

Module 5

Assignment: Network Fundamentals and Building Networks

1. What is the primary function of a router in a computer network?

- a) Assigning IP addresses to devices
- b) Providing wireless connectivity to devices

c) Forwarding data packets between networks

- d) Managing user authentication and access control

2. What is the purpose of DHCP (Dynamic Host Configuration Protocol) in a computer network?

- a) Assigning static IP addresses to devices
- b) Resolving domain names to IP addresses
- c) Managing network traffic and congestion

d) Dynamically assigning IP addresses to devices

3. Which network device operates at Layer 2 (Data Link Layer) of the OSI model and forwards data packets based on MAC addresses?

- a) Router
- b) Switch**
- c) Hub
- d) Repeater

4. Which network topology connects all devices in a linear fashion, with each device connected to a central cable or backbone?

- a) Star
- b) Bus**
- c) Ring
- d) Mesh

5. **True** or False: A VLAN (Virtual Local Area Network) allows network administrators to logically segment a single physical network into multiple virtual networks, each with its own broadcast domain.

6. True or **False**: TCP (Transmission Control Protocol) is a connectionless protocol that provides reliable, ordered, and error-checked delivery of data packets over a network.

7. **True** or False: A firewall is a hardware or software-based security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules.

8. Describe the steps involved in setting up a wireless network for a small office or home office (SOHO) environment.

. Planning and Preparation

Evaluate Network Requirements:

Determine the coverage area office space, floors, outdoor areas.

Estimate the number of devices computers, phones, printers that will connect to the network.

Choose Equipment:

- Select a wireless router or access point suitable for your needs (single router for small spaces, multiple APs for larger areas).
- Ensure compatibility with your devices

Gather Necessary Materials:

- Ethernet cables for initial setup and configuration.
- Power outlets and surge protectors for routers and APs.

. Setup and Configuration

Router Setup:

- Connect the router to the modem using an Ethernet cable.
- Power on the router and follow the manufacturer's setup instructions usually involves accessing a web interface via a browser using a default IP address.
- Configure basic settings such as SSID, Wi-Fi password, and security settings.

Placement of Access Points:

Position APs strategically to ensure optimal coverage throughout the office.

- Avoid physical obstructions and interference sources (e.g., walls, metal objects).

Network Configuration:

- Set up DHCP to automatically assign IP addresses to devices on the network.
- Configure DNS (Domain Name System) settings for internet connectivity.

. Network Security

Change Default Settings:

- Change the default administrator username and password for the router.
- Change the default SSID to something unique and avoid easily guessable names.

Enable Encryption:

- Use WPA2 or WPA3 encryption to secure your Wi-Fi network.
- Choose a strong password.

Update Firmware:

- Check for firmware updates for your router/AP regularly and install them to protect against security vulnerabilities.

Testing and Optimization

- Connect computers, laptops, smartphones, and other devices to the wireless network using the SSID and password configured earlier.
- Use Wi-Fi analyzers or apps to check signal strength and identify dead spots.
- Optimize AP placement if necessary to improve coverage.

. Documentation and Maintenance

Document Network Configuration:

- Keep a record of SSIDs, passwords, IP addresses, and other network settings for future reference.

Regular Maintenance:

- Periodically check and update security settings and firmware.
- Monitor network performance and address any connectivity issues promptly.

9. Demonstrate how to configure a router for Internet access using DHCP (Dynamic Host Configuration Protocol).

Physical Connections:

- Ensure your modem is connected to the router's WAN (Wide Area Network) or Internet port using an Ethernet cable.
- Connect your computer to any of the LAN (Local Area Network) ports on the router using another Ethernet cable.

Access Router's Web Interface

Open a Web Browser:

- Open a web browser (e.g., Chrome, Firefox, Edge) on your computer.

Access Router Settings:

- Enter the router's IP address in the browser's address bar. Common default IP addresses for routers are:
- Enter the router's username and password. These are usually set to default values (e.g., admin/admin), which you should change for security reasons after initial setup.

Navigate to WAN Settings:

- Look for a section like "Internet," "WAN," or "Network Setup" in the router's web interface.

Choose DHCP:

- Select the option to obtain an IP address automatically via DHCP. This setting is typically labeled as:
 - **Connection Type:** DHCP or Automatic Configuration - DHCP

Save Settings:

- Apply or save the changes made to the WAN settings.

. Verify Internet Connectivity

Restart Router:

- Restart your router to apply the new settings.

Check Connection:

- Once the router has rebooted, open a web browser on your computer.
- Navigate to a website (e.g., www.google.com) to verify that you have Internet access.

Additional Tips:

- **Security:** Change the default router username and password to enhance security.
- **Documentation:** Keep a record of your router's settings, including the DHCP configuration, for future reference.
- **Troubleshooting:** If you encounter issues, double-check all connections and settings. Restarting both the router and modem can often resolve connectivity problems.

10. Discuss the importance of network documentation in the context of building and managing networks.

- Documentation provides a detailed map of the network topology, including the layout of devices, routers, switches, access points, and their interconnections. This helps network administrators visualize how the network is structured, which aids in troubleshooting and planning expansions.
- During troubleshooting, having accurate documentation allows administrators to quickly identify the location of devices, IP addresses, configurations, and connections. This reduces downtime by streamlining the diagnosis and resolution of network issues.
- When making changes or upgrades to the network, documentation serves as a reference for understanding existing configurations. It ensures that modifications are implemented correctly without causing unintended disruptions or conflicts.
- Comprehensive documentation includes information about security configurations, firewall rules, access control policies, and VPN configurations. This aids in auditing and ensuring compliance with security best practices and regulations.

- By documenting network device capacities, and historical performance data, administrators can effectively plan for future growth and resource allocation. This prevents overloading network components and optimizes performance.
- Organizations often need to comply with industry regulations and undergo audits. Network documentation provides evidence of adherence to security standards, data protection measures, and operational guidelines.
- Accurate documentation helps in optimizing resource allocation by identifying underutilized assets or inefficient configurations. It supports informed decisions regarding equipment upgrades, licensing, and maintenance contracts.
- Documentation fosters effective communication among IT teams, stakeholders, and third-party contractors. It ensures everyone has access to up-to-date information about the network infrastructure, reducing misunderstandings and improving collaboration.