Course Code: CIS124
Course Name: Network+
Certification: CompTIA Network+ – N10-007
Duration: 3 months
Tuition: $1895.00

Course Overview

The Network+ course will provide learners with the basic concepts of networking, including network models, such as the OSI model and the TCP/IP model and the protocols and applications that function within these models. Students will learn the basics of routing and switching operations and the protocols used on most networks today. Students will learn about virtual networking and how to work with wireless technologies in order to create a functional wireless network. The course covers concepts related to securing networks using physical (e.g. badges), logical (e.g. policies), and technical controls (e.g. port security). Students will also learn about network troubleshooting methodologies and how these can be applied to resolving connectivity, performance, and service issues on networks.

Course Content

Module 1
- **Lesson 1** – **Ports and Protocols and the OSI Model**
  This lesson covers the following topics:
  - Ports and Protocols
    - TCP protocol
    - IP protocol
    - UDP protocol
    - ICMP protocol
    - Connection-oriented protocols
    - Well-known UDP and TCP ports
  - OSI Layers
    - The Open Systems Interconnect (OSI) model
    - Layer 1 – Physical
    - Layer 2 – Data Link
    - Layer 3 – Network
    - Layer 4 – Transport
    - Layer 5 – Session
    - Layer 6 – Presentation
    - Layer 7 - Application
- **Lesson 2** – **Routing, Switching, & IP Addressing**
  This lesson covers the following topics:
  - Concepts and Characteristics of Networking

- Network transmissions
- Network traffic
- Segmentation
- Hubs, switches, and routers
- Routing protocols
- IPv6
- Performance concepts
- NAT vs PAT
- Port forwarding
- Access control lists
- Private vs public IP addressing
- Loopback and reserved addresses
- Default gateways and subnet masks
- Virtual IPs
- Address assignments
- Subnetting and Supernetting
  - Base 2 conversions and binary values
  - Subnetting basics
  - Subnetting a class C network
  - Subnetting a class B network
  - Subnetting a class A network
  - Supernetting
  - Calculating subnet boundaries

Module 2
- **Lesson 1 – Network Topologies and Technologies**
  This lesson covers the following topics:
  - Network Topologies
    - Wired topologies
    - Wireless topologies
    - Network types
    - Internet of Things (IoT)
  - Wireless Technologies
    - 802.11 standards
    - Cellular technologies
    - Frequencies
    - Speed and distance requirements
    - Channel bandwidth
    - Channel bonding
    - MIMO/MU-MIMO
    - Unidirectional vs omnidirectional antennas

- Site surveys
- **Lesson 2 – Cloud Concepts, Network Services, & Cabling Solutions**
  This lesson covers the following topics:
  - Cloud Concepts
    - Types of services
    - Cloud delivery models
    - Connectivity methods
    - Cloud security
    - Local vs cloud
  - Network Services
    - DNS service
    - DNS structure
    - SOA records
    - Record types
    - DHCP service
    - Network Time Protocol (NTP)
    - IP Address Management (PAM)
  - Cabling Solutions
    - Media types
    - Plenum vs PVC
    - Connector types: copper
    - Connector types: fiber
    - Transceivers
    - Termination points
    - Copper cable standards
    - Copper termination standards
    - Ethernet standards

Module 3

- **Lesson 1 – Networking Devices**
  This lesson covers the following topics:
  - Types of Networking Devices
    - Firewalls
    - Routers
    - Switches and hubs
    - Bridges
    - Modems
    - Wireless access points
    - Media converters
    - Wireless range extenders
    - VoIP endpoints
  - Advanced Networking

- Multilayer switches
- Wireless controllers
- Load balancers
- IDS and IPS
- Proxy servers
- VPN concentrators
- AAA services
- UTM appliances
- Next-generation firewall (NGFW) & Layer 7 firewalls
- VoIP gateways
- Content filters

- **Lesson 2** – **Network Storage and Virtualization, & WAN Technologies**
  This lesson covers the following topics:
  - Network Storage and Virtualization
    - Virtual networking components
    - Hypervisors
    - Network Attached Storage (NAS)
    - Storage Area Network (SAN)
    - Connection type
    - Jumbo frame
  - Wide Area Network
    - Early Internet and WAN service types
    - Current Internet and WAN service types
    - Transmission mediums
    - Characteristics of service – Point-to-point
    - termination

Module 4

- **Lesson 1** – **Documentation and Diagrams and Business Continuity**
  This lesson covers the following topics:
  - Documentation and Diagram Types
    - Diagram symbols
    - Standard operating procedures
    - Logical vs physical diagrams
    - Rack diagrams
    - Change management documentation
    - Wiring and port locations
    - IDF and MDF documentation
    - Labeling
    - Network configuration and performance baselines
    - Inventory management

