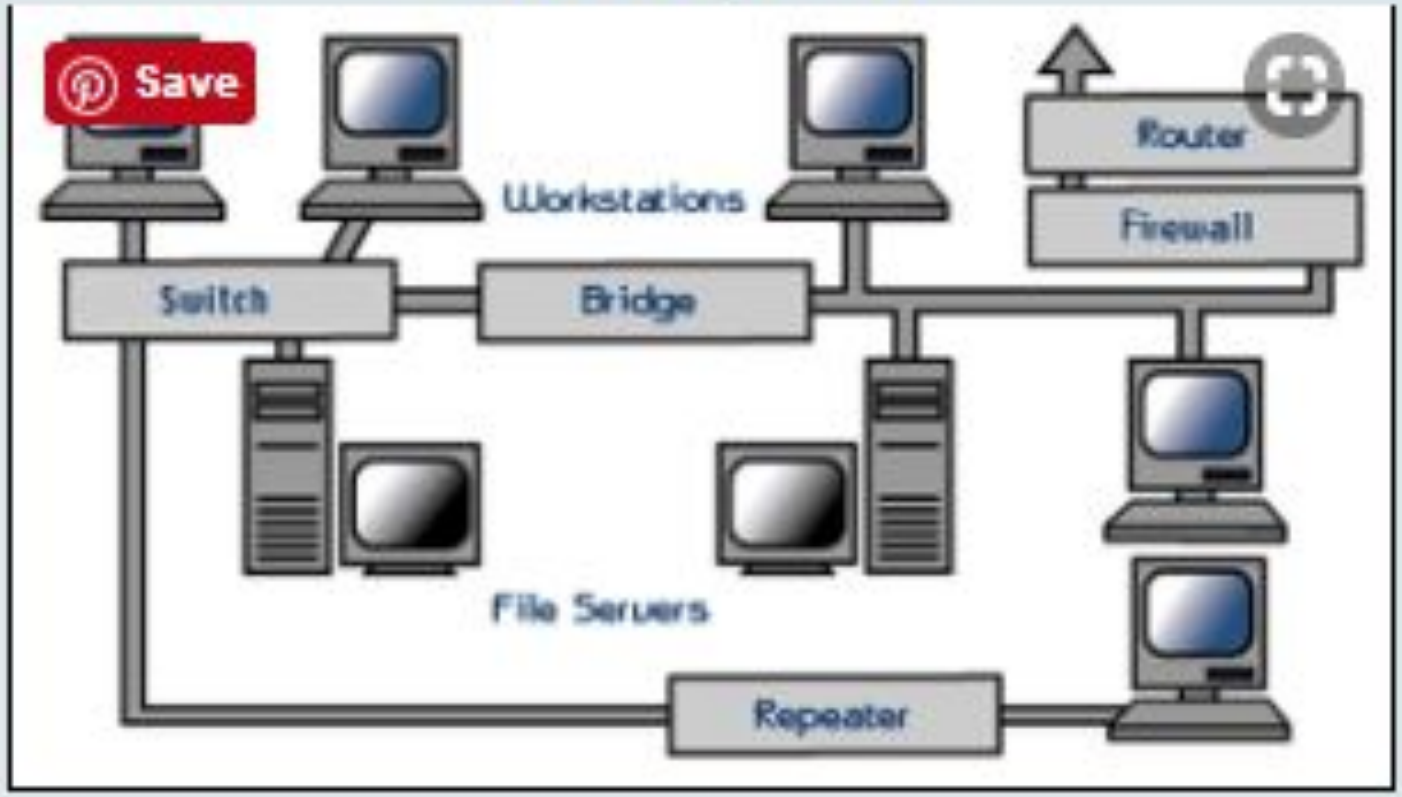
Network Devices

Key Concepts of this section:

- Understand that there are **seven** networking devices that can be used to construct a computer network.
- Know the **features** of each network device.
- Be able to **describe** the **role** that each networking device plays in the construction of a network.

In order to build a network, you need to use different types of hardware.

Examples:



Networks consist of various hardware.

Key Words:

Router, Network cards, Cable, Hub, Bridge, Switch, Modem.

Router

What are routers used for?

