IT IV

Computer Networks and connections

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Section Break

How does your message reach the recipient?

Computer Networks and connections

01 **Building a network**

02 **Network topologies**

03 **Types of networks**

04 **Physical network connections**

- The Internet is the world's largest computer network. Let's break that down:

- A **computer network** is any group of interconnected computing devices capable of sending or receiving data.

- Examples of computing devices?
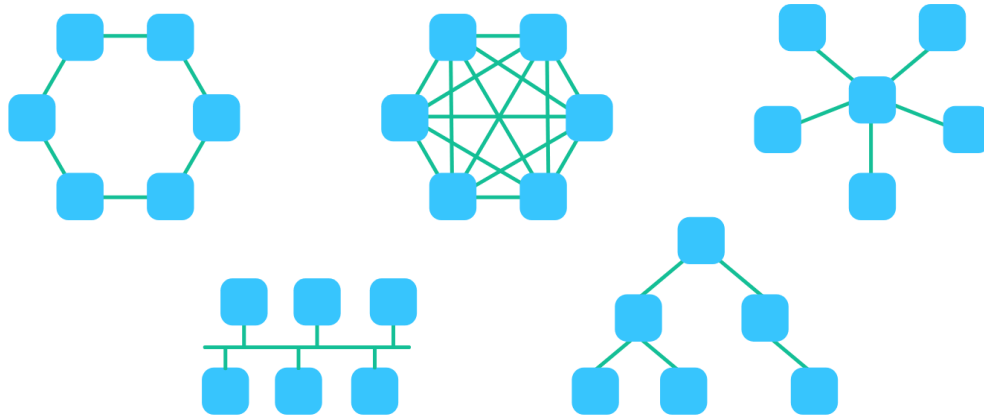
- The simplest computer network is two devices:

- A network like that only has to worry about a few things, like how to physically connect the two devices and how to send data over the physical connection in a format they both understand.

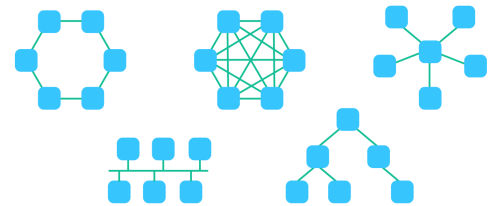- If we are connecting 6 computers we can work with one of the following topologies.

The top row shows the ring, mesh, and star topologies. The bottom row shows the bus and tree topologies.

- Each of those arrangements is a different network topology, and each topology has its advantages and disadvantages.

- Imagine the journey of a piece of data through one of those larger networks. What path will it take?

- When there are multiple paths, how does it know which path is best?

The top row shows the ring, mesh, and star topologies. The bottom row shows the bus and tree topologies.

- We use different terms to refer to networks based on their size and characteristics.

- The most common type of network is the **Local area network(LAN)** , a network that covers a limited area like a house or school.


A LAN connected using a bus topology. The devices are connected with an Ethernet cable.

- The largest type of network is a **Wide Area Network (WAN)**, a network that extends over a large geographic area and is composed of many, many LANs.

- Oftentimes, the networks in a WAN can only be connected by leasing telecommunications lines from different companies, since no single company owns all the infrastructure across the wide geographic area.

- Another type of network is the

Data Center Network (DCN), a network used in data centers where data must be exchanged with very little delay.
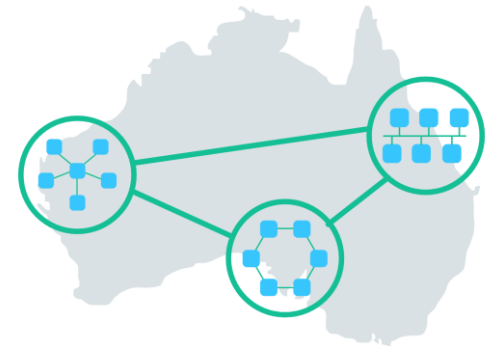
A WAN covering the country of Australia and connecting three LANs with long-distance connections.

- The Internet is a network of computers connected to each other. But what does each physical connection look like?

- It depends on the needs of the connection and the size of the network.

- We are going to discuss the followings:

- **Copper cables**

- **Fiber-optic cables**

- **Wireless**

4.1 Copper cables

- Since the landline telephone system originally used copper wires, the first Internet connections reused that technology and many still use it today.

