Component 1: Networks

Characteristics of computer networks

Sharing. Of digital resources

Performance. Assessed in terms of speed of data transmission and number of users.

Reliability. Maintenance of data communication in case of hardware failure or connectivity issues

Security. A main characteristic of computer network where steps for protecting data from unauthorised access can be implemented.

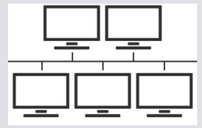
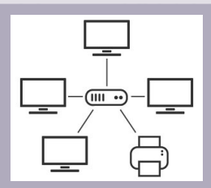
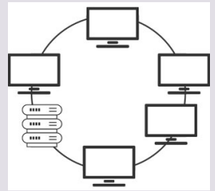
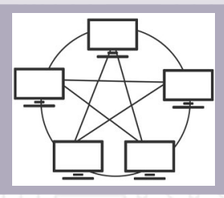
Advantages of computer networks

- Share hardware, software, data/files
- Allows internal communication/can send email
- Central backup
- Network activity can be monitored
- Centrally controlled security
- Can access data from any computer.

Disadvantages of computer networks

- A network manager may need to be employed
- Security problems – files sent between computers could spread a virus
- If the server is down, all workstations on the network are affected
- Initial cost of servers, devices etc.

Term	Definition
Network	A collection of computers, servers and other devices (nodes) connected to one another to allow the sharing of resources and data.
Network topology	The arrangement of the nodes and of the connections between them that make up a network.
Node	A node is any physical device within a network that is able to send, receive, or forward information. Computers, routers, switches and servers are all nodes.
Connectivity	Methods for connecting devices to each other in order to transfer data, including cabling and wireless.
LAN	Local Area Network. A network in which the connected computer systems are relatively close to each other. Connections are normally wire or fibre optic cables.
WLAN	Wireless Local Area Network.
WAN	Wide Area Network, such as the internet. Networks of computer systems that are geographically remote. Connection methods include microwave links, undersea cables and communication satellites.

Topology		Advantages	Disadvantages
BUS		Simple, with all devices to be connected via a single cable. More nodes can be easily added by joining additional cables.	If the cable experiences a failure, the whole network goes down, which can be time-consuming and expensive to restore.
STAR		A stable and secure network layout; should one node fail, the rest of the network will continue functioning unaffected. Devices can be added, removed, and modified without taking the network offline. Centrally managed.	If the central hub goes down, the rest of the network cannot function. Overall bandwidth and performance are also limited by the central server's configuration and technical specification.
RING		Efficient at transmitting data without errors as only one station is permitted to send data at a time, reducing the risk of packet collisions.	If one node goes down, it can take the entire network with it. The addition of more devices can result in communication delays.
MESH		Reliable and stable. Node failures will not bring network down	Complex, with high cabling costs.

Hardware used to establish connectivity.

Router

A device designed to receive, analyse and move incoming packets to another network. Routers are commonly used in home networks to share a single internet connection between multiple computers.

Hub

A network hub serves as a connection point for all devices in a LAN. It has no routing tables or intelligence on where to send information and broadcasts all network data across each connection.

Switch

A LAN device that determines where to send each incoming message according to the physical device address called the Media Access Control (MAC) address.

Bridge

A network bridge is a device that can create a single network by connecting two or more networks together so that they work as a single network.

WAP

Wireless Application Protocol (WAP) is a technical standard for accessing information over a mobile wireless network.

NIC

A network interface controller or card (NIC) is a computer hardware component that connects a computer to a computer network.