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**Assignment module 3 : Understanding and Maintenance of Network**

Section 1: Multiple Choice

**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

**ANS => c) Forwarding data packets between networks**

**2. What is the purpose of DNS (Domain Name System) in a computer network?**

a) Encrypting data transmissions for security

b) Assigning IP addresses to devices dynamically

c) Converting domain names to IP addresses

d) Routing data packets between network segments

**ANS =>c) Converting domain names to IP addresses**

**3. What type of network topology uses a centralized hub or switch to connect all devices?**

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

**ANS=> a) Star**

**4. Which network protocol is commonly used for securely accessing and transferring files over a network?**

a) HTTP

b) FTP

c) SMTP

d) POP3

**ANS => b) FTP**

**Section 2: True or False**

5. A firewall is a hardware or software-based security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules

**ANS => True**

6. DHCP (Dynamic Host Configuration Protocol) assigns static IP addresses to network devices automatically.

**ANS => False**

7. VLANs (Virtual Local Area Networks) enable network segmentation by dividing a single physical network into multiple logical networks.

**ANS =>True**

**Section 3: Short Answer**

**8. Explain the difference between a hub and a switch in a computer network.**

**ANS =>** A **hub** is a simple networking device that broadcasts data to all connected devices, regardless of the intended recipient. It operates at the physical layer (Layer 1) and does not differentiate between devices, leading to potential network congestion.

A **switch** is a more advanced device that intelligently directs data only to the specific device it is intended for, based on MAC addresses. It operates at the data link layer (Layer 2) and reduces network congestion by sending data only to the appropriate destination.

**9. Describe the process of troubleshooting network connectivity issues.**

**ANS =>**

Troubleshooting network connectivity issues generally involves the following steps:

1. **Verify Physical Connections**: Check cables, connectors, and hardware to ensure everything is properly connected.
2. **Check Device Status**: Ensure devices like routers, switches, and computers are powered on and functioning.
3. **Test Connectivity**: Use tools like ping or traceroute to test the connection between devices and identify where the issue may be occurring.
4. **Check IP Configuration**: Ensure that IP addresses, subnet masks, and default gateways are correctly configured.
5. **Review Network Settings**: Verify settings on routers, switches, and firewalls for proper configuration.
6. **Consult Logs and Diagnostics**: Review system logs and diagnostic tools for error messages or warnings.
7. **Restart Devices**: Reboot network devices to resolve temporary issues or conflicts

**Section 4: Practical Application**

**10. Demonstrate how to configure a wireless router's security settings to enhance network security**.

**ANS => steps:**

1. **Access Router Settings**:
   * Connect to the router using a web browser.
   * The router's IP address (e.g., 192.168.1.1 ) in the browser's address bar.
2. **Change Default Admin Password**:
   * Navigate to the router’s administration settings.
   * Change the default admin password to a strong, unique password.
3. **Enable WPA3 or WPA2 Encryption**:
   * Go to the wireless settings section.
   * Select WPA3 (if available) or WPA2 as the security protocol.
   * Avoid using WEP or WPA, as they are less secure.
4. **Set a Strong Wireless Password**:
   * Create a strong, complex passphrase for your wireless network
   * Update the wireless password in the router settings.
5. **Disable WPS (Wi-Fi Protected Setup)**:
   * WPS can be a security risk. Locate the WPS settings and disable it.
6. **Change the SSID (Network Name)**:
   * Rename the SSID to something unique and non-identifiable to avoid revealing your router’s brand or model.
7. **Enable Network Encryption**:
   * Ensure that network encryption is enabled to protect data transmitted over the wireless network.
8. **Update Firmware**:
   * Check for and install the latest firmware updates for your router to patch security vulnerabilities.
9. **Set Up a Guest Network**:
   * Create a separate guest network for visitors to keep your primary network secure.
   * Apply similar security settings to the guest network as you do for the main network.
10. **Enable Firewall**:
    * Ensure that the router’s built-in firewall is enabled to provide an additional layer of security.