- If you're in a computer lab or near a modem, you can probably find a cable similar to this one:
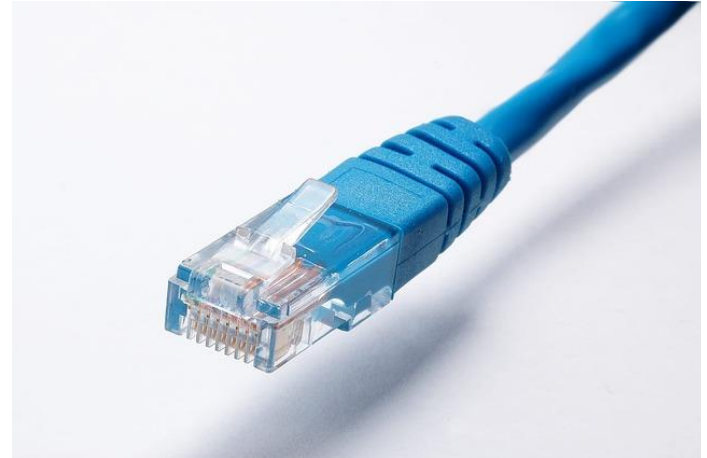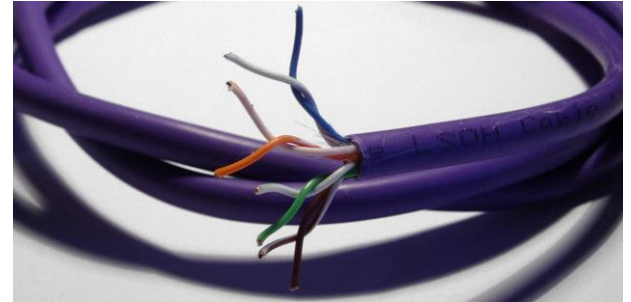

- That's a CAT5 cable, a type of **twisted pair cable** that's designed for use in computer networks.
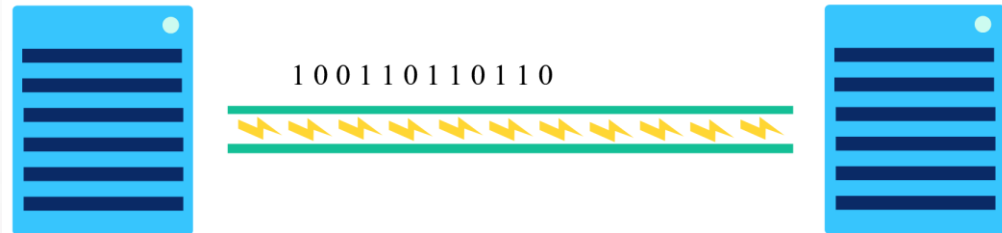
- If you were to look inside the cable, you would find four twisted pairs of copper wires:

- Twisted pair cables send data through a network by transmitting pulses of electricity that represent binary data:
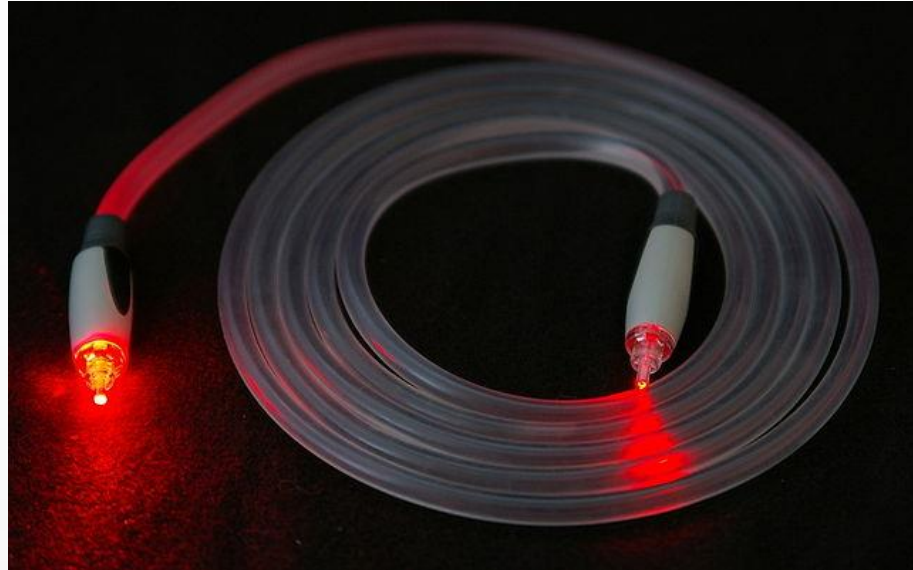

