# Network Devices

## Computer Networking

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# Outline

1. Cables → transmit
2. Devices → decisions (setup)

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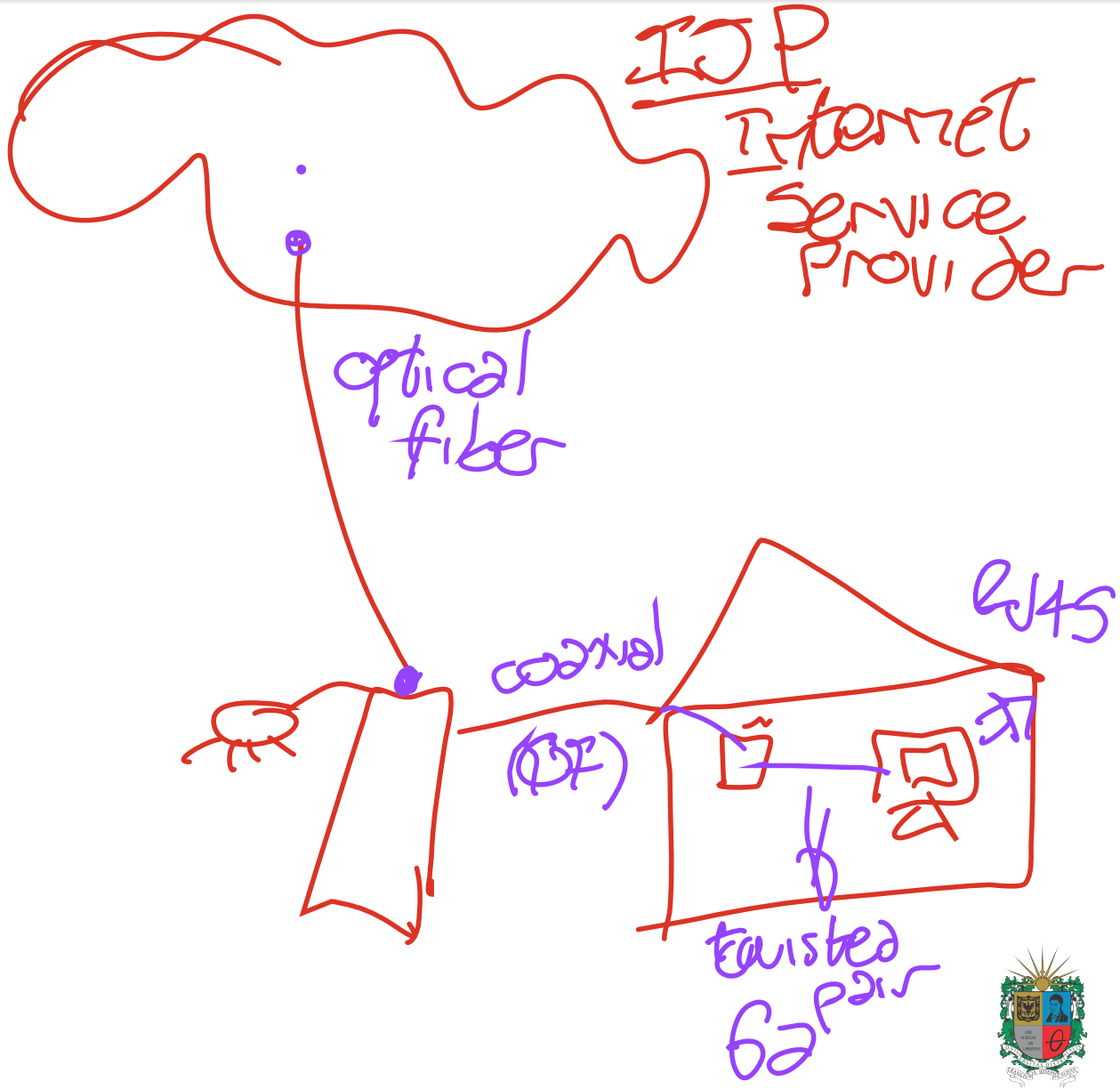
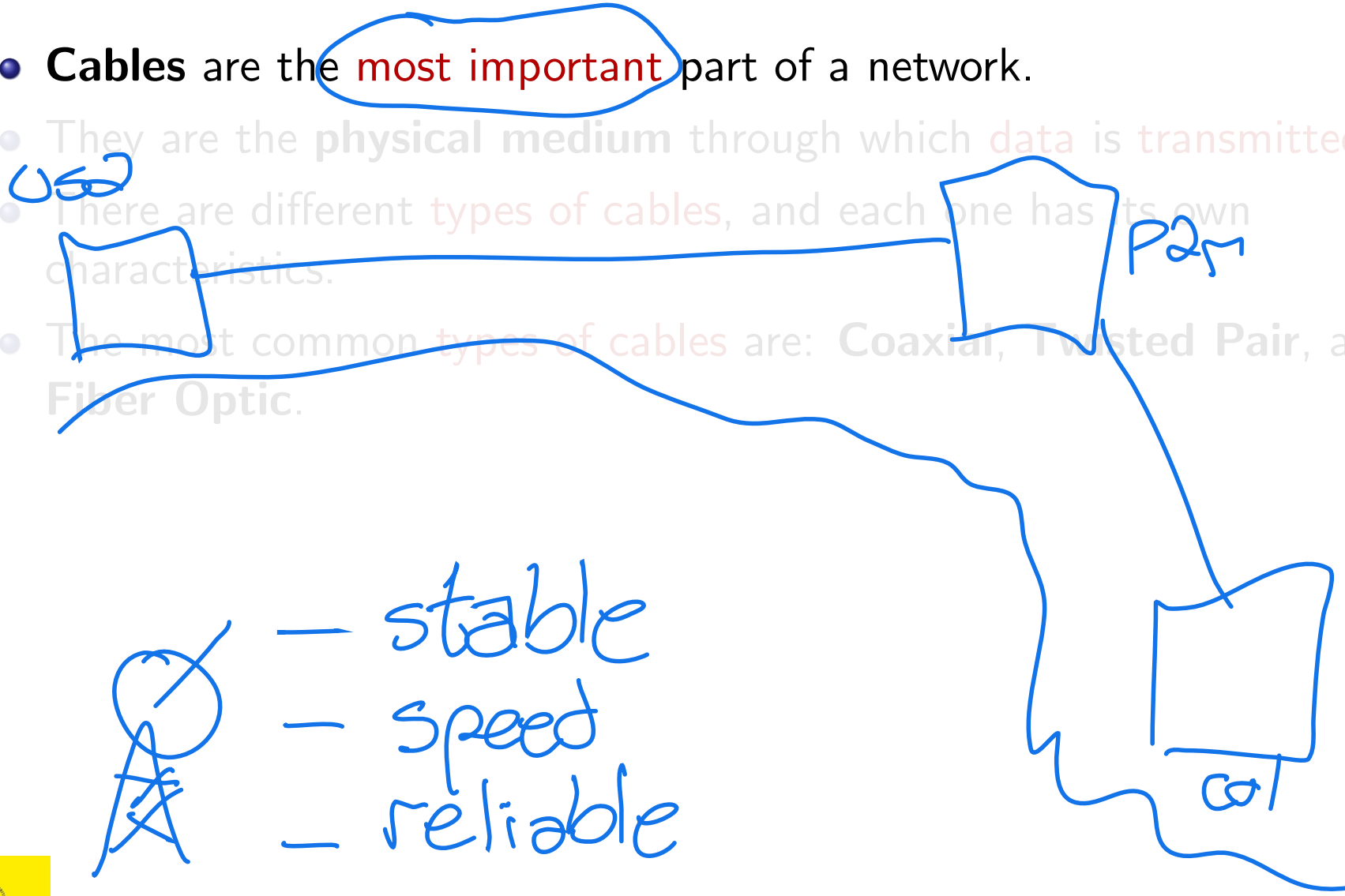
# Outline





# Cables

- **Cables** are the most important part of a network.
- They are the **physical medium** through which data is transmitted.
- There are different types of cables, and each one has its own characteristics.
- The most common types of cables are: **Coaxial**, **Twisted Pair**, and **Fiber Optic**.



