

Introduction to Networking

CT043-3-1 VE1

Tutorial Activity 1: Networking Today

Instructions: 1 Hour

Answer these questions:

Question 1: List 5 network devices used as intermediaries and explain the functions.

Answer:

Router: A router is a device that routes data packets between different networks, typically connecting a local area network (LAN) to a wide area network (WAN). It determines the best path for data to travel across the network and directs it accordingly.

Switch: A switch operates within a LAN and is responsible for forwarding data packets to the correct devices within that network. It uses MAC addresses to identify devices and ensures data is sent only to the intended recipient.

Hub: A hub is a basic networking device that connects multiple devices in a LAN. It broadcasts incoming data packets to all connected devices, regardless of the intended recipient. Hubs are less efficient than switches because they don't filter data traffic.

Modem: A modem (modulator-demodulator) converts digital data from a computer into analog signals that can be transmitted over phone lines or cable systems and vice versa. It's commonly used to connect a computer or a router to an Internet Service Provider (ISP).

Firewall: A firewall is a security device that monitors and controls incoming and outgoing network traffic based on predetermined security rules. It can be hardware-based or software-based and serves as a barrier between a trusted internal network and untrusted external networks.

Question 2: Give 5 industries using networking technologies as their core operation and explain in detail.

Answer:

Banking and Finance: Networking technologies are crucial in the banking and finance industry for processing transactions, online banking, and connecting ATMs across various locations. Secure and efficient networks ensure that financial data is transferred and processed quickly, enabling real-time transactions and protecting sensitive customer information.

Healthcare: In healthcare, networking technologies support telemedicine, electronic health records (EHRs), and the interconnection of medical devices. These networks allow healthcare professionals to share patient information securely, monitor patients remotely, and collaborate on diagnoses and treatment plans.

E-commerce: E-commerce businesses rely on networking technologies to operate online marketplaces, manage inventory, process payments, and provide customer service. Networks enable real-time communication between sellers, buyers, and payment gateways, ensuring smooth transactions and logistics.

Telecommunications: The telecommunications industry is built on networking technologies that allow for voice, video, and data communication across the globe. Networks enable mobile phone connectivity, internet access, and communication services such as VoIP and video conferencing.

Education: Educational institutions use networking technologies to provide online learning platforms, virtual classrooms, and access to digital resources. Networks facilitate communication between students, teachers, and administrative staff, enabling remote learning and collaboration.

Question 3: Compare LAN, WAN, MAN and PAN

Answer:

Local Area Network (LAN): A LAN covers a small geographic area, such as a home, office, or building. It's designed to connect computers and devices within a limited area, providing high-speed data transfer and sharing resources like printers and files.

Wide Area Network (WAN): A WAN covers a broad geographic area, such as a city, country, or even globally. It connects multiple LANs, allowing devices in different locations to communicate. WANs typically use public infrastructure like telephone lines or satellite links.

Metropolitan Area Network (MAN): A MAN covers a city or a large campus, providing network connectivity within a larger geographic area than a LAN but smaller than a WAN. It often connects multiple LANs within a city or region.

Personal Area Network (PAN): A PAN is a small network designed for personal use, typically covering a few meters around an individual. It connects personal devices like smartphones, tablets, and laptops using technologies such as Bluetooth or Wi-Fi.

Question 4: List 5 main components to establish network communication.

Answer:

Network Interface Card (NIC): A hardware component that allows a computer or device to connect to a network.

Cables and Connectors: Physical media, such as Ethernet cables, that carry data between devices.

Switches: Devices that connect multiple devices within a LAN and manage data traffic within the network.

Routers: Devices that direct data packets between different networks, facilitating communication between LANs and WANs.

Wireless Access Points (WAPs): Devices that allow wireless devices to connect to a wired network using Wi-Fi.

Question 5: Discuss 4 differences between logical and physical topology

Answer:

Definition:

- Logical Topology refers to how data flows within a network, regardless of its physical design.
- Physical Topology refers to the physical layout of devices and cables in a network.

Representation:

- Logical Topology is often represented by diagrams showing data paths.
- Physical Topology is represented by maps showing the physical connections and placement of devices.

Function:

- Logical Topology focuses on how data is transmitted between devices.
- Physical Topology focuses on how devices are physically connected.

Examples:

- Logical Topology: A bus topology can function logically as a star topology depending on how data is transmitted.
- Physical Topology: A star topology physically connects all devices to a central hub.

Question 6: List 4 standard bodies that regulate network standards.

Answer:

IEEE (Institute of Electrical and Electronics Engineers): Develops networking standards, including the popular 802.11 standards for Wi-Fi.

IETF (Internet Engineering Task Force): Develops and promotes voluntary Internet standards, particularly standards related to TCP/IP and Internet protocols.

ISO (International Organization for Standardization): Develops international standards, including those related to networking, such as the OSI model.

ITU (International Telecommunication Union): A United Nations agency that develops global telecommunication standards, including those for networking and communication technologies.

Question 7: Discuss the need for network planning for a company in the long term.

Answer:

Network planning is essential for a company to ensure that its network infrastructure can support current and future business needs. As a company grows, its networking requirements may evolve, necessitating scalable and flexible network designs. Long-term network planning helps in:

- **Scalability:** Ensuring that the network can grow with the company, accommodating more users, devices, and data traffic.
- **Security:** Implementing robust security measures that can adapt to emerging threats and protect sensitive business information.
- **Cost Efficiency:** Reducing costs associated with network upgrades, maintenance, and downtime by planning for future needs.
- **Performance Optimization:** Designing a network that provides reliable, high-speed connectivity to support business-critical applications and services.

Without proper network planning, a company risks network congestion, security vulnerabilities, and higher operational costs, which can hinder business growth and competitiveness in the long term.