Network Servers and Infrastructure

Assignment 2

Q1: Compare between the transmissions media as regarding the following metrics:

- **Components**
- **Advantages**
- **Disadvantages**
- **Cost**

COMPONENTS	COPPER	OPTICAL FIBER	WIRELESS
ADVANTAGES	Cheap, high efficiency, low energy	High speed, Durable, long distances, larger bandwidth	Mobility Can used at anywhere in boundary, remote reconfiguration
DISADVANTAGES	SLOW, Place is limited	Expensive, Place is limited, installation and maintenance is not as easy	May be affected by Weather and wall
COST	Lower	Higher	Lower

Q2: Compare between the wired LAN devices as regarding the following metrics

- **Functions**
- **Types**
- **Advantages**
- **Disadvantages**

	REPEATER	HUB	SWITCH
FUNCTIONS	regenerate signal	connect multiple nodes to a single physical device	provide a unique network segment on each port
TYPES	Telephone repeater Optical communications repeater Radio repeater	Active Passive Intelligent	Modular switch, smart switch, LAN switch, managed switch, unmanaged switch
ADVANTAGES	Dos not increase network traffic, can connect different type of media, No overhead processing	Low cost solution, having very less number of performance, can connect different types of media all at once with a central hub	Increases Capacity, Reduces Burden, Less frame collisions, More secure
DISADVANTAGES	Cannot filter data, Cannot different network architecture, number of repeaters between ends should be limited	Cannot filter data, Extend collision domain, Cannot communicate fully duplex mode, cannot provide dedicated bandwidth for every device	They are more costly, Issues in traffic broadcasting, Defenseless

Q3: Explain the spanning tree protocol

- **Loop resolution**
- **Address Learning**
- **Frame Forwarding**

Address Learning:

1. When frame arrives at port X, it has come from the LAN attached to port X

2. Use source address to update switching table for port X to include that address

3. Have a timer on each entry in table If timer expires, entry is removed

Each time frame arrives, source address checked against switching table:

- If present, timer is reset and direction recorded

- If not present, entry is created and timer set

Frame Forwarding:

1. frame arriving on port X

2. Search switching table to see if MAC address is listed for any port except port X

3. If destination MAC address is not found, forward frame out all ports except the one from which it was received

4. If the destination address is in the switching table for some port y, check port y for blocking or forwarding state

5. If port y is not blocked, transmit frame through port y

Loop resolution

STEP 1:

STP creates a loop-free architecture for Ethernet networks. Allow network loops to build, then detect and disable specific links to break them.

STEP 2:

STP uses STA to find the shortest path between two network nodes. The approach develops a tree by adding nodes until all network nodes are reachable from the root. After considering link cost and dependability, the algorithm chooses the optimum path from the root to each node.

STP can disable links to break loops after building the tree. STP chooses a "root port" for each node that gives the shortest path to the root node. STP shuts all node ports save the root port and redundant link ports.

STP ensures Ethernet network reliability. STP prevents loops and chooses the optimum path between nodes to convey data consistently and efficiently.

STEP 3:

The Spanning Tree Protocol, sometimes known as STP, is a type of network protocol that creates a topology for Ethernet networks that is free of logical loops. The fundamental concept is to enable the formation of network loops while simultaneously being able to identify those loops and selectively stop links in order to break them up.

The Spanning Tree Protocol (STP) employs the Spanning Tree Algorithm (STA) to determine which of two nodes in a network has the shortest path between them. The tree is constructed using the algorithm by beginning at a root node and continuing to add nodes until all of the nodes in the network can be reached from the root. After that, the algorithm decides which route is the most optimal to take from the root to each of the nodes, taking into consideration aspects such as the cost of each link and how reliable each link is.

After the tree has been constructed, STP has the ability to block certain links in order to remove any loops that may have been created. STP achieves this goal by designating a "root port" for each node. This "root port" is the port that offers the quickest route to the root node in the network. After that, STP will shut all of the node's other ports with the exception of the root port and any ports that are a part of a redundant link.