# 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:
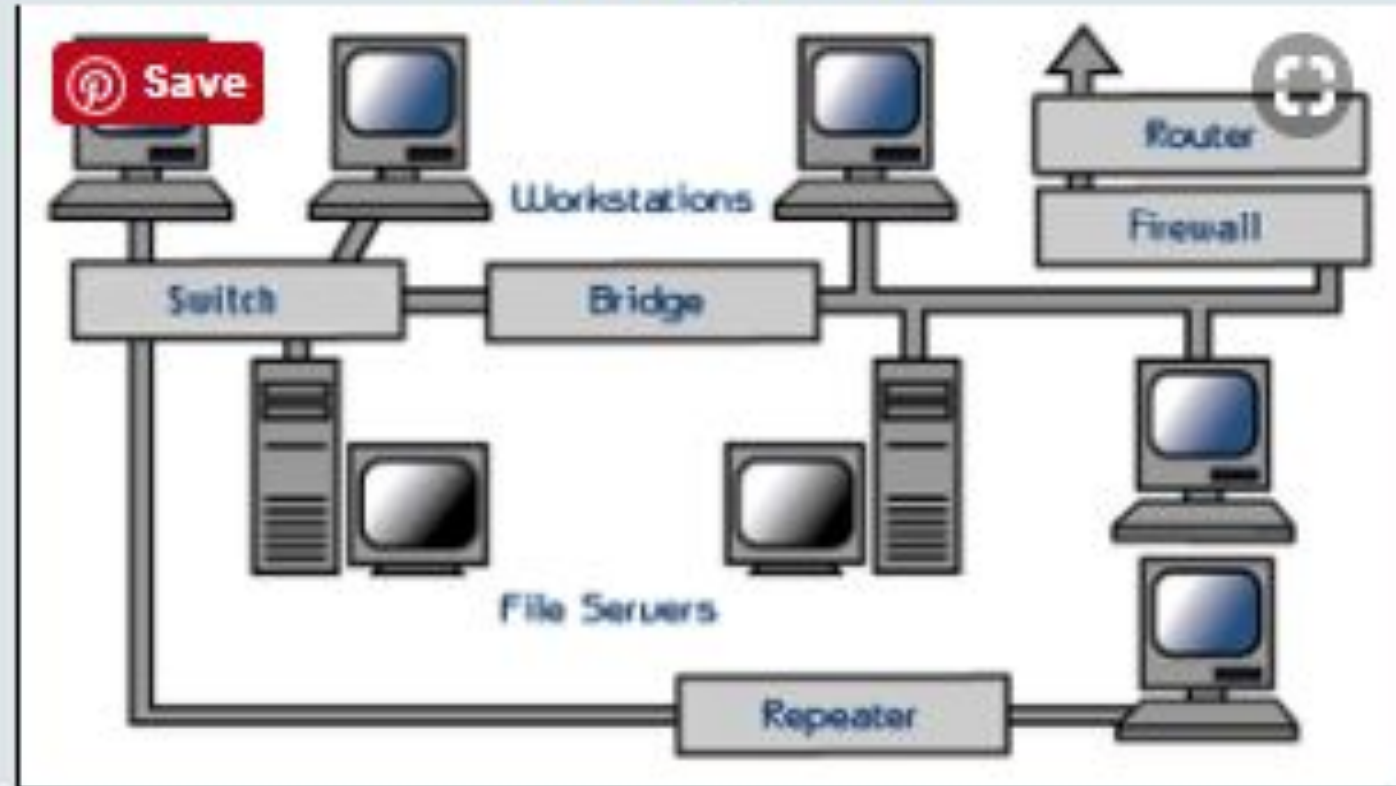
Networks consist of various hardware.

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:

LAN 1 – Sales Department

LAN 2 – Accounts Department

Client

Client

Client

Client

Printer

Printer

Switch/Hub

Switch/Hub

Server

Server

Router

Internet

In this example, a router has been used to connect 2 networks together

The router also **connects both LANs** to the same **internet** connection.

