



2.0 Networking

2.1 Compare and contrast Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) ports, protocols, and their purposes.

- **Ports and protocols**
 - 20/21 - File Transfer Protocol (FTP)
 - 22 - Secure Shell (SSH)
 - 23 - Telnet
 - 25 - Simple Mail Transfer Protocol (SMTP)
 - 53 - Domain Name System (DNS)
 - 67/68 - Dynamic Host Configuration Protocol (DHCP)
 - 80 - Hypertext Transfer Protocol (HTTP)
 - 110 - Post Office Protocol 3 (POP3)
 - 137/139 - Network Basic Input/Output System (NetBIOS)/NetBIOS over TCP/IP (NetBT)
 - 143 - Internet Mail Access Protocol (IMAP)
 - 161/162 - Simple Network Management Protocol (SNMP)
 - 389 - Lightweight Directory Access Protocol (LDAP)
 - 443 - Hypertext Transfer Protocol Secure (HTTPS)
 - 445 - Server Message Block (SMB)/Common Internet File System (CIFS)
 - 3389 - Remote Desktop Protocol (RDP)
- **TCP vs. UDP**
 - Connectionless
 - DHCP
 - Trivial File Transfer Protocol (TFTP)
 - Connection-oriented
 - HTTPS
 - SSH

2.2 Compare and contrast common networking hardware.

- **Routers**
- **Switches**
 - Managed
 - Unmanaged
- **Access points**
- **Patch panel**
- **Firewall**
- **Power over Ethernet (PoE)**
 - Injectors
 - Switch
 - PoE standards
- **Hub**
- **Cable modem**
- **Digital subscriber line (DSL)**
- **Optical network terminal (ONT)**
- **Network interface card (NIC)**
- **Software-defined networking (SDN)**



2.3 Compare and contrast protocols for wireless networking.

- **Frequencies**
 - 2.4GHz
 - 5GHz
 - **Channels**
 - Regulations
 - 2.4GHz vs. 5GHz
 - **Bluetooth**
 - **802.11**
 - a
 - b
 - g
 - n
 - ac (WiFi 5)
 - ax (WiFi 6)
 - **Long-range fixed wireless**
 - Licensed
 - Unlicensed
 - Power
 - Regulatory requirements for wireless power
 - **NFC**
 - **Radio-frequency identification (RFID)**
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2.4 Summarize services provided by networked hosts.

- **Server roles**
 - DNS
 - DHCP
 - Fileshare
 - Print servers
 - Mail servers
 - Syslog
 - Web servers
 - Authentication, authorization, and accounting (AAA)
 - **Internet appliances**
 - Spam gateways
 - Unified threat management (UTM)
 - Load balancers
 - Proxy servers
 - **Legacy/embedded systems**
 - Supervisory control and data acquisition (SCADA)
 - **Internet of Things (IoT) devices**
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2.5 Given a scenario, install and configure basic wired/wireless small office/home office (SOHO) networks.

- **Internet Protocol (IP) addressing**
 - IPv4
 - Private addresses
 - Public addresses
 - IPv6
 - Automatic Private IP Addressing (APIPA)
 - Static
 - Dynamic
 - Gateway



2.6 Compare and contrast common network configuration concepts.

- **DNS**
 - Address
 - A
 - AAAA
 - Mail exchanger (MX)
 - Text (TXT)
 - Spam management
 - (i) DomainKeys Identified Mail (DKIM)
 - (ii) Sender Policy Framework (SPF)
 - (iii) Domain-based Message Authentication, Reporting, and Conformance (DMARC)
 - **DHCP**
 - Leases
 - Reservations
 - Scope
 - **Virtual LAN (VLAN)**
 - **Virtual private network (VPN)**
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2.7 Compare and contrast Internet connection types, network types, and their features.

- **Internet connection types**
 - Satellite
 - Fiber
 - Cable
 - DSL
 - Cellular
 - Wireless Internet service provider (WISP)
 - **Network types**
 - Local area network (LAN)
 - Wide area network (WAN)
 - Personal area network (PAN)
 - Metropolitan area network (MAN)
 - Storage area network (SAN)
 - Wireless local area network (WLAN)
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2.8 Given a scenario, use networking tools.

- Crimper
- Cable stripper
- WiFi analyzer
- Toner probe
- Punchdown tool
- Cable tester
- Loopback plug
- Network tap