



5.0 Network Troubleshooting

5.1 Explain the network 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 the theory is confirmed, determine the next steps to resolve the problem
 - If the theory is not confirmed, reestablish 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, if applicable, implement preventive measures**
- **Document findings, actions, outcomes, and lessons learned**

5.2 Given a scenario, troubleshoot common cable connectivity issues and select the appropriate tools.

- **Specifications and limitations**
 - Throughput
 - Speed
 - Distance
- **Cable considerations**
 - Shielded and unshielded
 - Plenum and riser-rated
- **Cable application**
 - Rollover cable/console cable
 - Crossover cable
 - Power over Ethernet
- **Common issues**
 - Attenuation
 - Interference
 - Decibel (dB) loss
- Incorrect pinout
- Bad ports
- Open/short
- Light-emitting diode (LED) status indicators
- Incorrect transceivers
- Duplexing issues
- Transmit and receive (TX/RX) reversed
- Dirty optical cables
- **Common tools**
 - Cable crimper
 - Punchdown tool
 - Tone generator
 - Loopback adapter
 - Optical time-domain reflectometer (OTDR)
 - Multimeter
 - Cable tester
 - Wire map
 - Tap
 - Fusion splicers
 - Spectrum analyzers
 - Snips/cutters
 - Cable stripper
 - Fiber light meter



5.3 Given a scenario, use the appropriate network software tools and commands.

- **Software tools**
 - WiFi analyzer
 - Protocol analyzer/packet capture
 - Bandwidth speed tester
 - Port scanner
 - iperf
 - NetFlow analyzers
 - Trivial File Transfer Protocol (TFTP) server
- Terminal emulator
- IP scanner
- **Command line tool**
 - ping
 - ipconfig/ifconfig/ip
 - nslookup/dig
 - traceroute/tracert
 - arp
 - netstat
- hostname
- route
- telnet
- tcpdump
- nmap
- **Basic network platform commands**
 - show interface
 - show config
 - show route

5.4 Given a scenario, troubleshoot common wireless connectivity issues.

- **Specifications and limitations**
 - Throughput
 - Speed
 - Distance
 - Received signal strength indication (RSSI) signal strength
 - Effective isotropic radiated power (EIRP)/power settings
- Placement
- Type
- Polarization
- Channel utilization
- AP association time
- Site survey
- **Common issues**
 - Interference
 - Channel overlap
 - Antenna cable attenuation/signal loss
- RF attenuation/signal loss
- Wrong SSID
- Incorrect passphrase
- Encryption protocol mismatch
- Insufficient wireless coverage
- Captive portal issues
- Client disassociation issues

5.5 Given a scenario, troubleshoot general networking issues.

- **Considerations**
 - Device configuration review
 - Routing tables
 - Interface status
 - VLAN assignment
 - Network performance baselines
- **Common issues**
 - Collisions
 - Broadcast storm
 - Duplicate MAC address
 - Duplicate IP address
 - Multicast flooding
 - Asymmetrical routing
- Switching loops
- Routing loops
- Rogue DHCP server
- DHCP scope exhaustion
- IP setting issues
 - Incorrect gateway
 - Incorrect subnet mask
 - Incorrect IP address
 - Incorrect DNS
- Missing route
- Low optical link budget
- Certificate issues
- Hardware failure
- Host-based/network-based firewall settings
- Blocked services, ports, or addresses
- Incorrect VLAN
- DNS issues
- NTP issues
- BYOD challenges
- Licensed feature issues
- Network performance issues