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)

Network Interface Card

Ethernet cable

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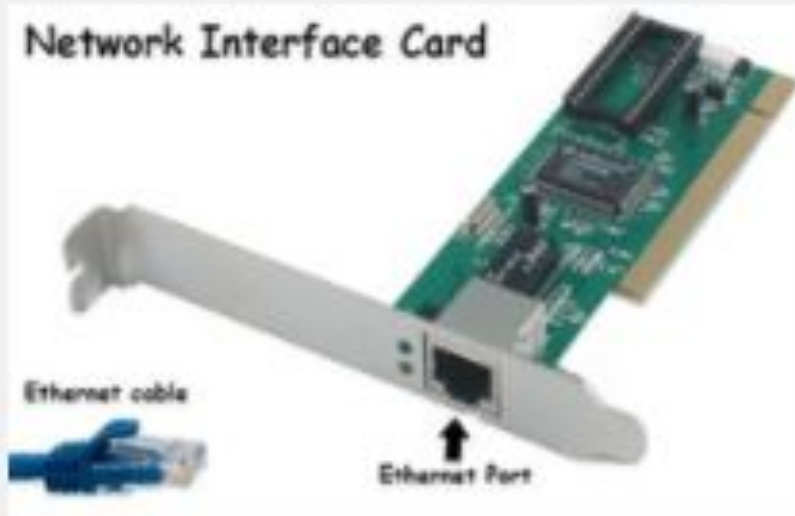
A wired network interface card connects computers to a network using cables.

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

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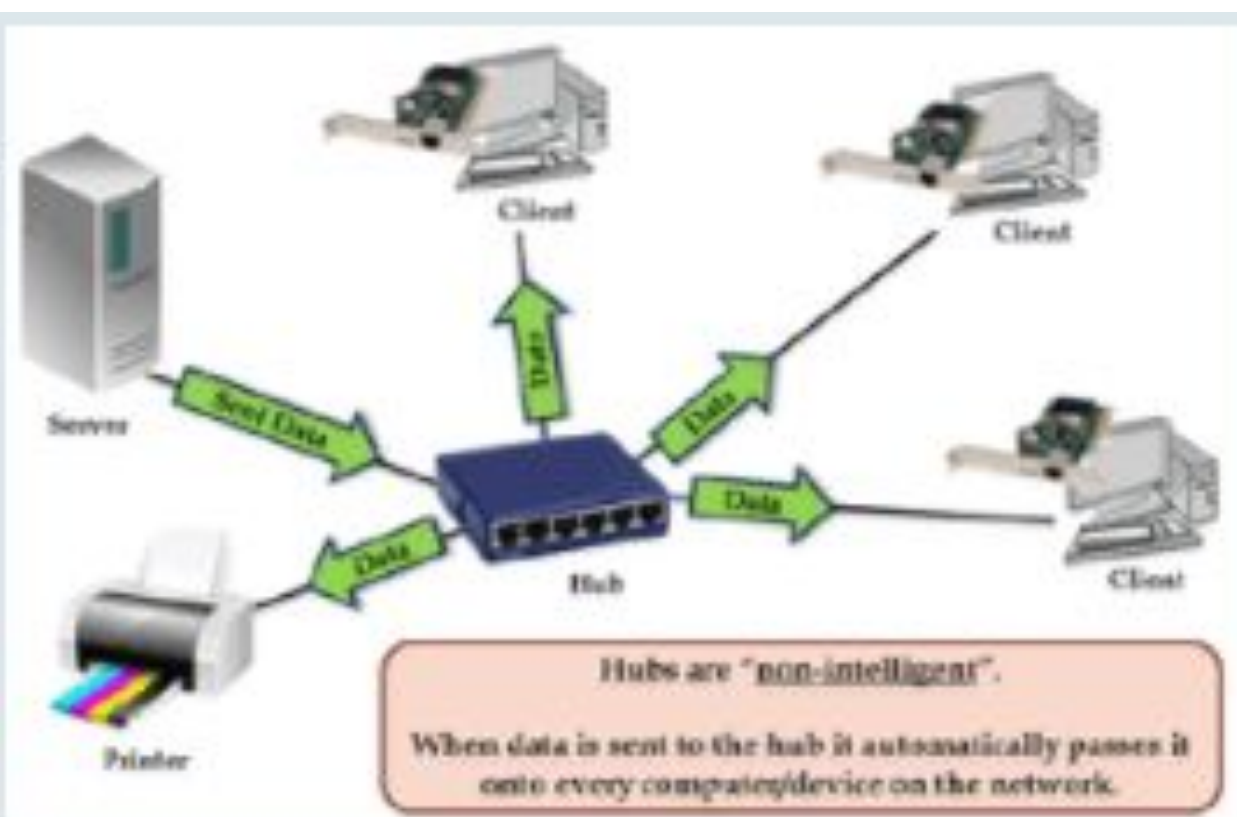
Hubs are 'non-intelligent' devices and do not manage data flowing around the network. (click to zoom)

