Cisco CCNA (200-301), Skill Labs

Course Specifications

Course Number: ACI76-034SL_rev1.0
Lab Length: Approximately 22 hours

Networking Concepts - Part One

Introduction
Objective

Welcome to the Networking Concepts—Part One practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Essential Router Configuration
- Exercise 2 - Essential Switch Configuration
- Exercise 3 - Next-Generation Firewalls
- Exercise 4 - Next-Generation IPS
- Exercise 5 - Access Points
- Exercise 6 - Controllers
- Exercise 7 - Endpoints and Servers
- Exercise 8 - Two-Tier and Three-Tier Architecture
- Exercise 9 - Spine-Leaf
- Exercise 10 - SOHO and WAN
- Exercise 11 - On Premises and Cloud
- Exercise 12 - Compare TCP to UDP

After completing this lab, you will be able to:

- Perform the initial configuration dialog.
- Configure and examine the router using CLI.
- Configure an IP address on an interface.
- Enable SSH access to the router.
- Configure the switch.
- Know about startup and running configurations.

- Manage startup and running configurations.
- View system information.
- Describe and compare next-generation firewalls with traditional firewalls.
- Describe NGIPS and how it works.
- Describe the purpose and function of an access point.
- Describe the purpose of Cisco DNA.
- Describe the purpose of Cisco WLC.
- Describe the purpose of endpoints and servers.
- Describe the difference between two-tier and three-tier architecture.
- Describe the characteristics of spine-leaf network topology.
- Describe SOHO networks.
- Describe WAN networks.
- Describe on-premises and cloud networks.
- Know about TCP and UDP.

Exam Objectives:

The following exam objective is covered in this lab:

- 1.1 Explain the role and function of network components
- 1.2 Describe characteristics of network topology architectures
- 1.5 Compare TCP to UDP

Networking Concepts - Part Two

Introduction
Objective

Welcome to the Networking Concepts—Part Two practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Copper and Fiber-Optics Cables
- Exercise 2 - Ethernet Shared Media and Point to Point
- Exercise 3 - Concepts of PoE
- Exercise 4 - Interface Configuration Options
- Exercise 5 - Cabling Issues
- Exercise 6 - Examining Methods of Observing Collisions and Other Errors

After completing this lab, you will be able to:

- Know about UTP and STP cable.
- Know about single-mode fiber and multimode fiber cable.
- Know about Ethernet shared media and point to point.
- Know about Power over Ethernet.
- Perform duplex Settings.
- Perform speed Settings.
- Know about cable types and ports.
- Know about medium-dependent interface/MDI crossover.
- Identify and resolve collisions.
- Know about types of errors.

Exam Objectives:

The following exam objectives are covered in this lab:

- 1.3 Compare physical interface and cabling types
- 1.4 Identify interface and cable issues (collisions, errors, mismatch duplex, and/or speed)

IP Addressing and Virtualization Concepts

Introduction
Objective

Welcome to the IP Addressing and Virtualization Concepts practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Planning an IP Addressing Scheme
- Exercise 2 - Implement an IP Addressing Scheme
- Exercise 3 - Verify and Troubleshoot the Implemented IP Address Scheme
- Exercise 4 - Need for Private IPv4 Addressing
- Exercise 5 - Determine the IPv6 Addressing Scheme
- Exercise 6 - Implement the IPv6 Addressing Scheme
- Exercise 7 - Verify and Troubleshoot the Implemented IP Address Scheme
- Exercise 8 - Introduction to SLAAC
- Exercise 9 - Global Unicast
- Exercise 10 - Unique Local

- Exercise 11 - Link Local
- Exercise 12 - Anycast
- Exercise 13 - Multicast Addressing
- Exercise 14 - Modified EUI 64
- Exercise 15 - Verify IP Parameters for Client OS
- Exercise 16 - Explain Virtualization Fundamentals

After completing this lab, you will be able to:

- Perform subnet preparation tasks.
- Calculate the subnets.
- Perform implementation of a planned IP addressing scheme.
- Perform implementation verification.
- Troubleshoot IP addressing issues.
- Know about the use and need for private IPv4 addressing.
- Configure private and public IP address using DHCP.
- Perform IPv6 addressing preparation tasks.
- Determine the IPv6 addresses.
- Perform implementation of an IPv6 addressing scheme.
- Verify the implementation of the IPv6 configuration.
- Troubleshoot IPv6 addressing issues.
- Configure and verify SLAAC.
- Configure and verify IPv6 global unicast address.
- Configure and verify IPv6 unique local address.
- Configure and verify IPv6 link local address.
- Analyze how link local addresses are generated.
- Configure and verify IPv6 anycast address.
- Know about IPv6 multicast address.
- Configure IPv6 EUI 64 type of address.
- Verify and manually configure an IP address on a Windows operating system.
- Know about virtualization.
- Know about different types of virtualization.