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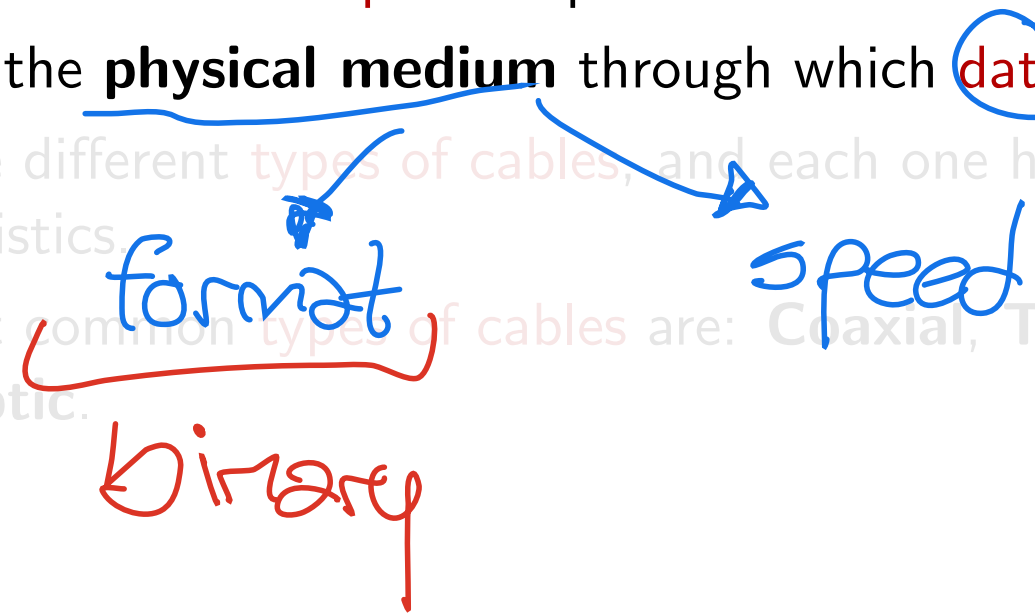


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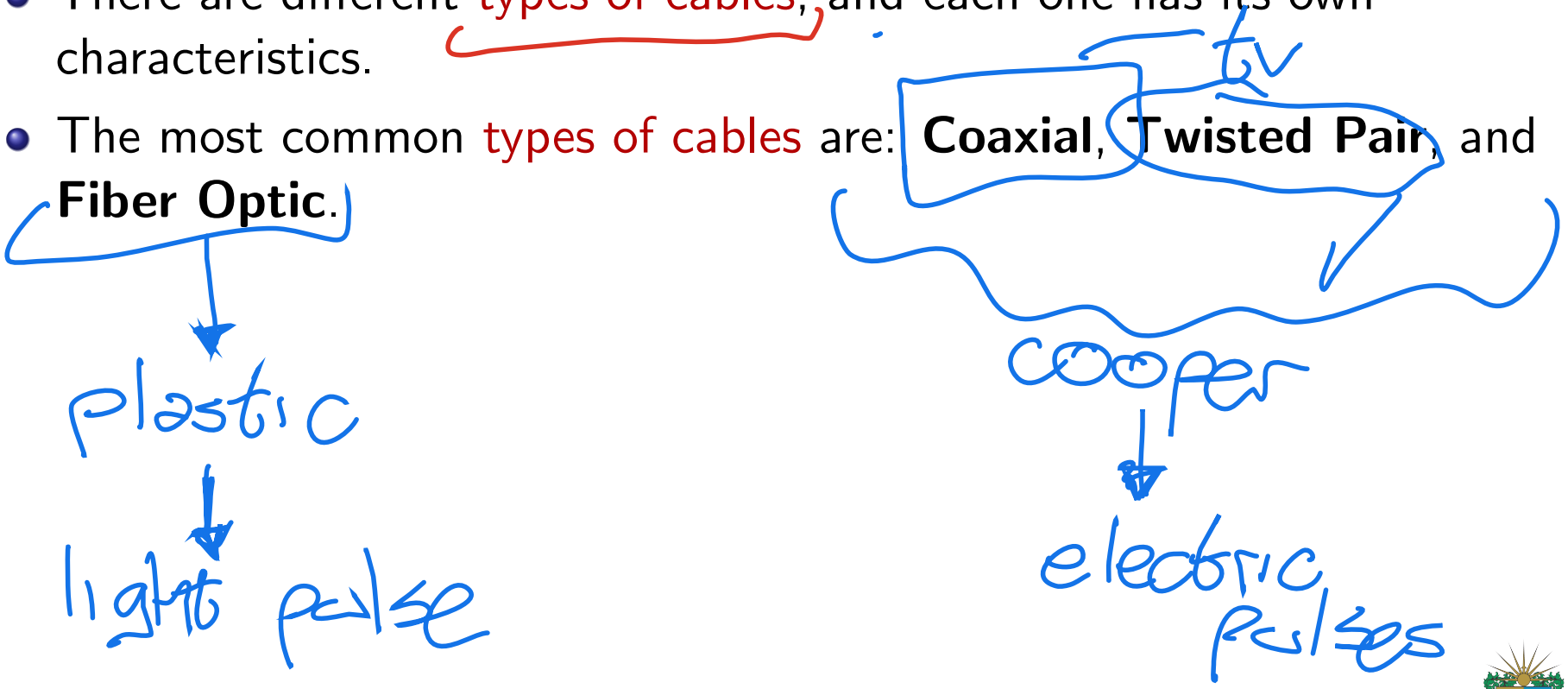


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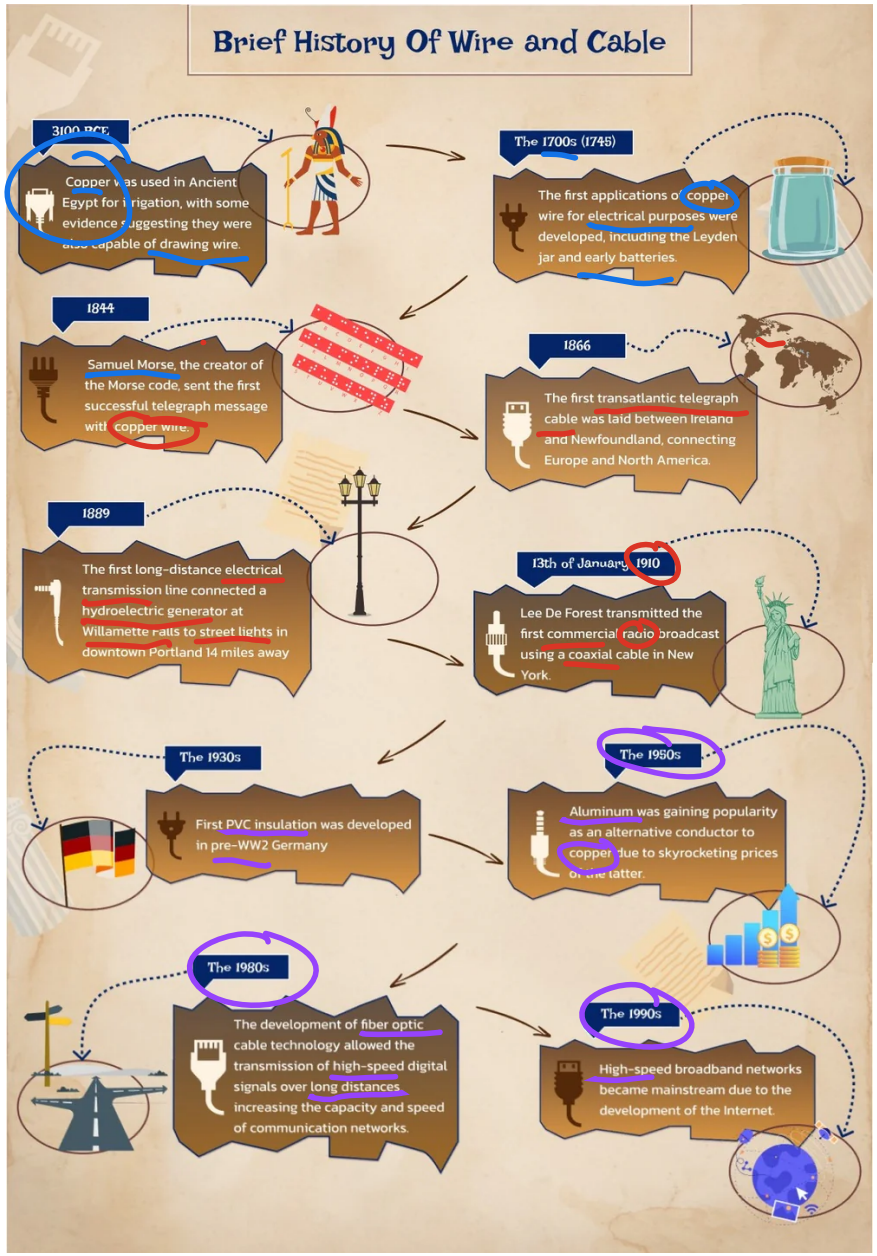
# History of Wire and Cable

