5.0 Network Troubleshooting

5.1 Explain the troubleshooting methodology.

- **Identify the problem**
  - Gather information
  - Question users
  - Identify symptoms
  - Determine if anything has changed
  - Duplicate the problem, if possible
  - Approach multiple problems individually
- **Establish a theory of probable cause**
  - Question the obvious
  - Consider multiple approaches
    - Top-to-bottom/bottom-to-top OSI model
    - Divide and conquer
- **Test the theory to determine the cause**
  - If theory is confirmed, determine next steps to resolve problem
  - If theory is not confirmed, establish a new theory or escalate
- **Establish a plan of action to resolve the problem and identify potential effects**
- **Implement the solution or escalate as necessary**
- **Verify full system functionality and implement preventive measures if applicable**
- **Document findings, actions, outcomes, and lessons learned throughout the process**

5.2 Given a scenario, troubleshoot common cabling and physical interface issues.

- **Cable issues**
  - Incorrect cable
    - Single mode vs. multimode
    - Category 5/6/7/8
    - Shielded twisted pair (STP) vs. unshielded twisted pair (UTP)
  - Signal degradation
    - Crosstalk
    - Interference
    - Attenuation
  - Improper termination
  - Transmitter (TX)/Receiver (RX) transposed
- **Interface issues**
  - Increasing interface counters
    - Cyclic redundancy check (CRC)
    - Runts
    - Giants
    - Drops
  - Port status
    - Error disabled
    - Administratively down
    - Suspended
- **Hardware issues**
  - Power over Ethernet (PoE)
    - Power budget exceeded
    - Incorrect standard
  - Transceivers
    - Mismatch
    - Signal strength

5.3 Given a scenario, troubleshoot common issues with network services.

- **Switching issues**
  - STP
    - Network loops
    - Root bridge selection
    - Port roles
    - Port states
  - Incorrect VLAN assignment
  - ACLs
- **Route selection**
  - Routing table
  - Default routes
- **Address pool exhaustion**
- **Incorrect default gateway**
- **Incorrect IP address**
  - Duplicate IP address
- **Incorrect subnet mask**

5.4 Given a scenario, troubleshoot common performance issues.

- **Congestion/contention**
- **Bottlenecking**
- **Bandwidth**
  - Throughput capacity
- **Latency**
- **Packet loss**
- **Jitter**
- **Wireless**
  - Interference
    - Channel overlap
  - Signal degradation or loss
  - Insufficient wireless coverage
  - Client disassociation issues
  - Roaming misconfiguration

5.5 Given a scenario, use the appropriate tool or protocol to solve networking issues.

- **Software tools**
  - Protocol analyzer
  - Command line
    - ping
    - traceroute/tracert
    - nslookup
    - tcpdump
    - dig
    - netstat
    - ip/ifconfig/ipconfig
    - arp
  - Nmap
  - Link Layer Discovery Protocol (LLDP)/Cisco Discovery Protocol (CDP)
  - Speed tester
- **Hardware tools**
  - Toner
  - Cable tester
  - Taps
  - Wi-Fi analyzer
  - Visual fault locator
- **Basic networking device commands**
  - show mac-address-table
  - show route
  - show interface
  - show config
  - show arp
  - show vlan
  - show power