**Section 5: Essay**

1. **Discuss the importance of network documentation and provide examples of information that should be documented.**

**ANS =>**

Network documentation is a critical component of effective network management and maintenance. It involves systematically recording details about the network's design, configuration, and operations, allowing network administrators and IT professionals to understand the network's architecture and behavior comprehensively. This documentation serves multiple purposes, from aiding in troubleshooting and maintenance to ensuring compliance with industry standards and regulations. Here is a discussion of the importance of network documentation and examples of the types of information that should be documented.

**Importance of Network Documentation**

1. **Facilitates Troubleshooting**:
   * **Quick Problem Identification**: When network issues arise, having detailed documentation helps technicians quickly identify potential problem areas, reducing downtime and minimizing the impact on business operations.
   * **Consistent Troubleshooting Process**: Documenting troubleshooting procedures allows for a standardized approach to problem-solving, which can be invaluable in complex network environments.
2. **Enhances Network Security**:
   * **Identifies Security Vulnerabilities**: Documentation of network configurations, such as firewall settings and access controls, helps in identifying potential security vulnerabilities and addressing them promptly.
   * **Supports Security Audits**: Detailed records are essential for conducting thorough security audits and ensuring that security measures comply with policies and regulations.
3. **Aids in Network Maintenance and Upgrades**:
   * **Eases Maintenance**: With comprehensive documentation, regular maintenance tasks become more manageable and efficient, reducing the risk of errors and improving the overall reliability of the network.
   * **Streamlines Upgrades**: When planning upgrades or expansions, documentation provides a clear overview of the current network infrastructure, making it easier to design and implement changes without disrupting existing services.
4. **Improves Collaboration and Knowledge Sharing**:
   * **Ensures Continuity**: In organizations with multiple IT staff, documentation ensures that knowledge about the network is shared and not limited to a few individuals, facilitating collaboration and continuity.
   * **Onboarding New Staff**: Documentation is an invaluable resource for onboarding new IT staff, providing them with the information needed to understand and manage the network effectively.
5. **Supports Compliance and Reporting**:
   * **Compliance with Standards**: Many industries require organizations to comply with specific network management standards and regulations. Proper documentation helps demonstrate compliance and avoid potential penalties.
   * **Facilitates Reporting**: Detailed documentation can aid in generating reports for management, illustrating network performance, issues, and improvements.

**Examples of Information That Should Be Documented**

1. **Network Topology**:
   * **Diagrams**: Visual representations of the network layout, including devices, connections, and data flows.
   * **Descriptions**: Written descriptions of the network structure, detailing the arrangement and function of network segments.
2. **Device Configuration**:
   * **Router and Switch Settings**: Documentation of the configuration settings for routers and switches, including IP addresses, VLANs, and routing protocols.
   * **Firewall and Security Appliance Settings**: Records of security configurations, such as access control lists (ACLs) and intrusion detection/prevention settings.
3. **IP Addressing Scheme**:
   * **IP Address Assignments**: Detailed records of IP address allocations, including static and dynamic addresses, subnet masks, and DHCP configurations.
   * **DNS and DHCP Settings**: Configuration details for DNS and DHCP servers, including zones, records, and lease times.
4. **Network Services and Protocols**:
   * **Service Configurations**: Documentation of network services, such as email, web hosting, and file sharing, including server settings and user permissions.
   * **Protocol Usage**: Information on network protocols in use, such as HTTP, FTP, and SNMP, and their respective configurations.
5. **Security Policies and Procedures**:
   * **Access Controls**: Records of user access controls, authentication methods, and authorization levels.
   * **Incident Response Plans**: Documented procedures for responding to security incidents, including roles, responsibilities, and contact information.
6. **Maintenance and Troubleshooting Logs**:
   * **Maintenance Records**: Logs of routine maintenance activities, including updates, patches, and hardware replacements.
   * **Troubleshooting Logs**: Records of past network issues, resolutions, and lessons learned, aiding in future problem-solving efforts.

**Conclusion**

Network documentation is a vital aspect of effective network management, providing a foundation for troubleshooting, security, maintenance, collaboration, and compliance. By systematically documenting the network's structure, configuration, and operations, organizations can ensure efficient and reliable network performance, reduce risks, and support long-term strategic goals. Comprehensive network documentation is not just a best practice; it is an essential component of any robust network management strategy.