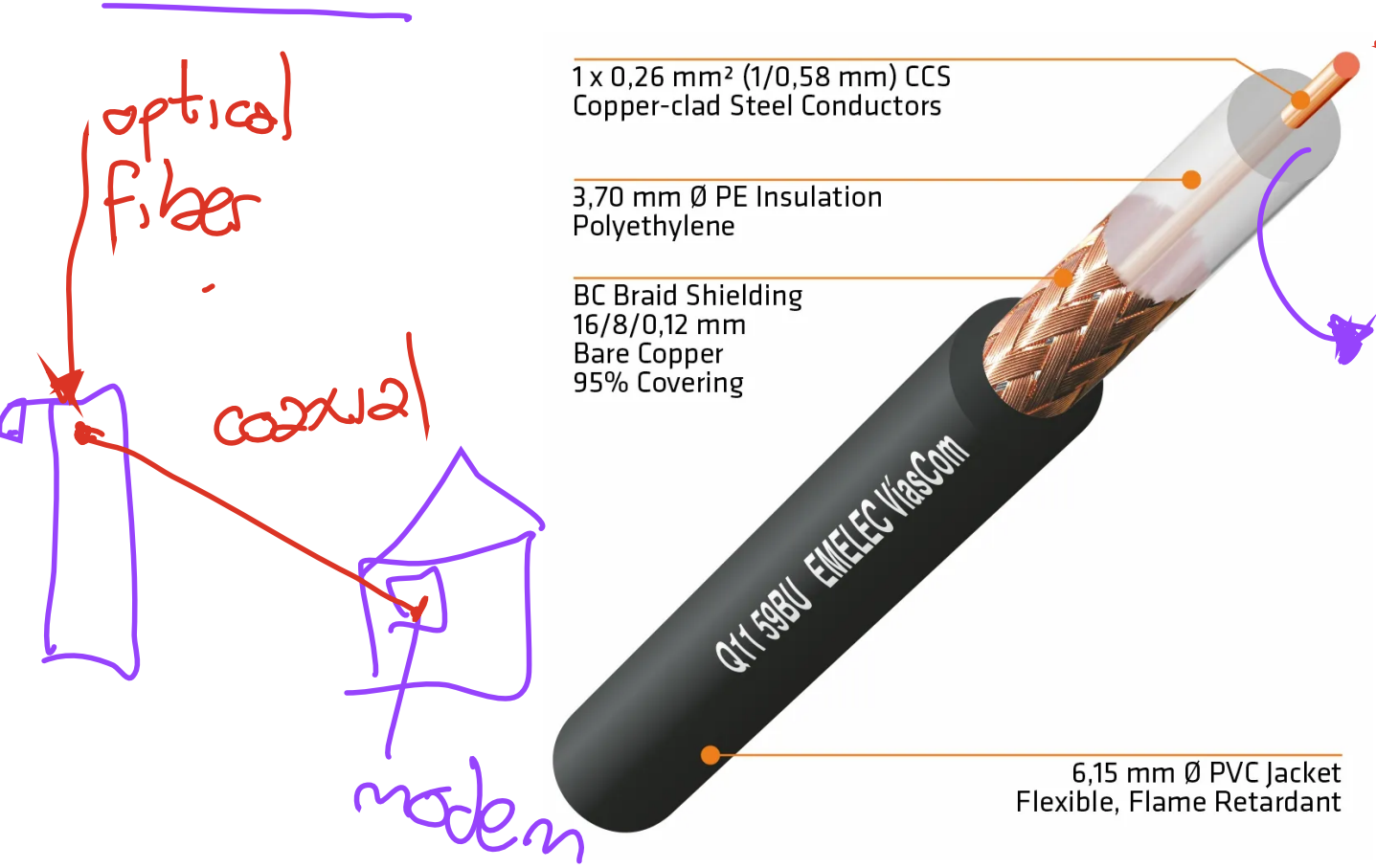


# Coaxial Cables I

- **Coaxial cables** are used in cable television systems, telephone companies, and the Internet.
- They are used for **long-distance** communication, and can carry **high-speed** data.
- They are more **expensive** than twisted pair cables, but they are more **reliable** and have a longer **lifespan**.

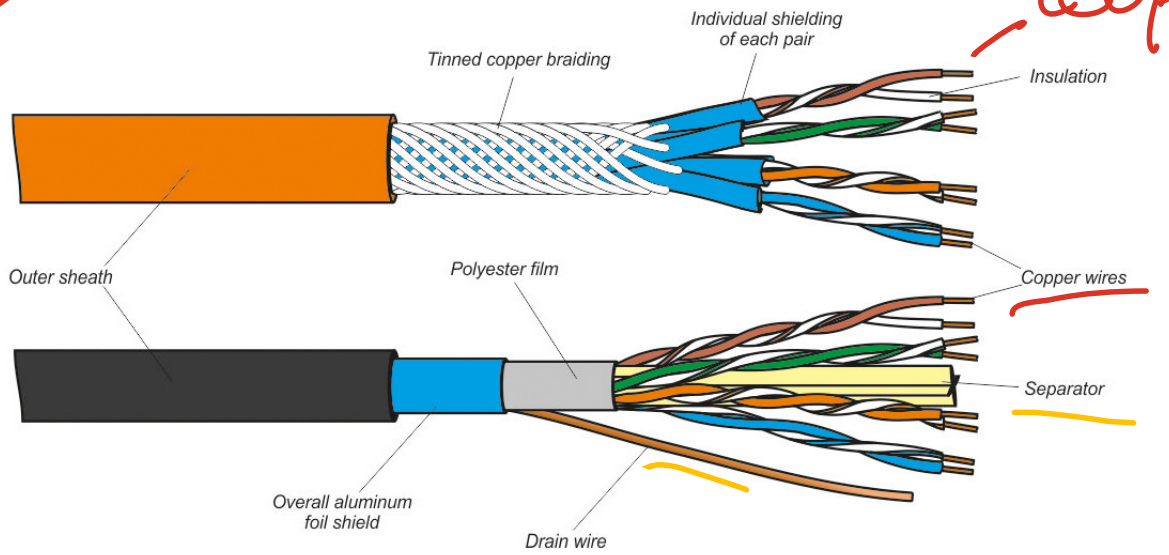
# Coaxial Cables II

They are made of a **copper** core, surrounded by a **plastic** insulator, and a **metal** shield.