Exam Objectives:

The following exam objectives are covered in this lab:

- 1.6 Configure and verify IPv4 addressing and subnetting
- 1.7 Describe the need for private IPv4 addressing

- 1.8 Configure and verify IPv6 addressing and prefix
- 1.9 Compare IPv6 address types
- 1.10 Verify IP parameters for Client OS (Windows, Mac OS, Linux)
- 1.12 Explain virtualization fundamentals (virtual machines)

Switching Fundamentals - Part One

Introduction
Objective

Welcome to the Switching Fundamentals—Part One practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Examining the Functionality of the MAC Address Table and Address Aging
- Exercise 2 - Frame Switching and Frame Flooding Methods
- Exercise 3 - Configuring and Understanding CDP and LLDP
- Exercise 4 - Configuring Static, PAgP, LACP, and Layer 3 EtherChannels

After completing this lab, you will be able to:

- Know about MAC address learning.
- Adjust the aging timer.
- Perform frame switching.
- Perform frame flooding.
- Configure Cisco Discovery Protocol.
- Configure Link Layer Discovery Protocol.
- Configure static EtherChannel.
- Configure Port Aggregation Protocol (PAgP).
- Configure Link Aggregation Control Protocol (LACP).
- Configure layer 3 EtherChannel.

Exam Objectives:

The following exam objectives are covered in this lab:

- 1.13 Describe switching concepts
- 2.3 Configure and verify layer 2 discovery protocols (Cisco Discovery Protocol and LLDP)
- 2.4 Configure and verify (layer 2/layer 3) EtherChannel (LACP)

Switching Fundamentals - Part Two

Introduction
Objective

Welcome to the Switching Fundamentals - Part Two practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Trunk Configuration and Dynamic Trunking Protocol—Part I
- Exercise 2 - VLAN Trunk Protocol
- Exercise 3 - Trunk Configuration and Dynamic Trunking Protocol—Part II
- Exercise 4 - Native VLAN Configuration

After completing this lab, you will be able to:

- Configure a trunk link.
- Configure VTP.
- Complete trunk configuration.
- Secure the native VLAN.

Exam Objectives:

The following exam objective is covered in this lab:

- 2.2 Configure and verify interswitch connectivity

Configuring VLANs - Part One

Introduction
Objective

Welcome to the Configuring VLANs—Part One practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - VLAN Creation and Management
- Exercise 2 - Creating a Voice VLAN
- Exercise 3 - VLAN Trunking Protocol

After completing this lab, you will be able to:

- Perform VLAN creation and management.
- Securing the default VLAN.
- Create a voice VLAN.
- Know about VTP configurations.

Exam Objectives:

The following exam objective is covered in this lab:

- 2.1 Configure and verify VLANs (normal range) spanning multiple switches

Configuring VLANs - Part Two

Introduction
Objective

Welcome to the Configuring VLANs—Part Two practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Spanning Tree Protocol
- Exercise 2 - STP and Ports
- Exercise 3 - Rapid Per VLAN Spanning Tree Plus
- Exercise 4 - PortFast

After completing this lab, you will be able to:

- Determine the root bridge.
- Change the root bridge.
- Know about root, designated, and alternate ports.
- Change the cost of an interface.
- Know about the five spanning tree states.
- Configure RPVST+.
- Configure portfast.

Exam Objectives:

The following exam objective is covered in this lab:

- 2.5 Describe the need for and basic operations of Rapid PVST+ Spanning Tree Protocol and identify basic operations

Static and Dynamic Routing Principles

Introduction
Objective

Welcome to the Static and Dynamic Routing Principles practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Routing Table Components
- Exercise 2 - Implementing a Longest Match Routing Rule
- Exercise 3 - Administrative Distance
- Exercise 4 - Routing Protocol Metric
- Exercise 5 - IPv4 Static Routes
- Exercise 6 - IPv6 Static Routes

After completing this lab, you will be able to:

- View the routing table.
- Implement static routes.
- Add a loopback interface.
- Delete static routes.
- Configure EIGRP.
- Configure OSPF.
- Delete the OSPF process.
- Configure EIGRP and change metric of the route.
- Create a network route.
- Create a host route.
- Create a default route.
- Create a floating route.
- Create a network route.
- Create a host route.
- Create a default route.
- Create a floating route.

Exam Objectives:

The following exam objectives are covered in this lab:

- 3.1 Interpret the components of routing table
- 3.2 Determine how a router makes a forwarding decision by default
- 3.3 Configure and verify IPv4 and IPv6 static routing

Configure OSPFv2

Introduction
Objective

Welcome to the Configure OSPFv2 practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configuring OSPF
- Exercise 2 - Additional OSPF Configuration Options
- Exercise 3 - OSPF Network Type

After completing this lab, you will be able to:

- Enable OSPF.
- Configure passive interfaces.
- Manipulate router IDs.
- Examine existing adjacencies.
- Establish OSPF adjacency over serial link.

Exam Objectives:

The following exam objective is covered in this lab:

- 3.4 Configure and verify single area OSPFv2

FHRP Configuration and Verification

Introduction
Objective

Welcome to the FHRP Configuration and Verification practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configuring HSRP

- Exercise 2 - Configuring VRRP
- Exercise 3 - Configuring GLBP

After completing this lab, you will be able to:

- Configure HSRP.
- Perform HSRP tracking.
- Configure VRRP.
- Perform VRRP object tracking.
- Configure GLBP.

