LESSON NOTES 12

Year/Level: 12   **Subjects: Computer Studies**

Strand:	Computer and Applications
Sub-strand:	CE 12.1.5 Communications and Networks
Content Learning Outcome:	❖ Network architecture

Lesson Notes
Network Architecture

- ❖ Network architecture describes how a network is arranged and how the resources are coordinated and shared.
- ❖ It is divided in two major parts: **topology** and **strategy**.
- ❖ Network topology describes how a network is configured and arranged while strategies define how resources are shared.

There are six different topologies that exist today.

Bus network

- ❖ Is where each device is connected to a common cable called a bus or a backbone and all communication travel along this bus
- ❖ The bus network is typically used when only a few microcomputers are to be linked together.
- ❖ This arrangement is common in systems for electronic mail or for sharing data stored on different microcomputers.

  Advantages
  - Less expensive
  - If a computer is down it does not affect the rest of the network

  Disadvantages
  - Inefficient for sharing common resources

Ring network

- ❖ Is where each device is connected to two other devices, forming a ring.
- ❖ Both the bus and the ring topology passes the message from device to device till it reaches its correct destination.
- ❖ With micro computes, the ring arrangement is the least frequently used of the four networks.
- ❖ However, it is often used to link mainframes, especially over wide geographical areas. These mainframes tend to operate fairly autonomously.

  Advantages
  - Computers can perform processing tasks at their own dispersed locations
  - Can also share programs, data, and other resources with each other

  Disadvantage
  - Computers linked together could easily be infected with virus
  - If ring is broken or node not working then communication is down

Star network

- ❖ Is where each device is connected to a central device usually a switch
- ❖ When a node sends a message, it first goes to the switch which then verifies and forwards the message to the correct destination device.
- ❖ The star network is the most widely used network topology in the world.

  Advantage

- Used to provide a time-sharing system where several users can share resources on a central computer

- Close control can be kept over the data
  Disadvantages
    - It is also expensive to install or setup a star network
    - Data communication could be slow at times

Tree network
- ❖ Is also known as a hierarchical network where each device is connecting to another device which may be connected to other devices
- ❖ It forms an upside down tree where the root device is usually the most powerful
  Advantages
    - Tree network is suitable for centralized organization, allowing various computers to share database, processing power and different output devices
    - Easier maintenance and fault findings
  Disadvantages
    - It is also expensive to setup a tree network
    - Huge cabling is needed

Hybrid network
- ❖ Is a mixture of all other topologies
- ❖ Big organizations have lots of smaller networks based on differing topologies which are then interconnected
  Advantages
    - Hybrid Network is flexible, can be designed according to the requirements of the organization by optimizing the available resources
    - Useful in centralized organizations
  Disadvantages
    - complex design which is one of the biggest drawbacks of hybrid topology
    - The hubs used to connect two distinct networks, are very expensive

Mesh network
- ❖ There is no particular configuration; rather the devices are connected to each other on the fly especially in the wireless domains.
- ❖ It is best suited for WLANs and PANs.
  Advantages
    - Is that expansion and modification in topology can be done without disrupting other nodes
    - Also if one of the components fails there is always an alternative present for data transmission. So data transfer doesn't get affected.
  Disadvantage
    - Includes redundancy in many of the network connections
    - high cost of this network compared to other network topologies
    - difficult to set-up and maintain this type of topology

Essay Question
A network topology describes how network is configured and arranged.

With reference to the above statement, discuss

- ❖ **four** network topologies   **(4 marks)**

❖ use diagrams to support the discussion   **(2 marks)**
❖ **one** advantage of any **two** network topologies   **(2 marks)**
❖ **one** disadvantage of any network topology   **(1 mark)**