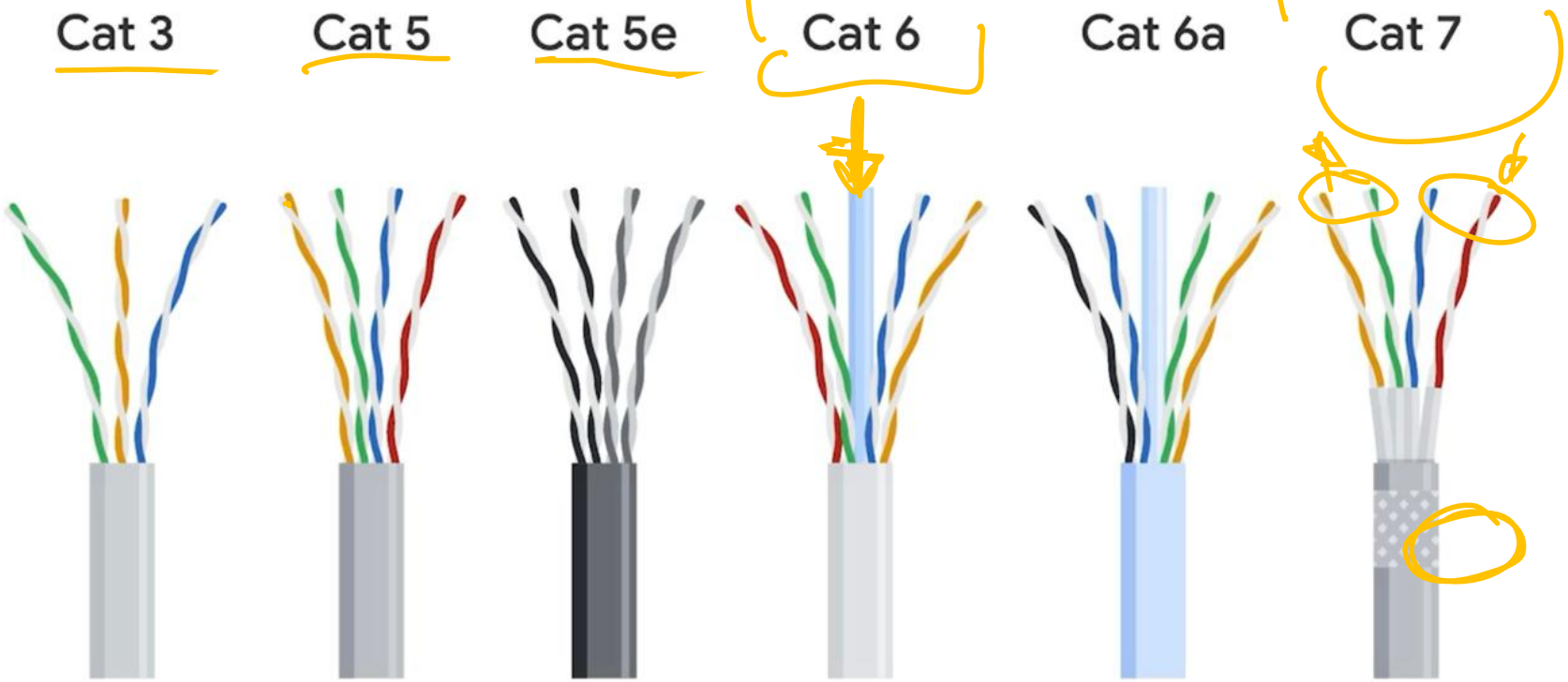
# Twisted Pair Cables

- **Twisted pair cables** are the most common type of cable used in computer networks.
- They are made of two **copper** wires twisted together, and are used for **short-distance** communication.
- They are used in **Ethernet** networks, and can carry **high-speed** data.
- They are **inexpensive**, **easy** to install, and **flexible**.



# Twister Pair Cables Categories I

≈ $1400 ≈ $3.600 ≈ $8.000




Cat 8 => $ 11.500

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# Twister Pair Cables Categories II

| Category | Maximum Speed | Max. Length | Frequency | SHIELDING | Application |
|---|---|---|---|---|---|
| CAT 1 | Up to 1Mbps(Carry only Voice) | -- | 1MHz | Unshielded | Old telephone cabling |
| CAT 2 | Up to 4Mbps | -- | 4MHz | Unshielded | Token Ring Network |
| CAT 3 | Up to 10Mbps | 100m | 16MHz | Unshielded | Token Ring & 10BASE-T Network |
| CAT 4 | Up to 16Mbps | 100m | 20MHz | Unshielded | Token Ring Network |
| CAT 5 | Up to 100Mbps | 100m | 100MHz | Unshielded | Ethernet, Fast ethernet and Token Ring |
| CAT 5e | Up to 1Gbps | 100m | 100MHz | Unshielded or Shielded | Ethernet, Fast ethernet & Gigabit ethernet |
| CAT 6 | Up to 10Gbps | 100m | 250MHz | Unshielded or Shielded | Ethernet, Fast ethernet, Gigabit ethernet & 10G Ethernet(37 - 55 meter) |
| CAT 6a | Up to 10Gbps | 100m | 500MHz | Shielded | Ethernet, Fast ethernet, Gigabit ethernet & 10G Ethernet(37 - 55 meter) |
| CAT 7 | Up to 10Gbps | 100m | 600MHz | Shielded | Ethernet, Fast ethernet, Gigabit ethernet & 10G Ethernet(100 meter) |
| CAT 8 | Up to 40Gbps | 100m | 2000MHz | Shielded | Ethernet, Fast ethernet, Gigabit ethernet & 25G-40G Ethernet(30 meter) |

Huawei

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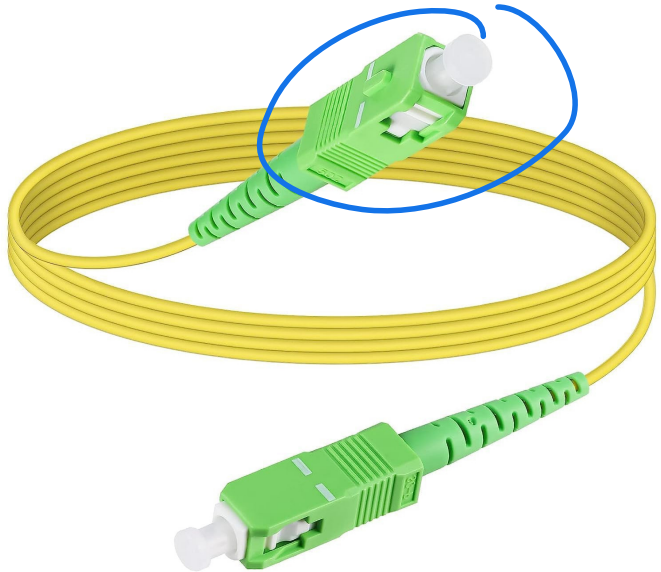
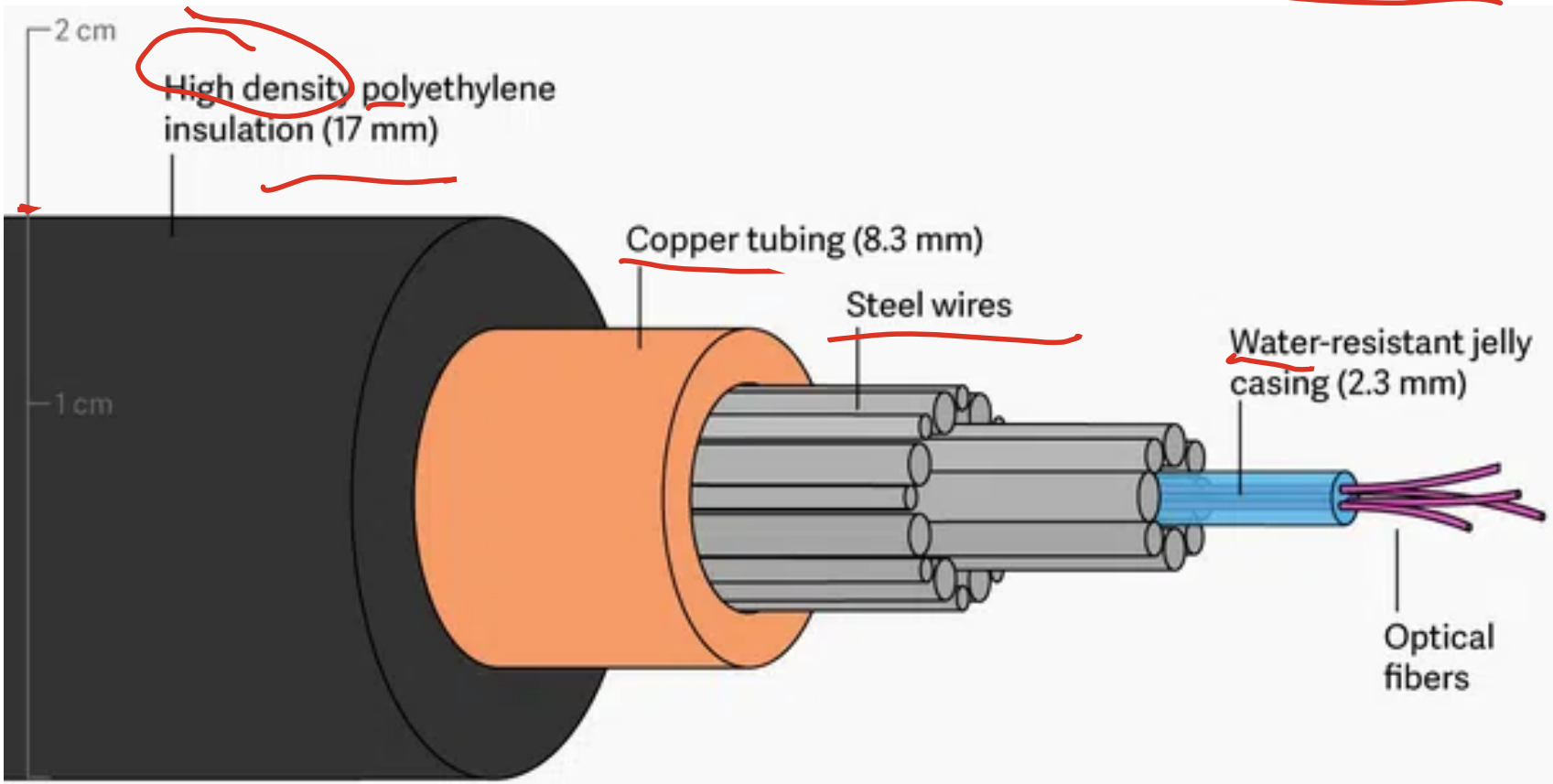
# Fiber Optic Cables

- **Fiber optic cables** are used in high-speed networks, such as the Internet and cable television systems.
- They are used for **long-distance** communication, and can carry **high-speed** data.
- They are more **expensive** than coaxial and twisted pair cables, but they are more **reliable** and have a longer **lifespan**.



