wireless Devices

Have you ever wondered how your phone can send a message or load a video without being plugged into anything? That's thanks to **radio waves**. These invisible waves move through the air and carry information between devices. You can't see them or hear them, but they're working all around you—at home, in school, and in many public places.

Cell phones, Wi-Fi, and even some types of TVs use radio waves to communicate. When you send a text message, your phone turns that message into a signal. This signal travels through the air as a radio wave. The radio wave goes to a **cell tower** or **Wi-Fi router**, which then sends it along to the person you're trying to reach. The whole process happens in just seconds!



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To make this work, we use special tools like **antennas** and **routers**. An antenna is a device that sends or picks up radio waves. Most phones have tiny built-in antennas. A router is the device in your house or classroom that creates a Wi-Fi signal. It takes internet information and sends it out as radio waves. Your phone or computer then picks up those waves and turns them back into something you can see or hear.

Radio waves are helpful because they can **travel through the air** and even go through **walls**. That means you don't have to be right next to a router or tower to stay connected. As long as the signal is strong enough, radio waves can help your devices talk to each other—even from across the room or across town.

Example 2: Light Waves in Fiber Optic Cables

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Fiber optic cables are used all over the world to connect homes, schools, and businesses to the internet. They are also used for cable television and sometimes even for phone service. When a company wants to send information—like a video, website, or message—it turns that information into patterns of light. The light is then sent through the fiber optic cable and travels to the user's computer or device.



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One big benefit of using light waves is that they **don't get weaker or mixed up** over long distances, like some other waves can. That means the message stays clear, even when it's sent across cities or even countries. Fiber optics are also very secure, making them a popular choice for safely sending important data.

Even though we can't see the light inside these cables, it's working behind the scenes to make sure

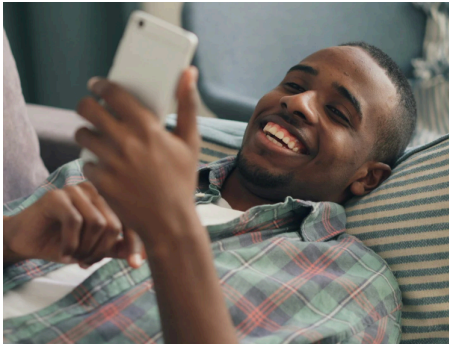
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How Do Waves Carry Information?

Now that you know waves like **light** and **radio** can be used to send messages, you might be wondering: *How do they actually carry information?* The answer is that waves can be **changed in small ways** to carry different kinds of messages—like sounds, pictures, or words.

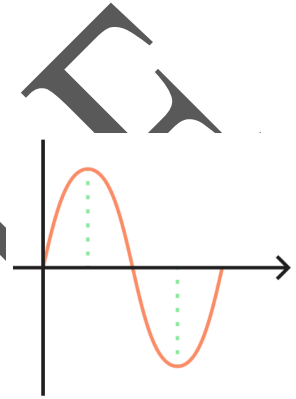
When a wave is used to send a message, it is slightly changed, or **adjusted**, to represent the information. This can happen in a few different ways. For example, the wave might become stronger or weaker, or it might change speed or shape for a short moment. These changes can happen very quickly—thousands or even millions of times each second!

Even though we **can't see or hear** these tiny changes with our own senses, **devices** like phones, radios, or Wi-Fi routers **can detect them**. The device picks up the wave, notices the pattern of changes, and then turns those changes back into something we understand—like a voice, a picture, or a video on the screen.



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Another example is a flashlight blinking on and off. If you were far away and saw the light blinking in a special pattern, you could figure out that someone was trying to send you a message. That's similar to how light is used in fiber optic cables, where the light turns on and off in patterns that carry information.



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Real-Life Uses of Communication Waves

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Texting and Calling

When you send a **text message** or make a **phone call**, your device uses **radio waves** to send your voice or words to another phone. It doesn't matter if the other person is across the room or in another city—radio waves make it possible to talk and share messages wirelessly.

Using the Internet

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If your home has **fiber optic internet**, the data first travels through **light waves** inside fiber optic cables. These light waves send the information to your neighborhood, and then the router turns it into radio waves your devices can use.

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GPS

GPS (Global Positioning System) also uses radio waves from satellites in

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From messaging and entertainment to safety and travel, communication waves play a big part in how we live and learn every day.

Waves Are All Around Us

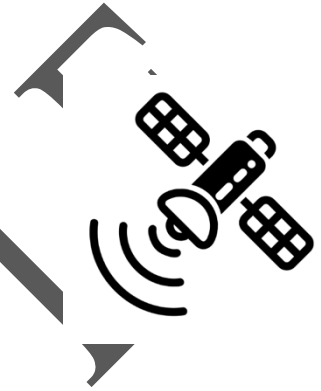
Waves are all around us—not just in the ocean, but in the air, in cables, and even in outer space. In science, a wave is a way to move energy from one place to another, and two important types of waves—**radio waves** and **light waves**—can be used to send information. These waves make it possible for us to communicate in ways that would have seemed impossible just a few generations ago.



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We also looked at **light waves** in **fiber optic cables**. These special cables carry light from one place to another, helping people send large amounts of data quickly and clearly. Light waves move so fast that they can carry internet and TV signals across towns, cities, and even across oceans.

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Reading Comprehension Questions

1. What is
2. Which two types of waves are commonly used to send messages in communication?
3. Why are
4. What kind of
5. What do antennas and routers do with radio waves?
6. Why is fiber
7. What
8. What does a device do when it receives a wave carrying a message?
9. What technology

Extension Questions

10. Why are fiber optic cables made of glass or plastic instead of metal?
11. How
12. What are

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