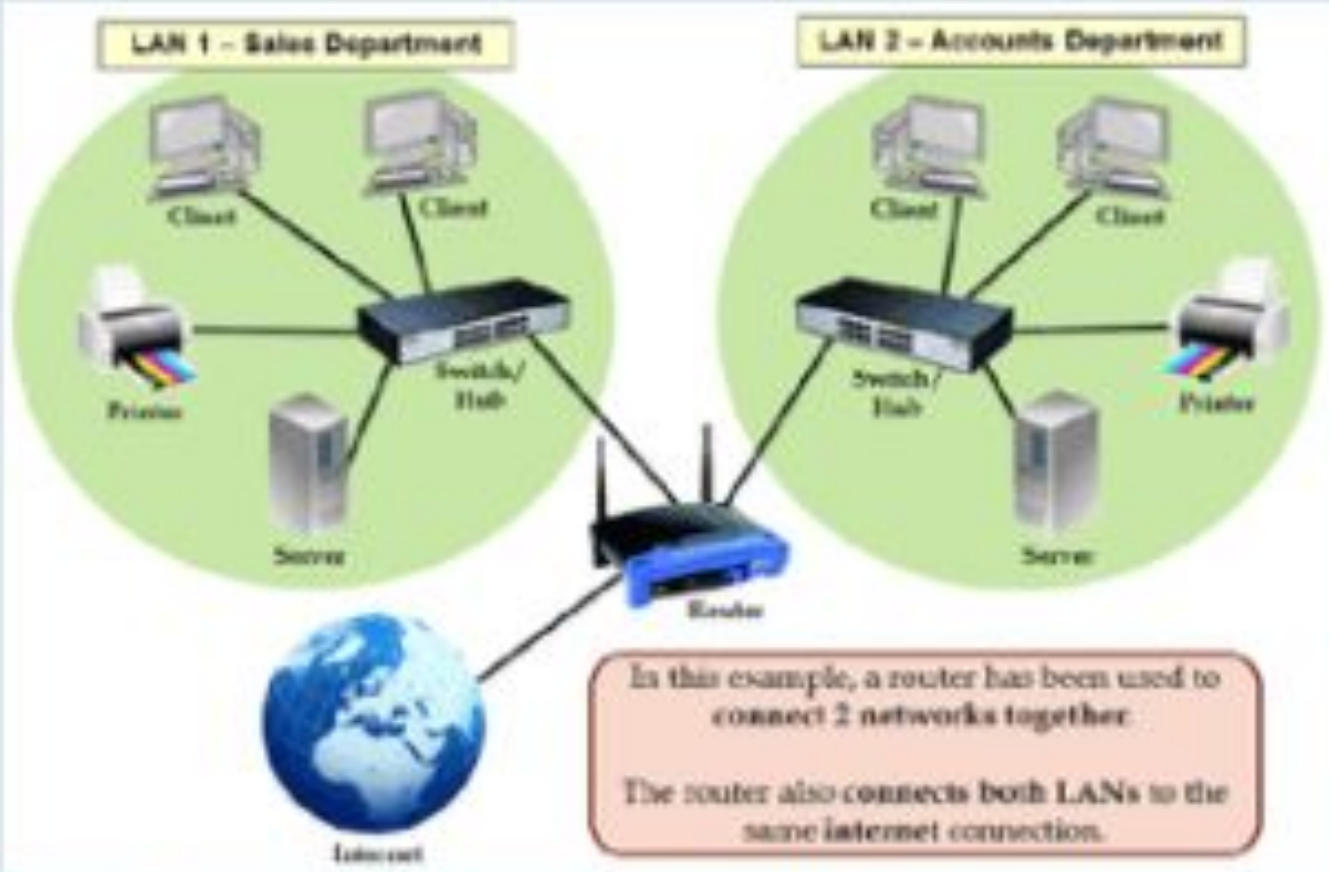
- Routers enable **data** to be **sent** (routed) between **different** types of **networks**.

For example:
A router could be used to connect a **LAN** (local area network) to a **WAN** (wide area network).

- Routers are most commonly used to **connect computers** and **devices** to the **internet** (WAN).

- Computers can connect to a router either through cables or wirelessly.

Examples:



Routers are used to connect networks together or to connect networks to the internet.
(click to zoom)

NIC- Network Interface Card

What are network interface cards used for?

Network Interface Cards are used to **connect** individual **computers/devices** to a **network**.

Modern computers usually come with network interface cards already **built-in**.

