IP Data Networks

- Understand the operation of data networks.
- Know the purpose and functions of network devices such as routers, switches, bridges and hubs.
- Be able to select components to meet a specific network requirement.
- Understand how certain applications can impact network performance.
- Know the protocols, purpose and operation of both the OSI and TCP/IP models.
- Describe the data flow between two hosts on a network
- Be able to choose the most appropriate cables, media, ports and connectors to connect network devices and hosts to a LAN.

LAN Switching

- Understand the media access control method for Ethernet.
- Describe the basic switching concepts and the operation of switches.
- Configure and verify switch configuration including remote access management.
- Verify a network and switch operation using basic utilities such as ping, telnet and SSH.
- Describe VLANs and the need for routing between VLANs.
- Understand network segmentation and traffic management.
- Be able to configure and verify VLANs.
- Configure and verify trunking on Cisco switches.
- Understand advanced switching technologies:
    - RSTP
    - PVSTP
    - Ether Channel
- Be able to configure and verify PVSTP operation.
- Describe the process of root bridge election.

IP Addressing (IPv4 and IPv6)

- Describe the need for public and private addresses for IPv4.
- Understand IPv6 addresses.
- Describe the appropriate IPv6 addressing scheme for a LAN/WAN environment.
- Describe the appropriate IPv4 addressing scheme for a LAN/WAN environment, including VLSM and summarization.
- Describe the technologies required to run IPv6 and IPv4 concurrently such as dual stack.

IP Routing

- Understand the basic routing concepts.
- Understand the boot process of a Cisco router.
- Configure and verify a basic router configuration using the command line interface.
- Configure and verify both serial and Ethernet interfaces.
- Be able to verify the network connectivity and configuration of a router.
- Configure a static or default route given specific requirements, then verify.
- Manage Cisco IOS files and image(s).
- Understand Cisco IOS licensing.
- Understand and distinguish different methods of routing and routing protocols.
- Configure and verify EIGRP in a single autonomous system.
- Configure and verify OSPF (v2 and v3) in a single area.
- Configure and verify interVLAN routing using router-on-a-stick.
- Be able to configure SVI interfaces.

IP Services

- Configure and verify DHCP on a Cisco router.
- Understand the features and applications of each type of ACL.
- Be able to configure and verify ACLs.
- Understand the basic operation of NAT.
- Configure and verify NAT based on a set of network requirements.
- Be able to configure and verify NTP as a client.
- Recognize high availability FHRP.
- Understand, configure and verify Syslog and utilize Syslog output.
- Understand SNMP v2 and v3.

Network Device Security

- Be able to configure and verify device security features.
- Understand, configure and verify switch port security features.
- Configure and verify ACLs for filtering network traffic.
- Limit telnet and SSH access to a router by configuring ACLs.

Troubleshooting

- Troubleshoot and correct common issues concerning IP addressing and host configurations.
- Be able to utilize netflow and monitor data.
- Troubleshoot and fix spanning tree operation.
- Troubleshoot and resolve routing issues, including OSPF, and EIGRP.
- Troubleshoot and correct VLAN problems.
- Identify and resolve interVLAN problems.
- Troubleshoot and resolve switch trunking issues.
- Troubleshoot and fix ACL problems.
- Troubleshoot and correct layer 1 problems.
- Troubleshoot and correct WAN issues.
- Troubleshoot EtherChannel issues.

WAN Technologies

- Understand and identify different WAN technologies including:
    - Metro Ethernet
    - Frame Relay
    - VSAT
    - Cellular 3G and 4G
    - MPLS
    - T1/E1
    - ISDN
    - DSL
    - Cable
    - VPN
- Configure and verify a serial WAN connection.
- Configure Frame Relay on Cisco routers including verification.
- Be able to configure and verify a PPP connection between two Cisco routers.
- Configure and troubleshoot PPPoE.