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**.
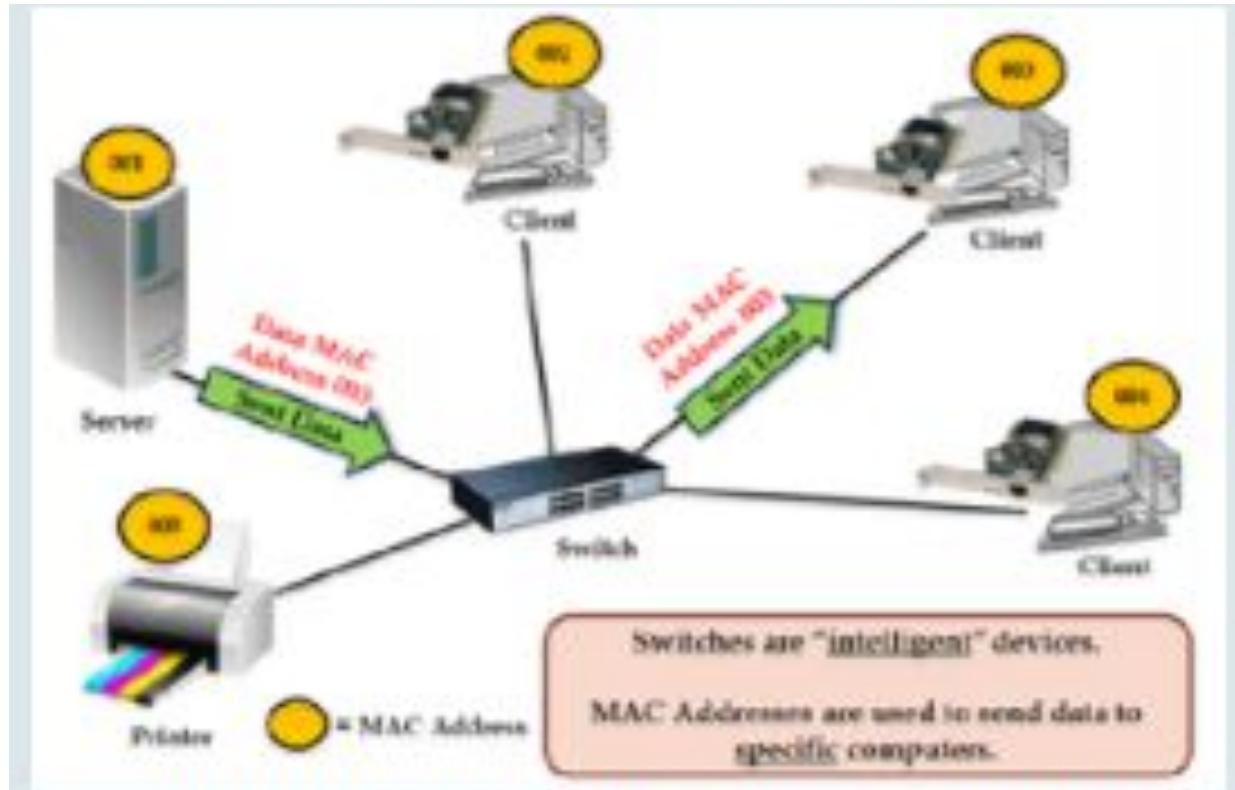
How do switches manage network data?

\#

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)

