

Computer Networks

What is a Network?

A network is two or more computers, or other electronic devices, connected together so that they can exchange data.

For example; a network allows computers to share files, users to message each other, a whole room of computers to share a single printer, etc.

Network connections between computers are typically created using cables (wires). However, connections can be created using radio signals (wireless / wi-fi), telephone lines (and modems) or even, for very long distances, via satellite links.

Why Use Networks?

Using a computer connected to a network allows us to...

- Easily share files and data
- Share resources such as printers and Internet connections
- Communicate with other network users (e-mail, instant messaging, video-conferencing, etc.)
- Store data centrally (using a file server) for ease of access and back-up
- Keep all of our settings centrally so we can use any workstation

In particular, if we use a computer connected to The Internet, we can...

- Make use of on-line services such as shopping (e-commerce) or banking
- Get access to a huge range of information for research
- Access different forms of entertainment (games, video, etc.)
- Join on-line communities (e.g. MySpace, Facebook, etc.)

Why Not Use Networks?

Using a computer connected to a network means that...

- The computer is vulnerable to hackers
- If the network breaks, many tasks become very difficult
- Your computer can more easily be attacked by a virus

In particular, if we use a computer connected to The Internet...

- We have to be careful about revealing personal information
- We have to be careful to avoid suspect websites that might contain malware
- We have to be aware that information found on The Internet is not always accurate or reliable

Computers in a Network

Computers connected together to create a network fall into two categories: servers and clients (workstations).

Clients

Client computers, or workstations, are the normal computers that people sit at to get their work done.

Servers

Servers are special, powerful computers that provide 'services' to the client computers on the network.

These services might include:

- Providing a central, common file storage area
- Sharing hardware such as printers
- Controlling who can or can't have access the network
- Sharing Internet connections

Servers are built to be very reliable. This means that they are much more expensive that normal computers.

In a small network one server might provide all of these services. In a larger network there might be many servers sharing the work.

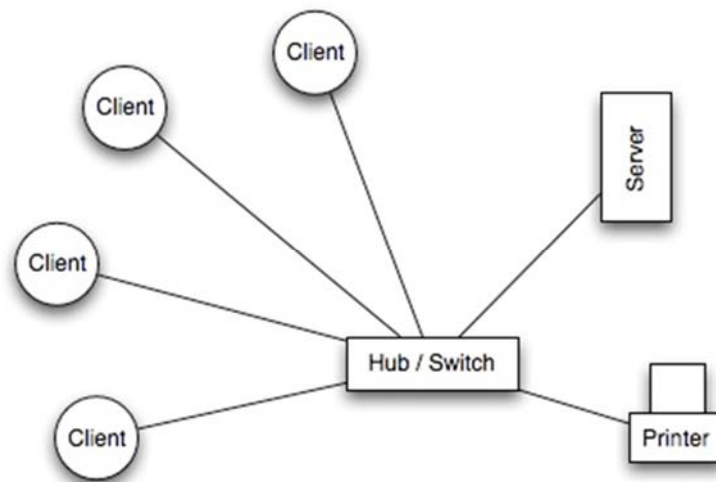
Types of Networks?

Local Area Network (LAN)

A Local Area Network is a network confined to one building or site.

Often a LAN is a private network belonging to an organization or business.

Because LANs are geographically small, they usually use cables or low-power radio (wireless) for the connections.

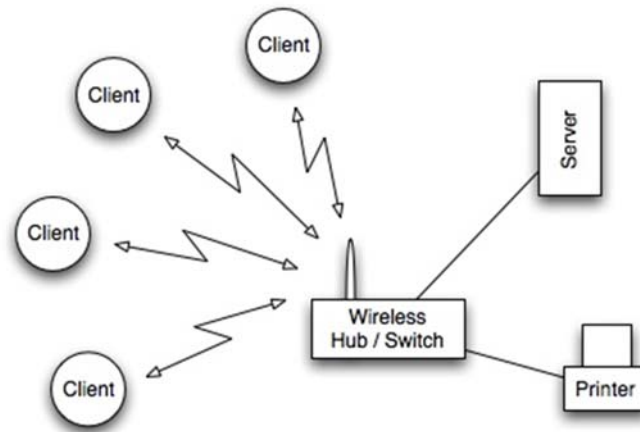


Wireless Local Area Network (WLAN)

A wireless LAN (WLAN) is a LAN that uses radio signals (WiFi) to connect computers instead of cables.