# Fiber Optic Cables Conponents

They are made of **glass** or **plastic** fibers, and use **light** to transmit data



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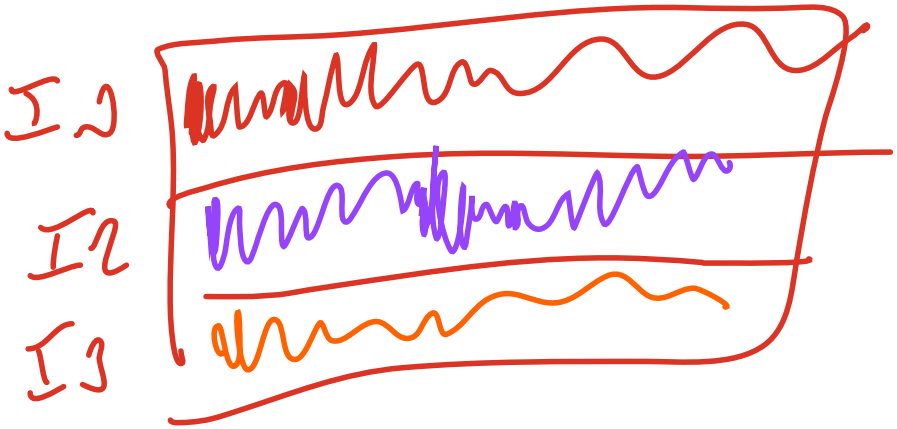

# Network Devices

- **Network devices** are the hardware components that make up a network.
- They are used to connect computers, printers, and other devices to the network.
- There are different types of network devices, such as **routers**, **switches**, and **hubs**.
- Each **device** has its own function, and is used to perform specific tasks on the network.

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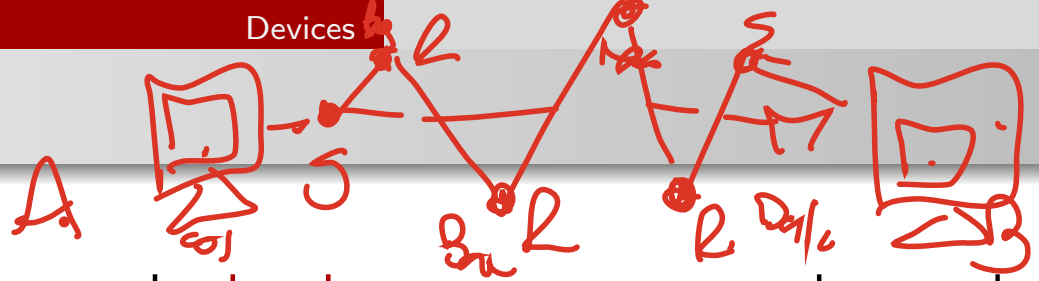

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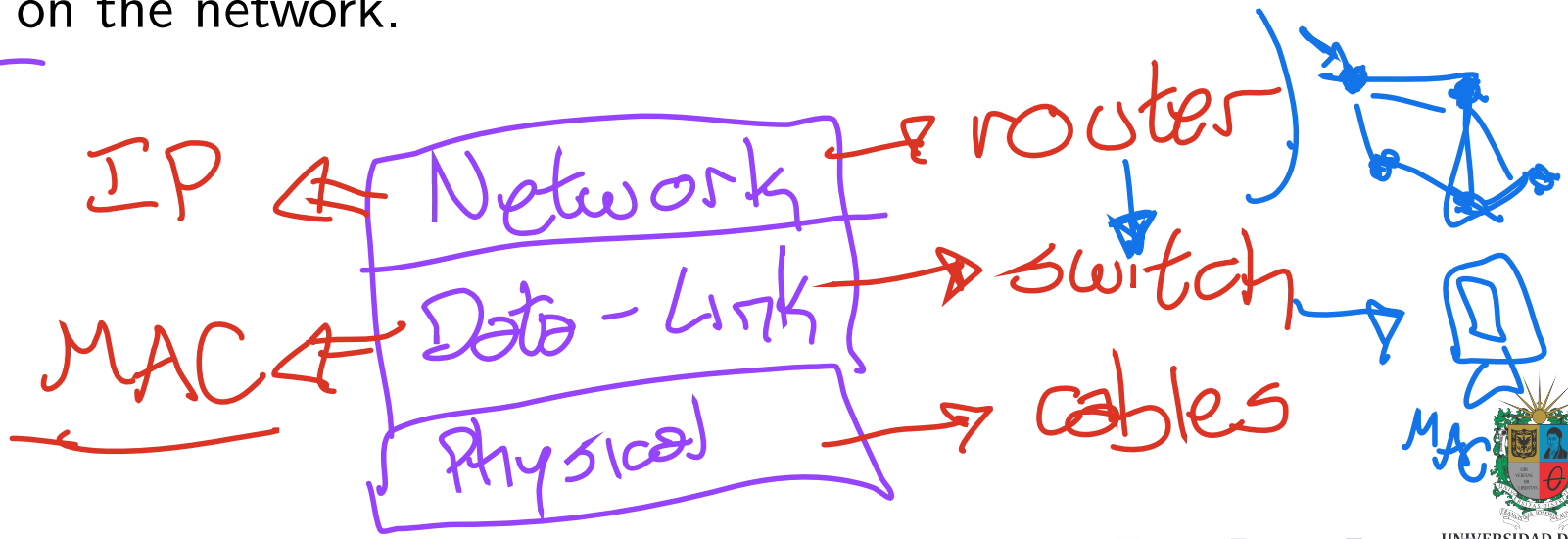
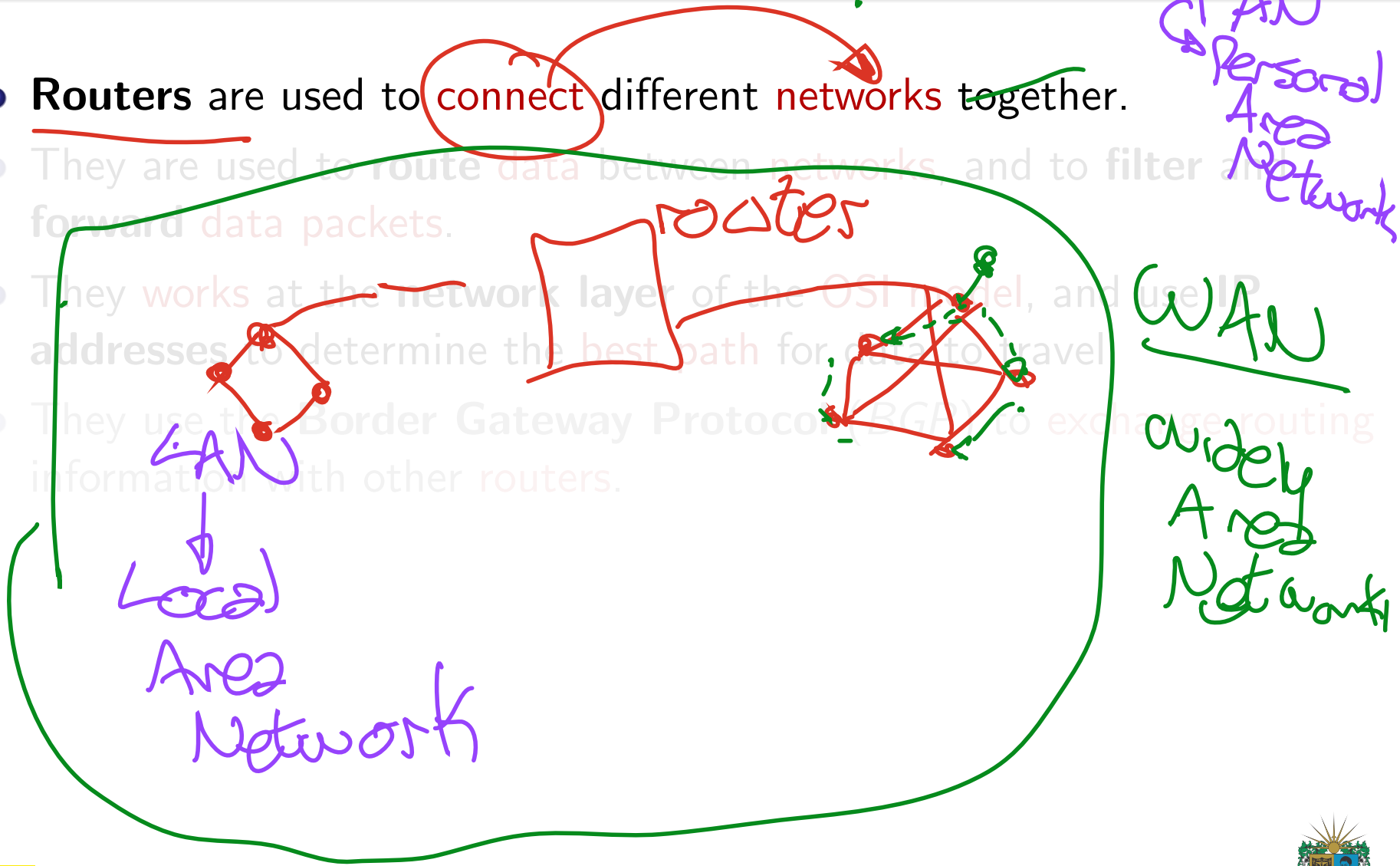


# Routers

- **Routers** are used to connect different networks together.
- They are used to **route** data between networks, and to **filter** and **forward** data packets.
- They works at the **network layer** of the OSI model, and use **IP addresses** to determine the best path for data to travel.
- They use the **Border Gateway Protocol** (BGP) to exchange routing information with other routers.