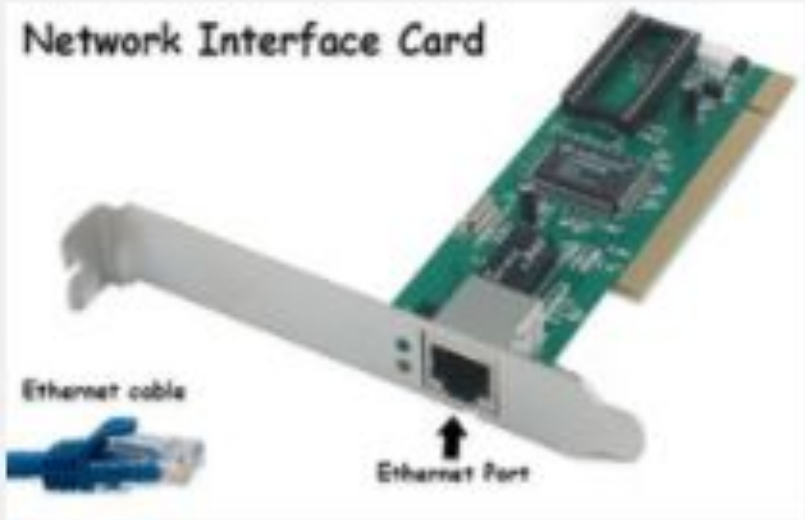
Network interface cards have **ports** which allow **network cables** to be **plugged in** and connect the computer to the network.

NIC- Network Interface Card - Types

Note:

There are **two** types of network interface card:

- Wired network interface card (Where cables are used to connect computers)
- Wireless network interface card (Where computers are connected using Wi-Fi)



A wired network interface card connects computers to a network using cables.

A wireless network interface card connects computers to a network using Wi-Fi signals.

Network Cable

What are network cables used for?

Network cables are **plugged** into a computers **wired network interface card** and connects it to the network.

Data is sent around the network via the network cable.

Cable holds **advantages** over wireless connections for two reasons:

- Cables can transfer data **faster** than wireless
- Data transferred over cables is **more secure** than over wireless (Hackers can't intercept data easily).

Network Cable - Types

Note:

Network cables are made up of different wires:

- Some wires are used to **send** data **to** the computer
- Some wires are used to **receive** data **from** the computer.

A network cable.

Network cables have connectors on each end that plug into network interface cards.

The wires inside a network cable perform different functions.

HUBS

What are hubs used for?

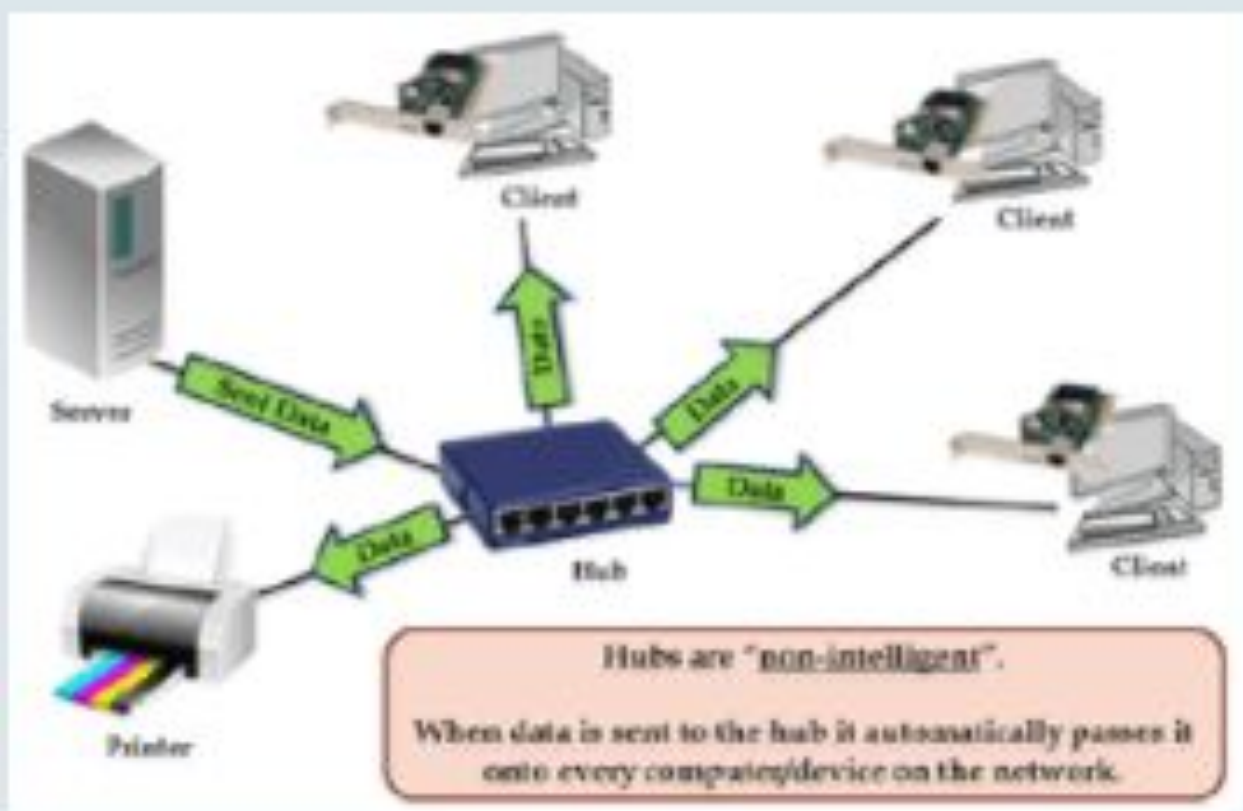
Hubs allow computers and devices to plug into their ports in order to **connect** to each other and **share files**, **data** and **resources**.

