

ANALYSIS OF NETWORK COMPONENTS

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Table of Contents

Analysis of Networking Components	2
Network Components and Their Functions	2
Network Types and Their Components	3
Importance of Protocols and Standards	3
Data Transfer and Security Considerations	3
Conclusion	4

Analysis of Networking Components

Networking components play a crucial role in constructing efficient and secure networks. Understanding their functions helps in selecting the right components for different network types, ensuring reliability, security, and performance.

Network Components and Their Functions

- **Routers:**
 - Direct data between networks and enable internet access.
 - Essential for connecting LANs to WANs.
- **Switches:**
 - Direct network traffic efficiently within a LAN using MAC addresses.
 - Improve performance by reducing collisions.
- **Hubs:**
 - Outdated technology that broadcasts data to all devices, causing congestion.
 - Replaced by switches for better efficiency.
- **Modems:**
 - Convert digital data into signals for internet access.
 - Required for ISP connectivity.
- **Access Points (APs):**
 - Enable wireless network connections.
 - Extend Wi-Fi coverage in large areas.
- **Firewalls:**
 - Monitor and control incoming and outgoing network traffic.
 - Provide security against unauthorised access.

Network Types and Their Components

- **LAN (Local Area Network):**
 - Used in small environments like homes and offices.
 - Components: Routers, switches, APs, firewalls.
- **WAN (Wide Area Network):**
 - Connects geographically separated locations.
 - Components: Routers, modems, leased communication lines.
- **Wireless Networks:**
 - Utilise radio signals instead of physical cables.
 - Benefits: Mobility and flexibility.
 - Security concerns: Encryption is required to protect data.

Importance of Protocols and Standards

- **TCP/IP:** Standard for internet communication.
- **IEEE 802.11 (Wi-Fi Standards):** Defines security, speeds, and compatibility for wireless networking.
- **Ethernet (IEEE 802.3):** Governs wired network connections and performance.

Data Transfer and Security Considerations

- **Within a Network:**
 - Switches direct data efficiently.
 - Example: File sharing between office computers.
- **Between Networks:**
 - Routers analyse and forward data packets.
 - Example: Accessing a cloud service remotely.
- **Security and Encryption:**
 - Data transmission can be intercepted without encryption.

- SSL/TLS and VPNs secure communications.

Conclusion

Selecting the right networking components depends on network size, security needs, and performance requirements. Hubs have been replaced by switches due to efficiency improvements. Firewalls and encryption are essential for securing data transfers. Understanding these components is critical for designing reliable networks.