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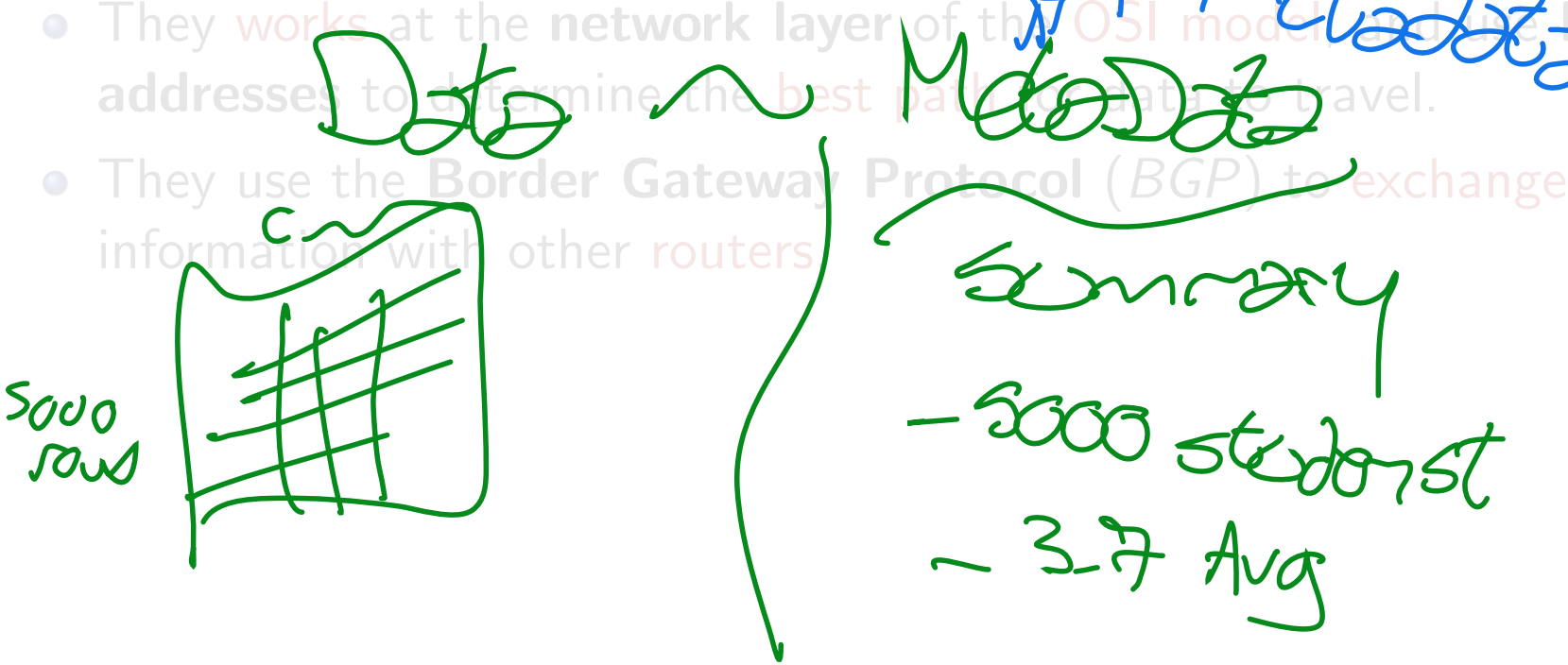

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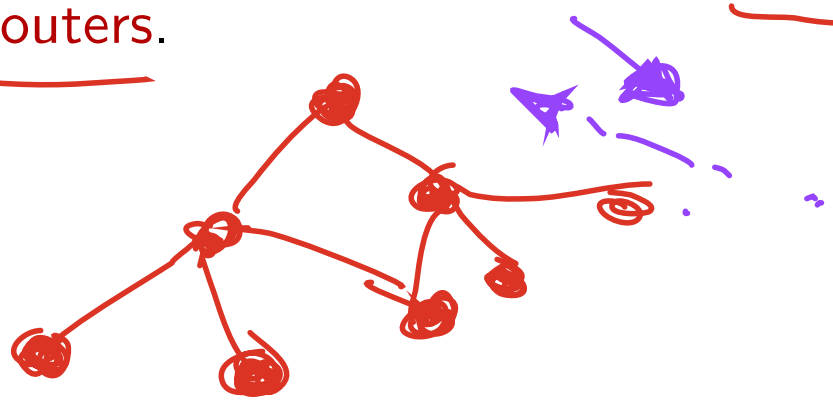
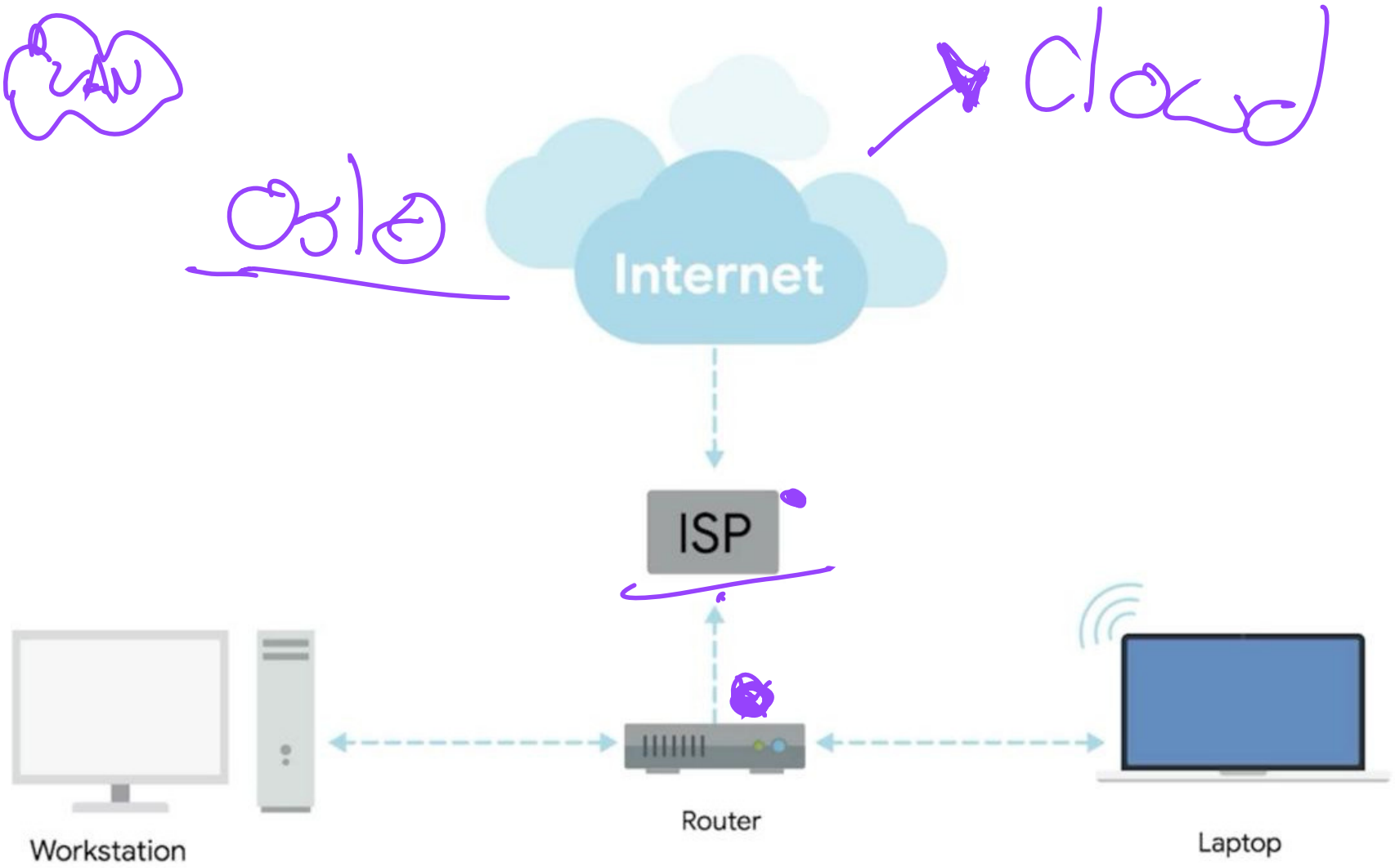


# Routers in a WAN



# Switches

- **Switches** are used to connect devices on the same network.
- They are used to **forward** data packets between devices, and to **filter** and **forward** data packets.
- They works at the **data link layer** of the OSI model, and use **MAC addresses** to determine the best path for data to travel.