Hubs are '**non-intelligent**' devices and they **don't manage** any of the data that flows through them.

When data gets sent to the hub, there is **no attempt** to **locate** the computer/device that the data is **meant for**.

The hub simply sends the data onto **every** computer/device on the network.

This means that every device on the network will **receive** the **same data** whether they requested it or not.



Hubs are 'non-intelligent' devices and do not manage data flowing around the network. (click to zoom)

Examples:

Hubs allow devices to connect to each other by plugging network cables into their ports.

Switch

What are switches used for?

Switches are **similar to hubs** in that they connect computers/devices to form a LAN.

However, switches are '**intelligent**' devices and transmit data around the network **more efficiently**.

How do switches manage network data?

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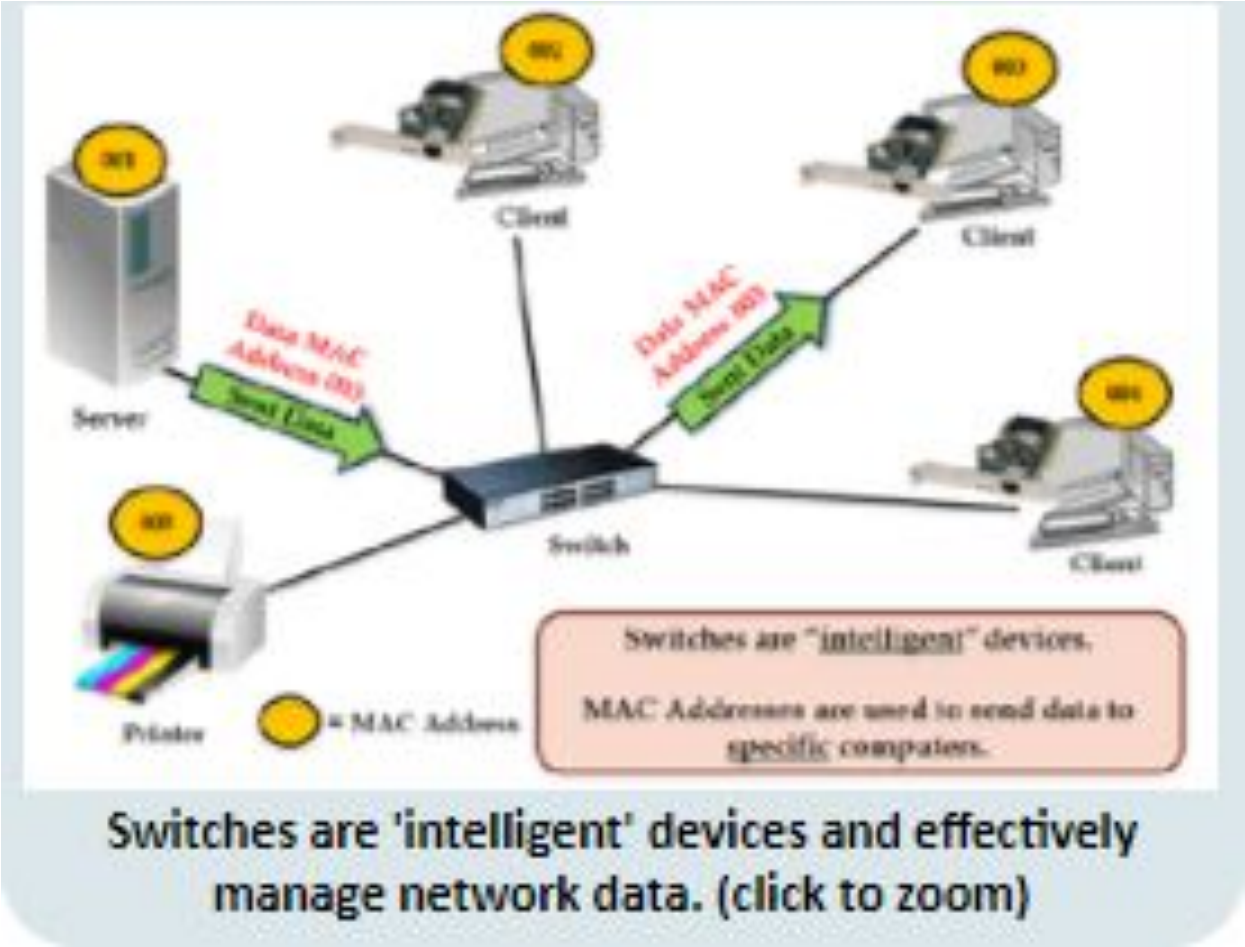
How switches manage data is summarised below:

