1. How are computer networks classified based on their size and coverage, and what are the typical applications for each type?

Answer: Computer networks can be classified into PANs (Personal Area Networks), LANs (Local Area Networks), MANs (Metropolitan Area Networks), and WANs (Wide Area Networks) based on their size and coverage. PANs are used for short-range communications, such as wireless headsets connecting to smartphones. LANs typically consist of computers in a single building or complex, like those on a university campus. MANs cover a local community, and WANs connect machines over greater distances, even spanning cities or continents.

2. What distinguishes an open network from a closed or proprietary network, and what implications does this distinction have for network development?

Answer: Open networks are based on designs in the public domain, allowing anyone to use them without fees or licensing. Closed or proprietary networks, on the other hand, are controlled by specific entities like corporations, often involving licensing fees and restrictions. Open networks tend to gain popularity and widespread adoption, while proprietary networks may generate income for the owning entity.

3. Explain the differences between the bus and star network topologies, and provide an example of a widely used network system employing each.

Answer: The bus topology connects machines to a common communication line (bus), whereas the star topology uses a central machine (access point) to which all others are connected. Ethernet networks popularized the bus topology in the 1990s. The star topology is common in wireless networks, using a central access point for coordination.

4. How does the Carrier Sense, Multiple Access with Collision Detection (CSMA/CD) protocol work in a bus network, and why is it not compatible with wireless star networks?

4. Answer: CSMA/CD protocol ensures that only one machine transmits at a time on a bus network by monitoring for silence and then transmitting when the bus is quiet. If two machines attempt to transmit simultaneously, they detect the collision and retry later. However, CSMA/CD is not suitable for wireless star networks because hidden terminals or signal interference can prevent collision detection. Wireless networks often use Carrier Sense, Multiple Access with Collision Avoidance (CSMA/CA) to avoid collisions and coordinate transmissions.