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.
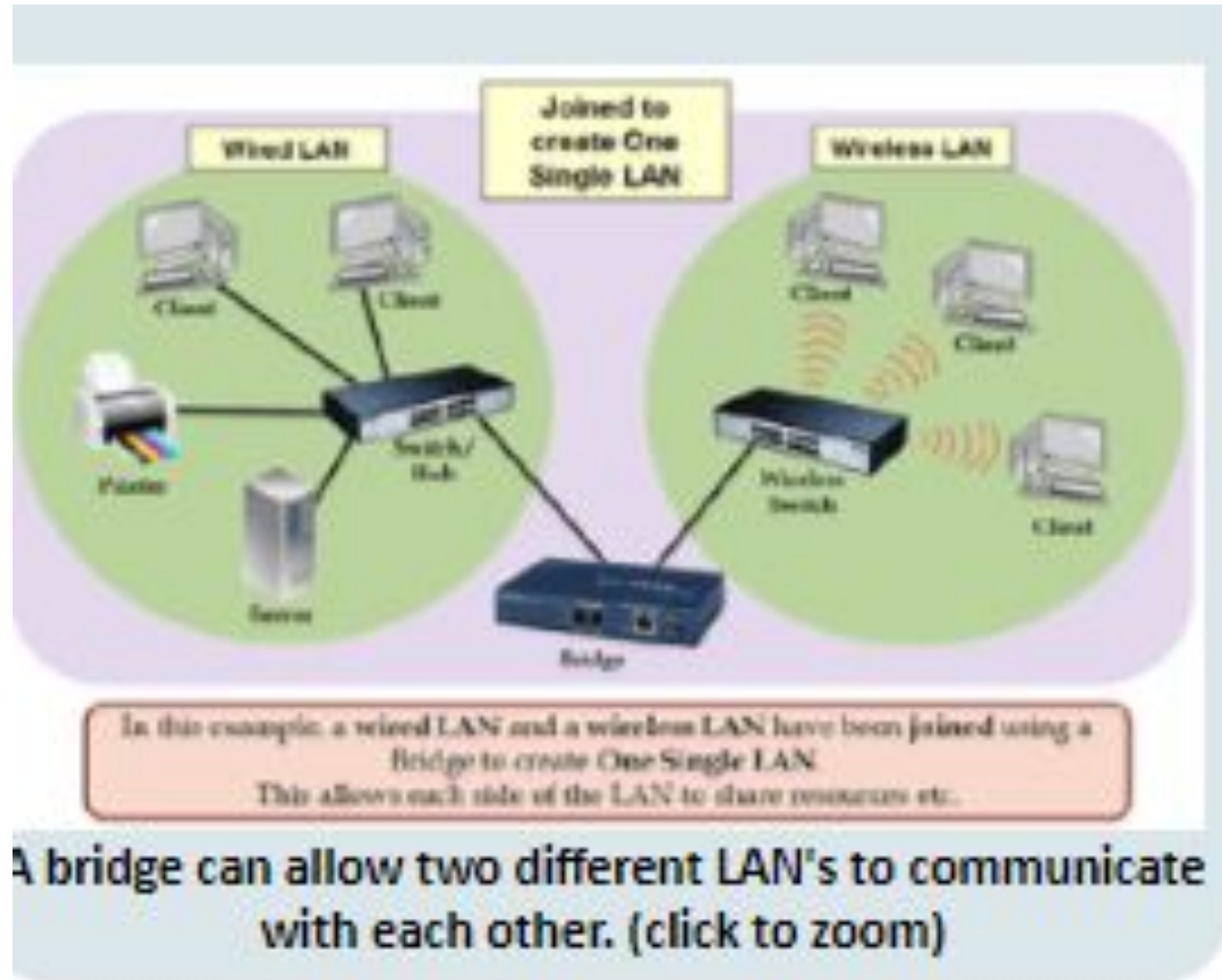
For example:

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**.
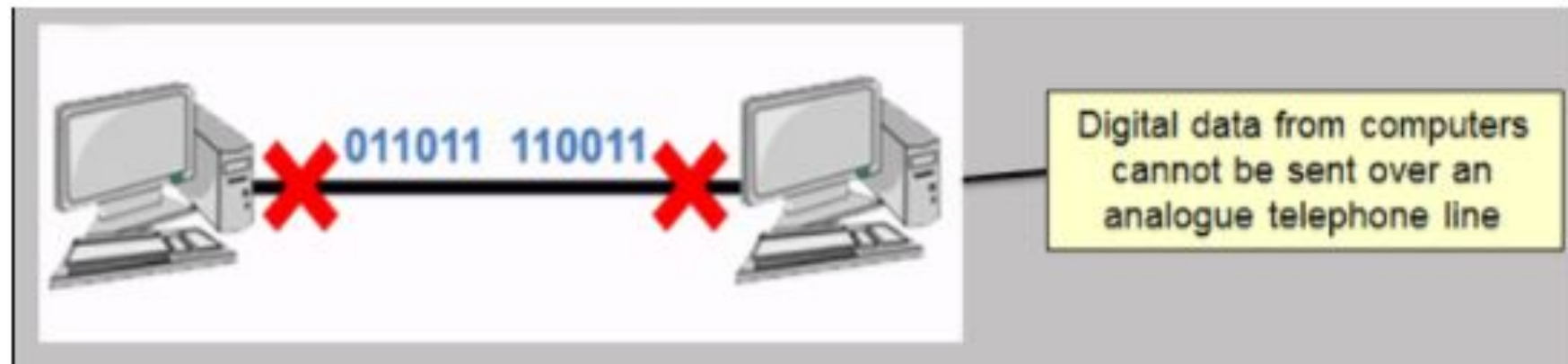
Bridge

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.

Analogue
signal (voices)

Telephone lines can only transmit analogue signals

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

011011 110011

Digital data from computers cannot be sent over an analogue telephone line

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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.