- Each network device has a **Media Access Control (MAC) address** which uniquely identifies it.
- Data sent to the switch contains the MAC address of the **sending device** and the MAC address of the **receiving device**.
- The switch will **check** these addresses and only send the data to the **relevant device** rather than to all devices.

Switch



Switches are 'intelligent' devices and effectively manage network data. (click to zoom)

Examples:

A network switch works in a similar way to a hub in that it allows network devices to connect to each other.

Bridge

What are bridges used for?

- Bridges are used to **connect** (bridge) LAN's together.

- Bridges can **connect** different types of **networks** so that they act as **one single LAN** and thus can communicate with each other.

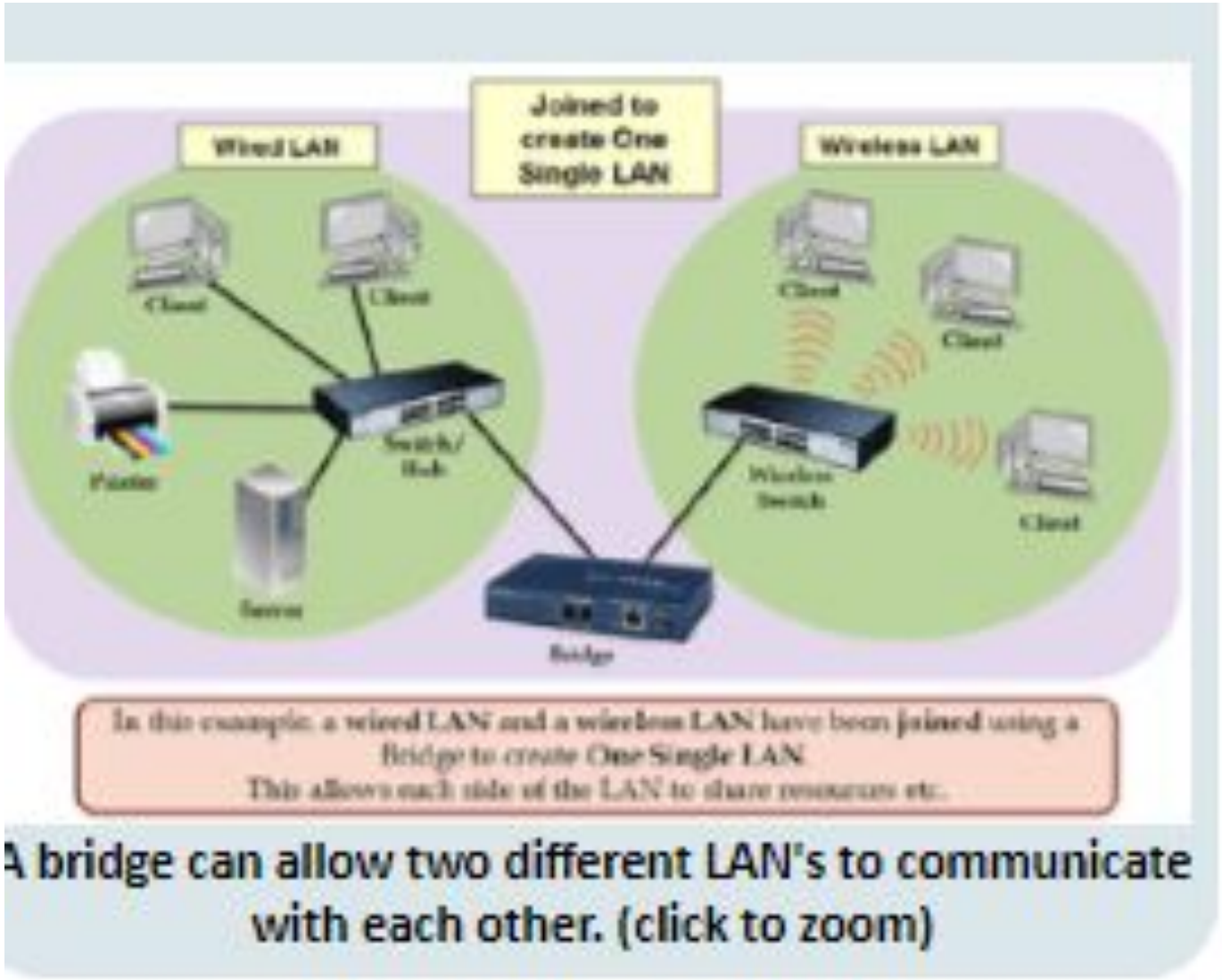
For example:

