

### **Peer to Peer Network:**

- Is a simple network in which two or more devices are connected directly without the use of intermediary network devices such as switches or hubs, routers, wireless etc. Often they use crossover cables. So printer connected directly to desktops via Ethernet (We don't use it at home since we have a router)

### **Advantages of Peer to Peer network:**

- Easy to set up
- Lower cost since network devices and dedicated servers may not be required
- Can be used for simple tasks such as transferring files and sharing printers

### **Disadvantages of Peer to Peer network:**

- Not scalable
- All devices may act as both client and servers which can slow performance
- Not as secure

### **Switching networks:**

- Use intermediary devices (routers, switches, hubs) such as switches to support more network hosts. Different types?

**Circuit switched network:** (telephone/old internet networks now fibre because limited to how fast transfer)

- Is a method of implementing a telecommunication network with two nodes/devices
- Establish a **set path (one)** with dedicated resources for the length of the call. They are commonly used in phones since they need full dedicated resources i.e. (no buffering)
- Sends data as electric current (not packets)
- +ve full bandwidth (no buffering)
- +ve low cost and

### **Packet switched network (internet):**

- Data networks use packet switch networks

- Packets: Unit of data that is routed between origin and destination. It allows the same paths to be shared among many users. Makes data smaller so less delays and
- Packets can transverse across any path (most efficient and no dedicated resources and not allocation for each flow.
- Prior transmission each communication broken into packets via addressing and numbering and will go to destination with best path. The packets will reassemble in order of sequence number at destination

#### **Packet switching network vs circuit network:**

- Circuit switches provides predictable service due to dedicated resource but is inefficient and not fault tolerant because circuit
- Packet switching is more efficient and fault tolerant but unpredictable:
  - Users share same resources (multiplexing)
  - User can get extra capacity when network is unused vice versa (nbn 6pm packet delay)
  - Packets can be routed around faults (circuit can't) many more path

#### **Network Convergence**

- Idea that we can unify all these communication services and services (Telephone, video, data normally have a single seperate network) in to a single network. So we don't have many networks eg: one for voice, one for data, video etc.
- The internet lends itself to convergence as it never designed for one single purpose

#### **Disadvantages/Challenges of Network Convergence:** (networks never designed to be shared)

- Different types of traffic have different network requirements eg: data, voice, and video. voice call you don't want buffer) but internet don't mind delay
- Data networks were not designed to transfer voice or videos
- Operating with voice, video and data over the same network is a very complex task
- Cause **packet delay**
  - Traffic is broken up into packets and transmitted over the internet

- The speed of arriving traffic can be greater speed at which it can be sent this therefore creates a queue which means there may be small delays in voice and video streams buffers
- To reduce this delay sensitive traffic (voice, video, and vital transactions) must be prioritised – **Quality of service**

Components of network

**End Device:**

- Devices are end points used to communicate with each another on a network
- Some devices will operate at every level OSI (PC webserver)
- Other specialised
  - Routers –network layers
  - Switches- data link layer (frames from one device to another)
  - Hubs- physical layer

**Communication Medium:** how devices are connected together eg: Ethernet cable and wireless, copper, and fibre

- Ethernet: eight wires at each end
- Straight through cable: order of wiring should be same on both. Connect devices different types
- Crossover cables: The green and orange colour pins switched (Test by both face up). Two devices of same type

**Messages:** information (data or packets) that travels over the medium

**Protocols: (rules)** governs how message flows across a network

- Open and interoperable protocols: are vital for the internet means that diverse range of devices can communicate using the same network eg: IEEE Institute of electrical and electronic engineers

- Protocols are systems of rules that define syntax semantics and synchronization of communication between computer and software EG: people must speak same language, computers and software must use same protocol
- They define how computers/application communicate
  - Basic rules
  - Message encoding (convert information into acceptable form)
  - Reliable transport

Network types:

- **Lan network (local area network):** is a collection of computers and other networked devices that fit within the scope of a single network serving one home, building or campuses like uni, schools (phones, router, laptops)
- **WAN (wide area network):** are just a network of multiple Lan networks separated by geographical distances eg: isps or two branches of business think two
- **Internet:** global mesh of interconnected networks (made up of wan and lans etc) commonly called network of network. Hierarchy
  - Each segment of the internet is owned and controlled by different entities. EG: Telstra own network, then iinet resellers

**Open system interconnection model (OSI):**

- Designed by International standard organisation (iso) and is Reference model for communication networks
- Model relies and interact with other layers via layer is served by layer below **Encapsulation**
- Layers are independent with standardised interfaces between layers (changes in one layer doesn't affect other)
- Makes protocol design easier

Summary of OSI model structure layers

- Application, Presentation, Session

- Transport
- Network
- Data Link, Physical

Summary of TCP or IP model structure (used in practise)

- Application (3 OSI layers)
- Transport (1 OSI layer)
- Internet (1 OSI)
- Network access (2 OSI)

Network Speed vs Data Storage:

- There are bits (small: b) and bytes (big chunks: B)
- Speed use bits

- 1 kb = 1000 bits (1000)
- 1 Mb = 1,000,000 bits (1000 x 1000)
- 1 Gb = (1000)<sup>3</sup>
- 8 bit = 1 bytes (MY INTETNET 100Mb/8 = 12.5 MB/s)

- Storage use bytes; MB, GB, kB used to use 1024 (kiB, MiB)

DO THE MATH QUESTION CONVERSION THINK TO POWER THEN DIVIDE

\*May need to add peer to peer network

\*Focus on conversions

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Local area network:

- Network for campus etc

Wan (Wide Area Network)

Internet:

Structure of internet:

- Internet is a hierarchical network
- Each segment of the internet is owned and controlled by different entities

ISO OSI Model

- Open systems interconnection
- Developed by the international standards organisation
- Reference model for communication networks
- Layers: Physical, Data link, Network, Transport, Session, Presentation, Application
- These layers will interact by the process called encapsulation process

Encapsulation process:

- Data comes from application transport header ports added

Transport layers:

- Defines protocols end to end delivery of application data
- Controls amount of data to send
- Provides error detection and correction
- Define application addressing
- EG: tcp (transmission control protocol) and udp

Network layer:

- Defines the packetisation and end to end transport of data does it through
  - Logical device addressing (IP addresses)
  - Routing of packets from source and destination (which paths)

Data Link layer:

- Controls data transport over a single link or network segment
  - Devision of data frames
  - Medim of access control
  - Eg: ethernet

Physical layer:

TCP/IP model:

- Simplified vesion of osi model based on the internet
- Application, transport, internet, network access

Networking devices:

- Some devices operate at every layer
- Some devices operate at lower layer- Routers (network layer), switches, and hubs

Speed vs storage

- 8 bits in a single byte
- Network bits vs storage
  - Units for network: kb/s Mb/s Gb/s



- Storage unit: Kb, MB, GB

1 Kilobits (kb) = ? Giga bits (Gb)

- 1000

1 Bytes (B) = ? Mega bytes (MB)

1000 bytes = 1 KB