- o Disaster Recovery
  - Availability concepts
  - Power management
  - Recovery
  - Backups
  - Mean Time To Failure (MTTF)
  - Mean Time Between Failures (MTBF)
  - SLA requirements
- **Lesson 2** – **Network Monitoring & Remote Access Methods**
  This lesson covers the following topics:
  - o Scanning, Monitoring, and Patching
    - Processes
    - Patch management
    - Event management
    - SNMP monitors
    - metrics
  - o Remote Access Methods
    - Virtual Private Network (VPN)
    - Remote Desktop Protocol (RDP)
    - Secure Shell (SSH)
    - Virtual Network Computing (VNC)
    - Network Terminal Protocol (NTP)
    - HTTPS
    - Remote file access
    - Out-of-band management

Module 5

- **Lesson 1** – **Policies and Best Practices**
  This lesson covers the following topic:
  - o Policies and Best Practice Guidelines
    - Privileged user agreement
    - Password policy
    - Onboarding and off-boarding
    - Licensing restrictions
    - International export controls
    - Data loss prevention
    - Remote access policies
    - Incident response policies
    - BUOD, AUP, and NDA
    - System lifecycle
    - Safety procedures and policies
- **Lesson 2** – **Security Devices, Wireless Security, & Access Control**

This lesson covers the following topics:
- o Physical Security Devices
    - Motion detection and video surveillance
    - Asset tracking
    - Tamper detection
    - prevention
- o Authentication and Access Control
    - Authentication, authorization, and accounting
    - Additional authentication types
    - Multifactor authentication
    - Access control
- o Wireless Security
    - WPA and WPA2
    - TKIP-RC4 and AES-CCMP
    - Authentication and authorization
    - Geofencing

Module 6
- **Lesson 1 – Network Attacks & Device Hardening**
  This lesson covers the following topic:
    - o Network Attacks
        - Denial of Service (DoS)
        - Social engineering
        - Insider threats
        - Logic bombs and evil twins
        - Wardriving and phishing
        - Rogue access points and spoofing
        - DNS and ARP poisoning
        - Ransomware
        - Deauthentication and brute force
        - VLAN hopping and Man-in-the-Middle
        - Exploits vs vulnerabilities
    - o Network Device Hardening
        - Changing credentials and using strong passwords
        - Hardware trust and updating firmware
        - Patching and updates
        - File hashing
        - Disabling unnecessary services
        - Secure protocols
        - Cryptography
        - Generating new keys

- ▪ Disabling unused ports
- **Lesson 2** – **Mitigation Techniques**
  This lesson covers the following topic:
  - o Introducing Mitigation Techniques
    - ▪ Signature management
    - ▪ Device and host hardening
    - ▪ VLAN
    - ▪ Switch port configuration
    - ▪ Switch port protection
    - ▪ Network segmentation
    - ▪ Privileged user accounts
    - ▪ File integrity
    - ▪ Role separation
    - ▪ Access control lists
    - ▪ Honeypots
    - ▪ Penetration testing

Module 7
- **Lesson 1** – **Troubleshooting Methodology & Tools**
  This lesson covers the following topics:
  - o Network Troubleshooting
    - ▪ Identifying the problem
    - ▪ Establishing the cause
    - ▪ Testing techniques
    - ▪ Identifying potential effects
    - ▪ Resolving problems
    - ▪ Verifying system functionality
    - ▪ Documentation process
  - o Network Troubleshooting Tools
    - ▪ Hardware tools
    - ▪ Packet sniffer
    - ▪ Port scanner
    - ▪ WiFi analyzer
    - ▪ Bandwidth speed tester
    - ▪ Command line tools
    - ▪ Linux commands
- **Lesson 2** – **Troubleshooting Connectivity & Performance Issues**
  This lesson covers the following topics:
  - o Wired Connectivity Issues
    - ▪ Attenuation, latency, and jitter
    - ▪ Crosstalk and EMI

- Opens and shorts
- Incorrect pinouts and cable types
- Duplex and transceiver mismatches
- Bad ports, bottlenecks, and VLAN mismatches
- Damaged cables and bent pins
- LED status indicators
  - o Wireless Connectivity Issues
    - Reflection, refraction, and latency
    - Latency, jitter, and attenuation
    - Incorrect antenna types and placement
    - Interference, overcapacity, and channel overlap
    - Distance limitations and frequency mismatches
    - Wrong SSID and passphrases
    - Security type mismatches
    - Power levels and signal-to-noise ratio

Module 8

- **Lesson 1** – **Troubleshooting Common Network Service Issues**
  This lesson covers the following topic:
  - o Network Service Issues
    - Incorrect gateway or netmask
    - Duplicate IP or MAC addresses
    - Resolving names
    - Expired DHCP scopes and Rogue DHCP servers
    - Expired IP addresses and incorrect times
    - SSL certificates and blocked ports
    - Incorrect firewall and ACL settings
    - Hardware failures and unresponsive services
- **Lesson 2** – **Additional Network Services**
  This lesson covers the following topic:
  - o Network Services
    - Power over Ethernet (PoE)
    - IPv6 address assignment
    - Variable-length subnet masks (VLSMs)
    - DHCP components
    - Software-defined networking
    - RADIUS and TACAS+