You have **two networks**. One network connects the computers/devices with **cables** and the other connects the computers/devices using **wireless**.

The cabled network **cannot communicate** with the wireless network and vice versa.

By using a bridge, all of the computers/devices can communicate with each other as **one single LAN**.

Bridge

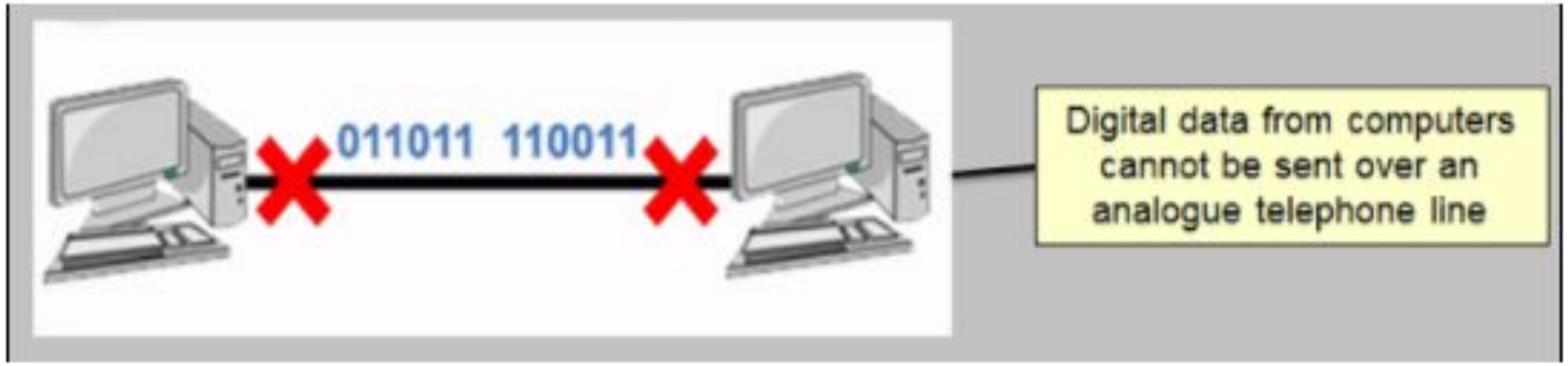


A bridge can allow two different LAN's to communicate with each other. (click to zoom)

How do modems work?

- Most internet connections are made over **telephone lines**. Telephone lines are designed to carry **sound and voices**, which are **analogue** signals.

- The problem is that computer data is **digital** and it is **not possible** to send digital data over an analogue telephone line.