At the centre of the WLAN is a wireless switch or router - a small box with one or two antennas sticking out the back - used for sending and receiving data to the computers. (Most laptops have a wireless antenna built into the case.)

It is much more convenient to use wireless connections instead of running long wires all over a building.



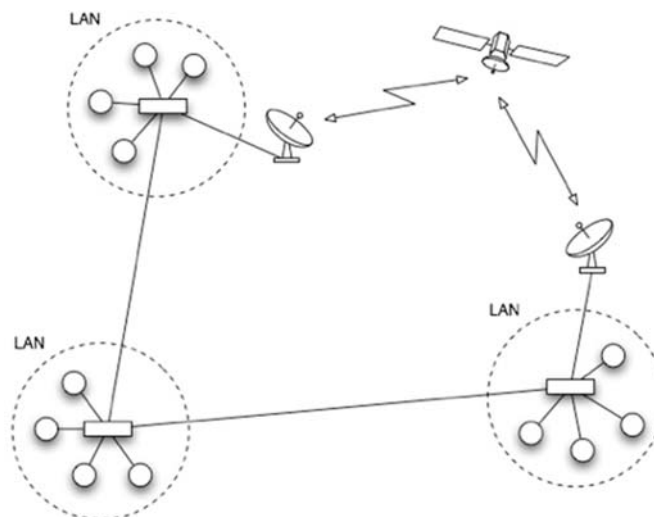
However, WLANs are more difficult to make secure since other people can also try to connect to the wireless network. So, it is very important to have a good, hard-to-guess password for the WLAN connections.

Wide Area Network (WAN)

A Wide Area Network is a network that extends over a large area.

A WAN is often created by joining several LANs together, such as when a business that has offices in different countries links the office LANs together.

Because WANs are often geographically spread over large areas and links between computers are over long distances, they often use quite exotic connections technologies: optical fibre (glass) cables, satellite radio links, microwave radio links, etc.

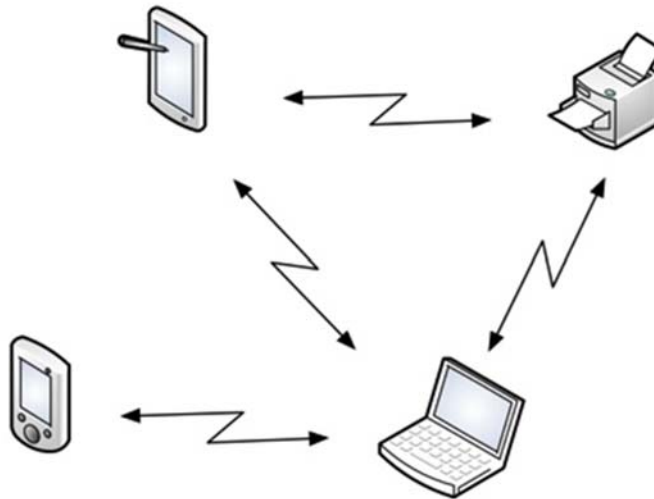


Bluetooth (Personal Area Network)

Bluetooth is a wireless networking technology designed for very short-range connections (typically just a few metres).

The idea of Bluetooth is to get rid of the need for all of those cables (e.g. USB cables) that connect our computer to peripheral devices such as printers, mice, keyboards, etc.

Bluetooth devices contain small, low-power radio transmitters and receivers. When devices are in range of other Bluetooth devices, they detect each other and can be 'paired' (connected)



Typical uses of Bluetooth:

- Connecting a wireless keyboard to a computer
- Connecting a wireless mouse to a computer
- Using a wireless headset with a mobile phone
- Printing wirelessly from a computer or PDA
- Transferring data / music from a computer to an MP3 player
- Transferring photos from a phone / camera to another device
- Synchronizing calendars on a PDA and a computer