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- To make sure cables are transmitting information in a way that can be understood by the recipient, they follow the **Ethernet** standards??? That's why twisted pair cables are commonly known as Ethernet cables.

- They are used both in networks as small as a company office (a LAN) or as large as an entire country (a WAN).
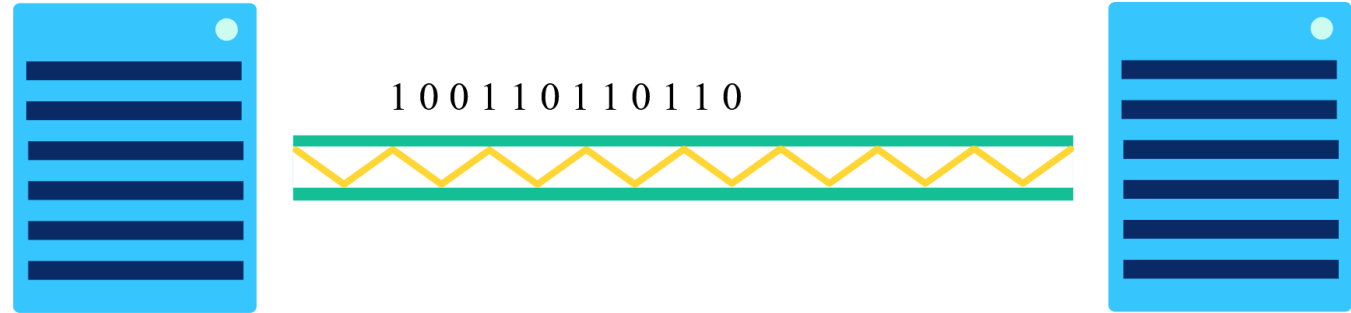
- A fiber-optic cable contains an optical fiber that can carry light (instead of electricity). The fiber is coated with plastic layers and sheathed in a protective tube to protect it from the environment.

- Fiber-optic cables communicate by sending pulses of light that represent binary data:

1 0 0 1 1 0 1 1 0 1 1 0

- They typically also follow the Ethernet standards to make sure they're sending data in a way that can be commonly understood by any recipient in the network.

Fiber-optic cables

- Fiber-optic cables communicate by sending pulses of light that represent binary data:

- Fiber-optic cables are capable of transmitting much more data per second than copper cables. They're often used to connect networks across oceans so that data can travel quickly around the world.

- As fiber-optic cables become less expensive, they're becoming increasingly common in city-wide networks as well.

- Wireless connections don't involve any wiring at all—at least at first. A wireless card inside the computer turns binary data into radio waves and transmits them through the air:
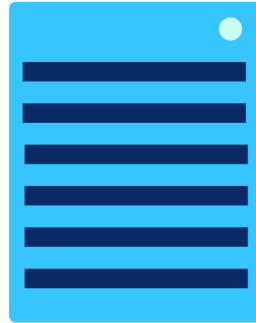
1 0 0 1 1 0 1 1 0 1 1 0 1 1 0 0

- Those radio waves can't travel very far: 75-100 feet in a place like an office building that's filled with all sorts of obstacles, or up to 1000 feet in a wide open field.

- The waves are hopefully picked up by a wireless access point which converts them from radio waves back into binary data.

4.3 Wireless

- Wireless access points are connected to the rest of the network using physical wiring, like copper or fiber-optic cables.

- Wireless connections are limited in how much area they can cover, but they are increasingly commonplace due to the prevalent use of portable computing devices.

Knowledge Check

LAN network can connect tow cities.

True
False

Copper Cable, CAT5 and Ethernet Cable can refer to the same thing.

True
False

Fiber Optics uses radio waves to transmit data

True
False

DCN is and acronym for Data Center Name

True
False