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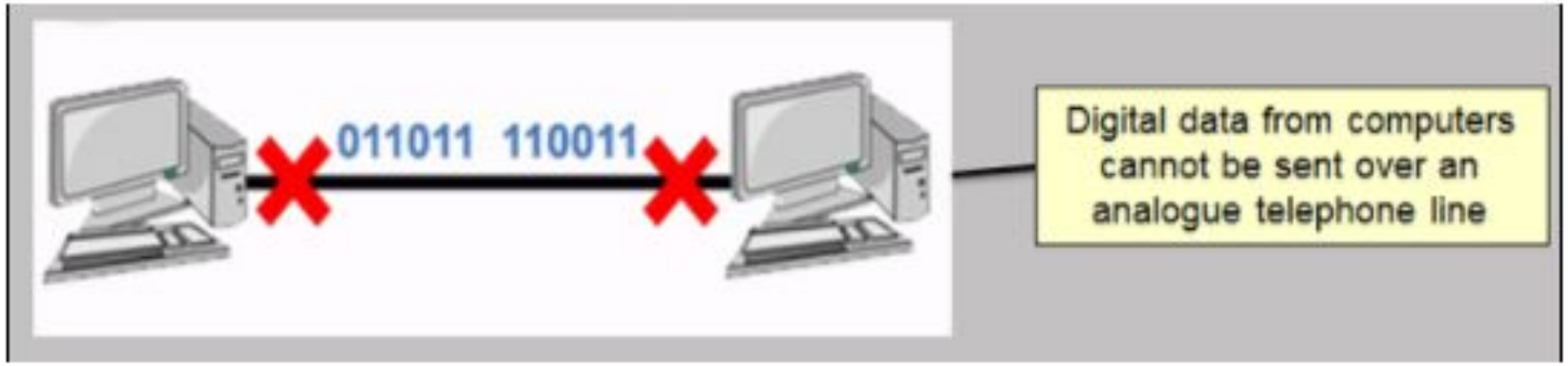

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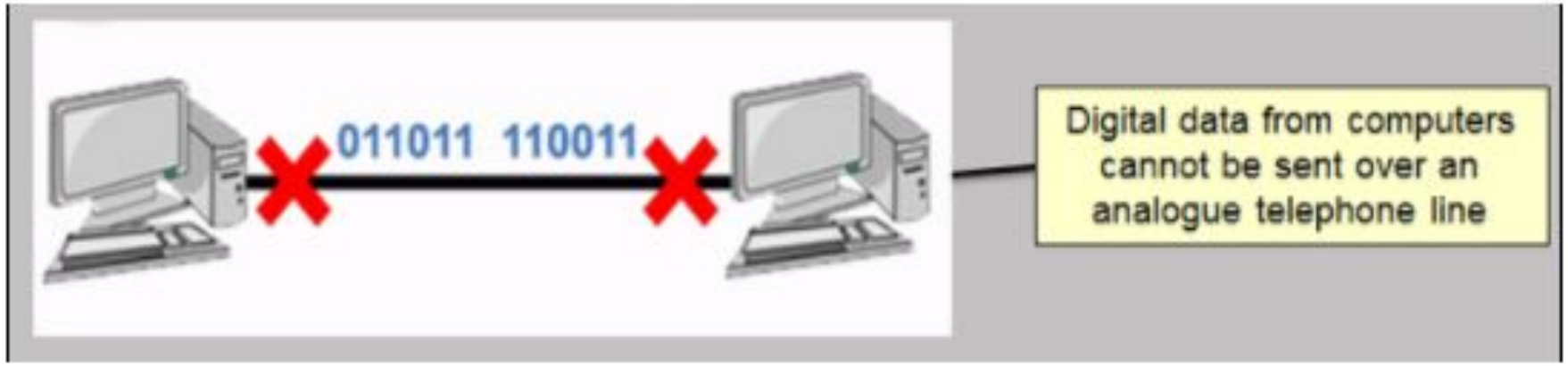

This is where the modem comes in.

The modem can **convert** the **digital** computer data into an **analogue** signal/noise **(modulate)** so it can be sent over the analogue telephone line.

Modems can also reverse this process and convert the **analogue** signals from the telephone line into **digital** data **(demodulate)** so the computer can use it.

Modems contain both a **Digital to Analogue Converter** (DAC) and a **Analogue to Digital Converter** (ADC).

Some modems have routers built-in and some don't. If you want to connect multiple devices to the same internet connection you will need both.