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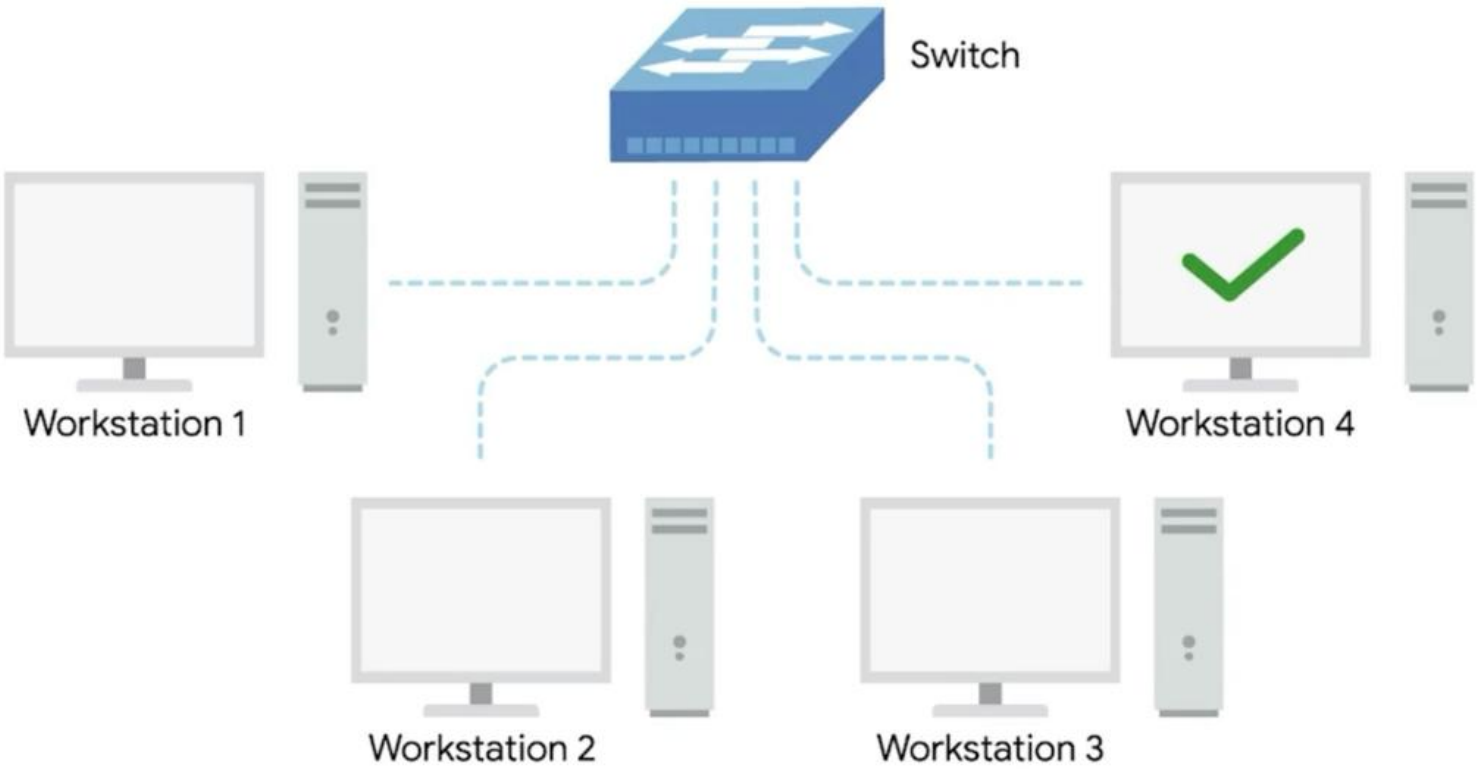

# Hubs

- **Hubs** are used to connect devices on the same network.
- They are used to **broadcast** data between devices, and to **forward** data packets to all devices on the network.
- They works at the **physical layer** of the OSI model, and use **electrical signals** to transmit data between devices.

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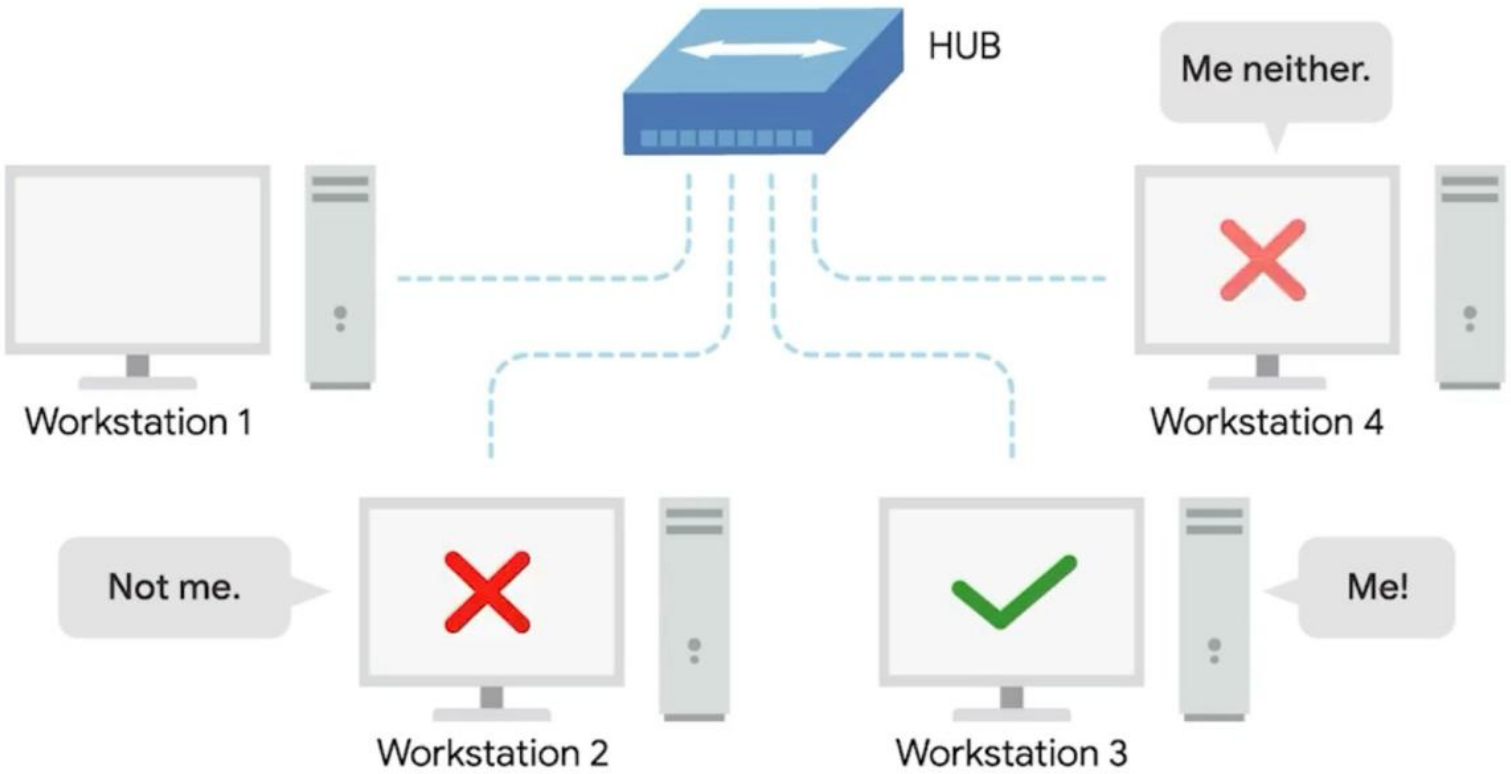
HUB
Me neither.
Workstation 1
Workstation 4
Not me.
Me!
Workstation 2
Workstation 3

# Repeaters

- **Repeaters** are used to extend the range of a network.
- They are used to **amplify** and **retransmit** data signals between devices.
- They are sometimes called **signal boosters**, and are used to overcome the **attenuation** of data signals over long distances.
- Also, they could be known as **bridges**, and are used to connect two networks together.

