

Network Servers and Infrastructure

Assignment 2

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

- Components
- Advantages
- Disadvantages
- Cost

Answer:

Component	Copper	Optical fiber	Wireless
Advantages	High Bandwidth, High corrosion resistance, heat resistance	Improved latency, high flexibility, Stronger security	mobility to communication nodes, Easy to setup
Disadvantages	susceptibility to corrosion, fire hazard	Can't Be Curved, difficult to splice	Susceptible to rain and atmospheric variations, Increased chance of jamming
COST	Cheap	Mostly Expensive	Cheap

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

- Functions
- Types
- Advantages
- Disadvantages

Answer:

LAN device	Repeater	Hub	Switch
Function	receives a signal, regenerates it, and passes it	connect multiple nodes to a single physical device	provide a unique network segment on each port
Types	phone repeater radio repeater optical repeater	Passive Active Intelligent	Smart switches Modular switches Stackable switches
Advantages	used to limit latency, connect signals using different types of cables	Hubs are multiport repeaters, Hubs can connect different types of media all at once	separating collision domains, Switches learn certain information about the data packets that are received
disadvantages	cannot reduce network traffic or congestion, Cannot differentiate between actual signal and noise	Hubs cannot communicate fully duplex mode, increases more chances of collision between domains	Broadcast traffic might be problematic, They are more costly in contrast with network spans.

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