

# **10. NETWORK MANAGEMENT**

**School of Education**  
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# Network Infrastructure Design

# Network Infrastructure Design

- A good Network Infrastructure Design is a foundation of your computer system environment you would like to build on it.
- No matter how good you design your computer system if the Network Infrastructure Design is poor, the system will not run efficiently due to network congestion.

# Network Infrastructure Design

- A network has a limitation capacity in transmitting the data.
- As the number of network devices increases, congestion increases which affects the network performance.
- Therefore, a good **Network Infrastructure Design** is very essential in reducing network congestion and maintaining the network in top performance.

# Network Infrastructure Design

- The main purpose of **Network Infrastructure Design** is to reduce network congestion and increase performance through network segmentation.
- There are three areas in Network Infrastructure Design you need to pay attention to.
  1. **Ethernet Network Infrastructure Design**
  2. **Segmentation**
  3. **Selecting a network solution**

# Network Infrastructure Design

## Ethernet Network Infrastructure Design

- Ethernet in the Network Infrastructure Design depends on the LAN cable type used.
- You can use hubs or repeaters to connect multiple segments in a star topology.
- However there are limits to the number of segments and repeaters that you can connect in this manner.

# Network Infrastructure Design

## Ethernet Network Infrastructure Design

- **Fast** Ethernet and **Gigabit** Ethernet are variations of Ethernet standard.
- Fast Ethernet standards which operate at 100 Mbps, and uses either twisted pair or fiber-optic cable
- Gigabit Ethernet operates at 1,000 Mbps (1 Gigabit). By using the same Category 5 twisted pair cable as Ethernet

# Network Infrastructure Design

## Ethernet Network Infrastructure Design

- Ethernet that use twisted pair cable must adhere to the following Network Infrastructure Design rules:
  - Can have a maximum of 5 segments – which is cables connecting two hubs.
  - Each device on the Network can be separated by no more than 4 repeaters or hubs.



# Network Infrastructure Design

## Network Infrastructure Design segmentation

- The need of segmentation in Network Infrastructure Design when the network grows is to reduce congestion and extend the overall network size.

# Network Infrastructure Design

## Network Infrastructure Design segmentation

- By having segmentation in Network Infrastructure Design we can have the following benefits:
  - Overcome architecture limitations
  - Reduce network congestion
  - Connect multiple networks
  - Connect dissimilar networks

# Network Infrastructure Design

## Selecting a network solution

- The segmentation in your Network Infrastructure Design is very useful in isolating the traffic to a segment, or to prevent unwanted traffic from crossing over to other segment, or to slow WAN links.
- It is recommended to use intelligent switches which support Virtual LANs (VLAN) that allow the network to be easily segmented for management and/or security reasons.

# Concept of Network Management

# Concept of Network Management

- Network Management can be defined as monitoring, testing, configuring and troubleshooting network components to meet a set of requirements defined by an organisation.
- The network management system uses hardware, software and humans

# Concept of Network Management

- The functions performed by a network management are divided into five broad categories:
  1. **Configuration Management**
  2. **Fault Management**
  3. **Performance Management**
  4. **Security Management**
  5. **Accounting Management**

# Concept of Network Management

## Configuration Management

- Deals with the status of each entity in the network and its relation to other entities.
- A large network is usually made up of hundreds of entities that are physically connected to each other.
- These entities have an initial configuration when the network is set up, but it can change with time.

# Concept of Network Management

## Fault Management

- The fault is defined as the abnormal condition in the system.
- The Fault Management deals with the proper operation of the individual components of a complex network.
- There are two types of fault management.
  1. **Reactive fault management**
  2. **Proactive fault management**



# Concept of Network Management

## 1. Reactive Fault Management

- Responsible for detecting, isolating, correcting and recording faults.

## 2. Proactive Fault Management

- Tries to prevent fault from occurring where it is possible to predict and prevent the failure.

# Concept of Network Management

## Performance Management

- Monitors and controls the network to ensure that it is running as efficiently as possible.
- The performance of the system depends upon
  1. **Capacity**
  2. **Traffic**
  3. **Throughput**
  4. **Response**

# Network Management

## Concept of Network Management

### Performance Management

- **Capacity:** Every network has a limit capacity.
- The performance management system must ensure that it is not used above this capacity.

# Concept of Network Management

## Performance Management

- **Traffic:** Traffic can be measured in two ways.
  1. **Internal traffic** (measured by the number of packets or bytes travelling inside the network).
  2. **External traffic** (measured by the exchange of packets or bytes outside the network)

# Concept of Network Management

## Performance Management

- **Throughput:** Monitors the throughput to make sure that it is not reduced to unacceptable levels.
- **Response time:** Measured from the time a user requests a service to the time the service is granted.

# Concept of Network Management

## Security Management

- Responsible for controlling access to the network based on the predefined policy.

# Concept of Network Management

## Accounting Management

- The control of users' access to network resources through charges.
- Under accounting management, individual users, departments, divisions or projects are charged for the service they receive from the network