**Computer Networks**

A computer network is a system of connected computers, peripherals and communication devices that can exchange data and share resources. If the network is limited to a single building or group of buildings then it’s described as a Local Area Network (or LAN). Computers in a LAN can be linked together directly but more commonly are linked through a hub or switch. The network connections can be cable, fiber-optic or wireless. A router acts as an interface between networks, passing data packets back and forth between them.

Hardware can be shared by all the computers on the network. Some software and files such as databases can be shared by different users. An Internet connection can also be shared.

A network adapter such as a network interface card (NIC) is needed to connect computers and other peripherals to a network, either by cable or wirelessly. Each connected device is allocated an IP address to uniquely identify it on a TCP/IP network.

A hub is used to link computers and peripherals together in a cabled network that uses a star topology. It doesn’t manage any of the traffic that comes through it, any data packet entering any port is sent out to all the connected ports.

A switch is used in the same way as a hub but the switch uses the IP address of the data packet to direct the data to the correct device, rather than being sent out to all the connected ports.

A wireless access point is a device that allows computers, printers and so on to connect to wired network using radio waves rather than cabling, provided they’re equipped with a wireless NIC.

There’re 2 types of networks. A client-server network is a connection between a client computer and a server computer for the purpose of providing the client with resources. And in a peer-to-peer network computers are simply linked together, either using cables and a hub or with a wireless connection.

A network topology is the name given to the way in which devices are physically connected in a network. There’re 3 common network topologies: ring, bus and star. In a ring network the devices are connected in a ring and data travels in one direction using a control signal called a “token”. In a bus network all devices are connected to a main cable using special T-connectors. In a star network a central computer is connected to the other devices either through a switch or hub.

A WAN covers a much larger geographical area than a LAN. The largest WAN is the Internet itself as it’s a global network of linked computers and LANs.

An Internet Protocol (IP) address is a unique address number that’s allocated to devices on a computer network that uses the Internet Protocol. Media Access Control address (MAC address) is a unique 48-bit number assigned by the manufacturer to any hardware device used to connect to a network. Modern computer networks carry data by breaking it down into a series of distinct units called data packets, rather than sending it as a continuous stream of data.

A communication protocol is a description of the format that digital data has to be in and the rules for hardware/software to communicate that data. Examples include the Internet Protocol Suite, the set of communication protocols used for the Internet and similar networks. They’re TCP/IP, HTTP, FTP, SMTP, UDP and TLS/SSL.

A network needs security to prevent unauthorized user access to the information stored on the network and unauthorized access to hardware managed by the network. Some network security techniques include user access levels, suitable passwords, access restrictions, encryption, physical security, firewall, antivirus software, proxy servers, Wi-Fi access restrictions and filtering.