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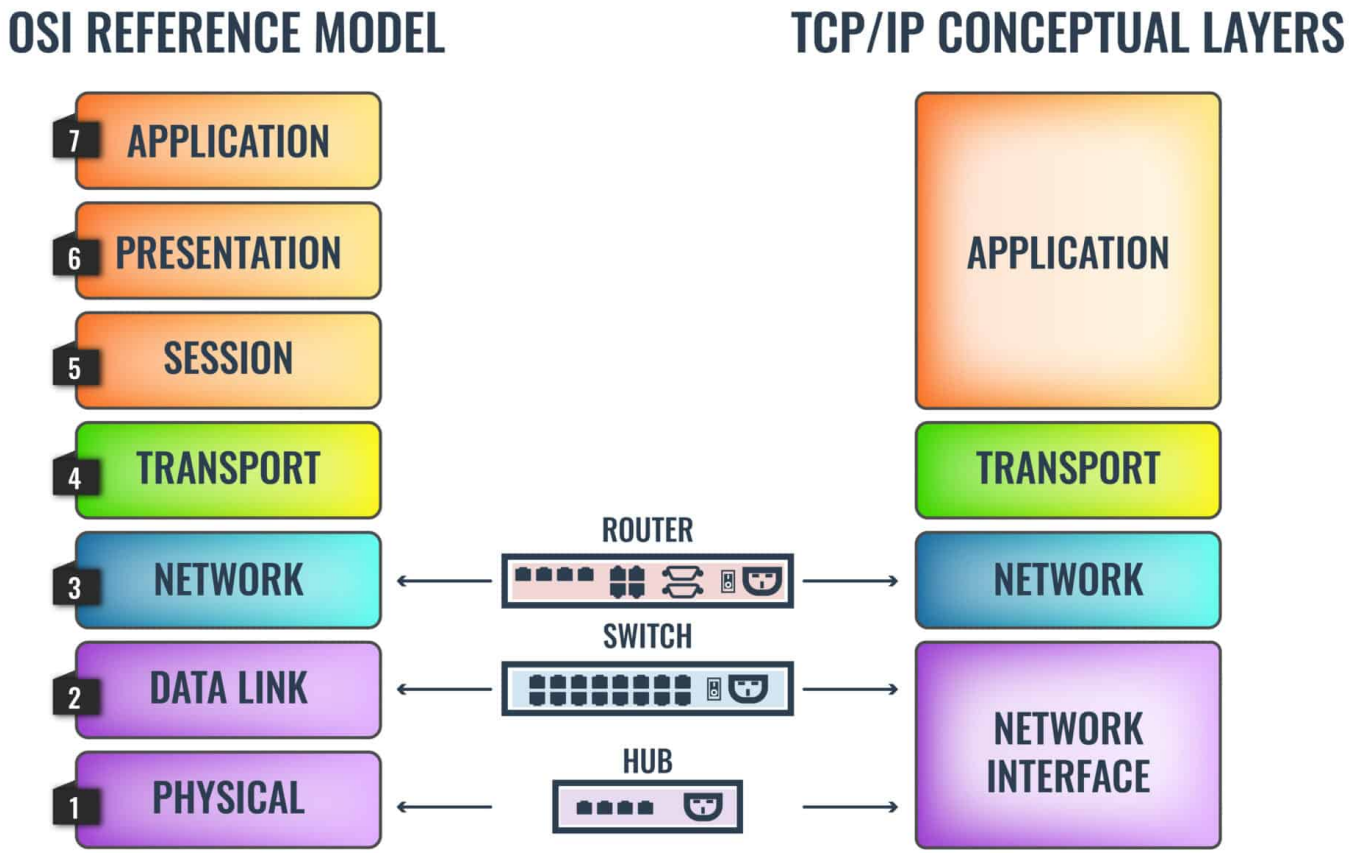
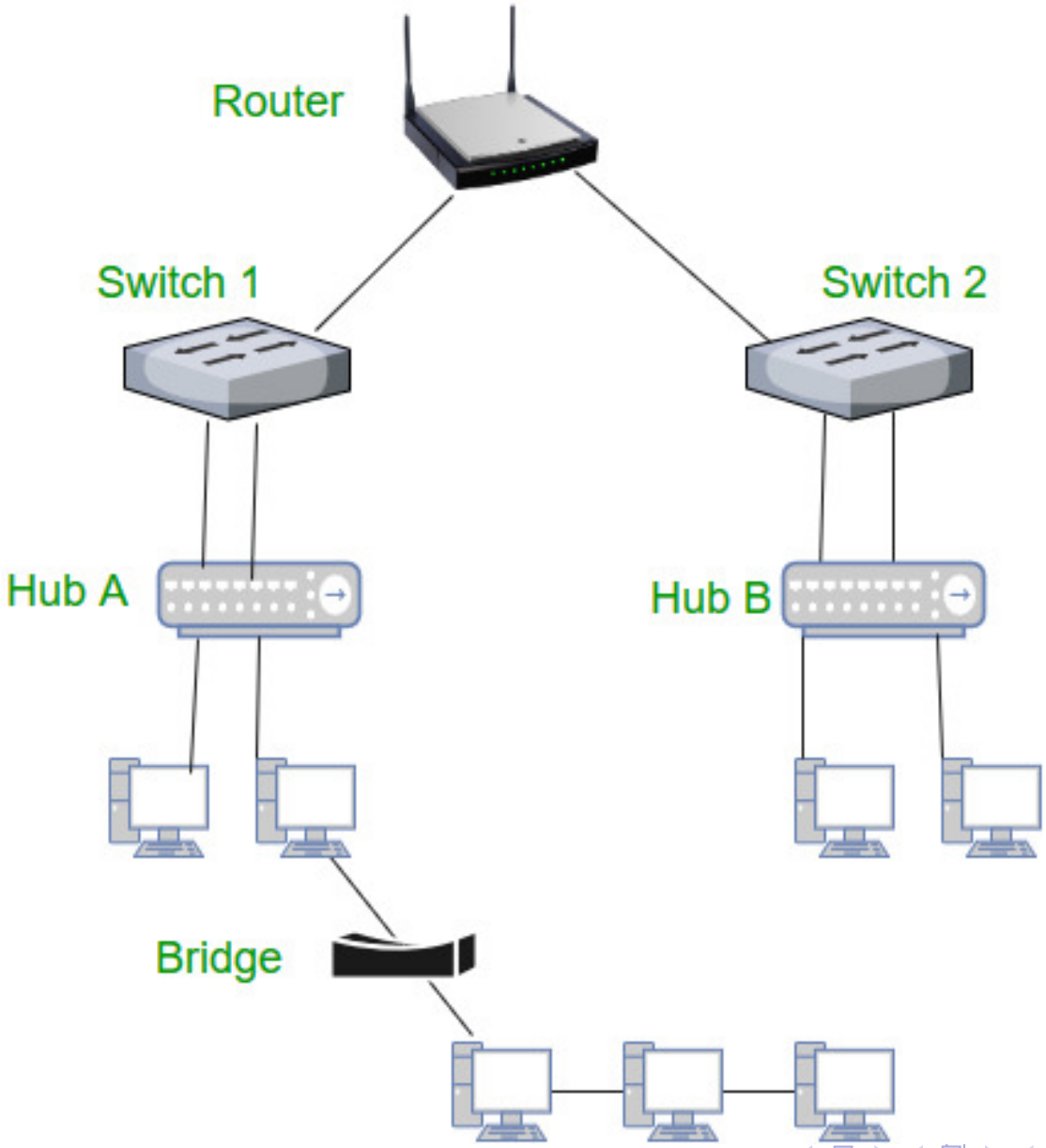
# Devices per Layer



# Case of Study: Network Architecture



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# Conclusion

- **Cables** are the most important part of a network, and are used to transmit data between devices.
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# Thanks!

# Questions?

Repo: *https://github.com/EngAndres/ud-public/tree/main/courses/computer-networking*

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