1. List at least one (1) **advantage** and one (1) **disadvantage** for the Bus, Ring and Star network topologies.

**Star Topology:**

**Permits easy routing because the central station knows the path to the other sites**

**Access to the network can be controlled easily**

**Heavy Dependence on a single central site (controller)**

**Ring Topology:**

**Can be modified to be flexible as needed**

**Might require all nodes to be functional to work properly, unless the nodes are designed to be easily by passed and for packets to head to the next node.**

**Bus Topology:**

**Data can pass directly from one device to another**

**All sites share a communication line and require a control mechanism to prevent/handle collisions**

1. Compare and contrast the following network types:
   1. Personal Area Network (PAN)

Personal Area Networks are the shortest network type of them all and typically consist of a small array of technology in close range of each other (10 meters typically). Can be connected to a larger network.

* 1. Local Area Network (LAN)

A network consisting of multiple users in an area owned by a single party. LANs may have ‘subnetworks’ which are connected via bridges or gateways. Even a house may be considered a LAN.

* 1. Metropolitan Area Network (MAN)

Typically associated with a city area (100 km maximum). These are usually public utilities.

* 1. Wide Area Network (WAN)

Network that reaches the international level and spans multiple countries. The most common and well-known WAN is the internet itself.

* 1. Wireless Local Area Network (WLAN)

This is basically just a LAN but with wireless capabilities. Tends to have security issues.

1. What is the purpose of the Domain Naming Service (DNS)?

Allows resolves internet addresses and presents them in a human-readable name.

1. Compare and contrast the following network devices:
   1. Bridge

Connects distant LANs which use a similar protocol.

* 1. Gateway

This device works like a bridge but can connect networks that use different protocols.

* 1. Router

Internetworking device which directs traffic between different types of LAN. Typically used to direct traffic down the fastest route for devices connecting to the internet.

1. List at least one (1) **advantage** and one (1) **disadvantage** of the Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) routing strategies.

**Routing Information Protocol:**

**Easiest to implement**

**Doesn’t account for important factors involved in modern computing**

**Increases traffic: The routing table is updated every 30 seconds whether the table was changed or not**

**Open Shortest Path First:**

**Better at handling errors such as a node malfunctioning and accounts for more information**

**More hardware intensive: Higher CPU usage and higher memory usage**

1. List at least two (2) **advantages** and two (2) **disadvantages** of the Circuit Switching and Packet Switching connection models.

**Circuit Switching:**

**Transmits information in real time**

**Once circuits are completed, the network is transparent to users**

**Line is less efficient**

**Easily overwhelmed**

**Packet Switching:**

**Line is efficient**

**Requires no dedicated connection**

**Transmits in batches**

**Shared by many transmissions**

1. Describe at least one (1) situation where a Circuit Switching connection would be preferred over a Packet Switching connection.

Whenever quality, near perfect transmissions are always needed. Ex: If a doctor were giving life-saving advice over the phone.

1. Answer the following questions about the CSMA/CD and CSMA/CA Access Control Techniques:
   1. What does the CS stand for?

Carrier Sense

* 1. What does the MA stand for?

Multiple Access

* 1. What does CD stand for?

Collision Detection

* 1. What does CA stand for?

Collision Avoidance

* 1. How much data is affected if a **collision** occurs between two (2) network nodes using **CSMA/CA**?

3 Bytes

1. Which Access Control Technique (CSMA/CD, CSMA/CA or Token Passing) is the **most popular** in a Ring network?

Token Passing

1. Answer the following questions about the OSI and TCP/IP Reference Models:
   1. How many layers exist in the OSI model?

7: Physical, Data Link, Network, Transport, Session, Presentation and Application.

* 1. How many layers exist in the TCP/IP model?

4: Network Access, Internet, Host-Host and Application

* 1. Which layer in the OSI model is responsible for data compression and encryption?

The Presentation Layer

* 1. Which layer in the TCP/IP model is responsible for error checking and flow control?

The Data-Link Layer

* 1. Which layer(s) of the OSI model are aligned with the Process/Application Layer of the TCP/IP model?

Layer 6 (Presentation Layer) and Layer 7 (Application Layer)

* 1. Which layer(s) of the OSI model are aligned with the Host-Host Layer of the TCP/IP model?

Layer 4 (Transport Layer) and Layer 5 (Session Layer)

* 1. Which layer(s) of the OSI model are aligned with the Internet Layer of the TCP/IP model?

Layer 3 (The network layer)

* 1. Which layer(s) of the OSI model are aligned with the Network Access Layer of the TCP/IP model?

Layer 1 (Physical Layer) and Layer 2 (Data Link Layer)