**Assignment 1 [ CSI­-2470 ]**

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**1. Difference Between a Host and an End System**

* **Host**: A host is any device connected to a network that is capable of sending or receiving data. Examples include servers, desktops, and even routers in some cases.
* **End System**: An end system refers specifically to devices that are the starting or final points in communication. All end systems are hosts, but not all hosts are end systems.

**Examples of End Systems**:

1. Smartphones
2. Laptops
3. Smart TVs
4. Tablets
5. Desktop Computers

**Is a Web Server an End System?**  
Yes, a web server is an end system because it serves as the endpoint for communication when delivering web content to clients.

**2. Diplomatic Protocol**

The word **protocol** is often associated with diplomatic relations and describes the formal rules, customs, and procedures that govern interactions between state representatives and diplomats.

According to Wikipedia, **diplomatic protocol** refers to the set of international rules and guidelines that determine the proper and generally accepted behavior in matters of diplomacy. It includes:

* Showing appropriate respect to heads of state and ranking diplomats.
* Defining the order of precedence based on the chronological accreditation of diplomats.
* Following established conventions in ceremonial events.

The term originates from the Greek word *protokollon*, meaning "first glued sheet of or onto a papyrus-roll," signifying the importance of authenticity and order in documentation and communication.

Diplomatic protocol helps to:

1. Maintain decorum in international relations.
2. Symbolize respect and cultural traditions.
3. Provide a structured framework for communication, ensuring that all parties can focus on substantive issues rather than procedural uncertainties.

**3. Importance of Standards for Protocols**

Standards for protocols are crucial because they:

1. Enable **interoperability** between different devices and systems.
2. Ensure **uniformity**, making it easier for developers to design compatible software and hardware.
3. Enhance **efficiency** by providing predefined rules for communication.
4. Allow **scalability** and global collaboration in expanding networks.
5. Promote **innovation** by offering a consistent framework for developing new technologies.

**4. Access Technologies**

Below are four access technologies and their classifications:

1. **DSL (Digital Subscriber Line)**: Home access.
2. **Cable Modem (HFC)**: Home access.
3. **Ethernet**: Enterprise access.
4. **5G Cellular Network**: Wide-area wireless access.

**5. Residential Access Technologies in Auburn Hills, Michigan**

The following residential access technologies are available in Auburn Hills, Michigan:

| **Provider** | **Connection Type** | **Advertised Downstream Rate** | **Advertised Upstream Rate** | **Monthly Price** |
| --- | --- | --- | --- | --- |
| AT&T Fiber | Fiber | Up to 5 Gbps | Up to 5 Gbps | Starting at $55 |
| Xfinity | Cable | Up to 2 Gbps | Up to 2 Gbps | Starting at $30 |
| T-Mobile Home Internet | 5G Home Internet | Up to 245 Mbps | Up to 245 Mbps | Starting at $50 |
| EarthLink | Fiber | Up to 5 Gbps | Up to 5 Gbps | Starting at $39.95 |

**Note**: Prices and speeds may vary based on location and plan.

**6. Transmission Rate of Ethernet LANs**

Ethernet LANs have the following transmission rates:

1. 10 Mbps (Standard Ethernet)
2. 100 Mbps (Fast Ethernet)
3. 1 Gbps (Gigabit Ethernet)
4. 10 Gbps, 40 Gbps, 100 Gbps, or higher (modern advanced Ethernet for enterprises).

**7. Physical Media for Ethernet**

Ethernet can run over:

1. **Twisted Pair Cables**: Cat 5e, Cat 6, or Cat 6a cables.
2. **Fiber Optic Cables**: Single-mode or multi-mode fibers for high-speed applications.
3. **Coaxial Cables**: Used in older Ethernet setups.

**8. Residential Access Technologies: HFC, DSL, and FTTH**

* **HFC (Hybrid Fiber Coaxial)**:
  + Downstream: 100 Mbps to 1 Gbps.
  + Upstream: 10 Mbps to 50 Mbps.
  + **Connection Type**: Shared among users.
* **DSL (Digital Subscriber Line)**:
  + Downstream: 1 Mbps to 100 Mbps.
  + Upstream: 128 Kbps to 10 Mbps.
  + **Connection Type**: Dedicated to each user.
* **FTTH (Fiber to the Home)**:
  + Downstream: 100 Mbps to 10 Gbps.
  + Upstream: 100 Mbps to 10 Gbps.
  + **Connection Type**: Dedicated.

**9. Popular Wireless Internet Access Technologies**

1. **Wi-Fi**:
   * Speed: Up to 1 Gbps (Wi-Fi 6).
   * Range: Limited to local areas like homes or offices.
2. **4G LTE**:
   * Speed: 10–100 Mbps.
   * Range: Wide-area coverage suitable for mobile users.
3. **5G**:
   * Speed: 100 Mbps to 10 Gbps.
   * Range: Wide-area coverage with better speed and lower latency than 4G.
4. **Satellite Internet**:
   * Speed: 25 Mbps to 100 Mbps.
   * Range: Global coverage for rural and remote areas.

**Comparison**:

* Wi-Fi is ideal for local, high-speed connections.
* 4G and 5G offer mobility and wide coverage, with 5G being faster.
* Satellite is slower but provides coverage in remote areas.

**10. Structure of IPv4 Protocol and Subnetting**

* **Structure of IPv4 Address**:  
  IPv4 addresses are 32-bit binary numbers, divided into four 8-bit octets, represented in decimal (e.g., 192.168.1.1). The address consists of two parts:
  1. **Network Part**: Identifies the network.
  2. **Host Part**: Identifies the specific device within the network.
* **Subnetting**:  
  Subnetting is the process of dividing a large network into smaller sub-networks (subnets). It allows better utilization of IP addresses, improves security, and reduces network congestion. Subnet masks (e.g., 255.255.255.0) define the division between the network and host parts.

**End of Assignment**