Exam Objectives:

The following exam objective is covered in this lab:

- 3.5 Describe the purpose of first hop redundancy protocol

Static NAT Configuration

Introduction
Objective

Welcome to the Static NAT Configuration practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configuring Static and Dynamic NAT
- Exercise 2 - Configuring PAT for an ISP Connection

After completing this lab, you will be able to:

- Configure static NAT.
- Configure dynamic network address translation.
- Configure port address translation.
- Debugging NAT.

Exam Objectives:

The following exam objective is covered in this lab:

- 4.1 Configure and verify inside source NAT using static and pools

NTP Configuration

Introduction
Objective

Welcome to the NTP Configuration practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercise:

- Exercise 1 - Understand and Configure the NTP Service

After completing this lab, you will be able to:

- Configure a router as an NTP server.

Exam Objectives:

The following exam objective is covered in this lab:

- 4.2 Configure and verify NTP operating in a client and server mode

DHCP Concepts, Configuration and Verification

Introduction
Objective

Welcome to the DHCP Concepts and Configuration and Verification practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configure DNS on a Router
- Exercise 2 - Configure and Verify DHCP
- Exercise 3 - Configure and Verify DHCP Client and Relay

After completing this lab, you will be able to:

- Configure DNS.
- Configure a DHCP scope.
- Troubleshoot DHCP.
- Configure a DHCP scope and relay agent.

Exam Objectives:

The following exam objective are covered in this lab:

- 4.3 Explain the role of DHCP and DNS within the network
- 4.6 Configure and verify DHCP client and relay

Network Traffic Management Using SNMP

Introduction
Objective

Welcome to the Network Traffic Management using SNMP practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configuring SNMP

After completing this lab, you will be able to:

- Configure SNMP on network devices.
- Install and configure network management software.
- Verify data on a network management server.

Exam Objectives:

The following exam objective is covered in this lab:

- 4.4 Explain the function of SNMP in network operations

Configuring Syslog for Switching and Routing

Introduction
Objective

Welcome to the Configuring Syslog for Switching and Routing practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configure Syslog Server

After completing this lab, you will be able to:

- Configure syslog server.

- Enable logging on a Cisco router and configure logging severity.

Exam Objectives:

The following exam objective is covered in this lab:

- 4.5 Describe the use of syslog features including facilities and levels

Remote Management Techniques

Introduction
Objective

Welcome to the Remote Management Techniques practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Device Access Using AUX and Console Ports
- Exercise 2 - Secure Remote Access
- Exercise 3 - Secure the Management Plane Using MPP
- Exercise 4 - Describe Virtual Private Networks
- Exercise 5 - IPSec Site-to-Site VPN

After completing this lab, you will be able to:

- Configure AUX access.
- Configure console access.
- Enable SSH.
- Enable HTTPS access.
- Configure Management Plane Protection (MPP).
- Know about site-to-site VPN.
- Know about remote access VPN.
- Configure site-to-site VPN.

Exam Objectives:

The following exam objectives are covered in this lab:

- 4.8 Configure network devices for remote access using SSH
- 5.5 Describe remote access and site-to-site VPNs

Using File Transfer Protocols on Routers

Introduction
Objective

Welcome to the Using File Transfer Protocols on Routers practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercise:

- Exercise 1 - Backup Solution for Config Files Using TFTP

After completing this lab, you will be able to:

- Back up and restore config files.

Exam Objectives:

The following exam objective is covered in this lab:

- 4.9 Describe the capabilities and function of TFTP/FTP in the network

Network Management Tools

Introduction
Objective

Welcome to the Network Management Tools practice lab. In this module, you will be provided with the information needed to develop your knowledge.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Automation and Programmability
- Exercise 2 - Compare Traditional Networks with Controller-Based Networking
- Exercise 3 - Describe Controller-Based and Software-Defined Architectures
- Exercise 4 - Compare Traditional Device Management with Cisco DNA Center
- Exercise 5 - Describe Characteristics of REST-Based APIs
- Exercise 6 - Recognize the Capabilities of Puppet, Chef, and Ansible
- Exercise 7 - Interpret JSON Encoded Data

After completing this lab, you will have covered the following topics:

- Know about network automation and programmability
- How automation impacts network management

- Traditional versus controller-based networking
- Know about underlay network, overlay network, and fabric
- Separation of control plane and data plane
- Northbound and southbound APIs
- Know about traditional device management
- Know about Cisco DNA Center
- Describe REST APIs
- Configuration management tools
- Interpret JSON

Exam Objectives:

The following exam objectives are covered in this lab:

- 6.1 Explain how automation impacts network management
- 6.2 Compare traditional networks with controller-based networking
- 6.3 Describe controller-based and software defined architectures (overlay, underlay, and fabric)
- 6.4 Compare traditional campus device management with Cisco DNA Center enabled device management
- 6.5 Describe characteristics of REST-based APIs (CRUD, HTTP verbs, and data encoding)
- 6.6 Recognize the capabilities of configuration management mechanisms Puppet, Chef, and Ansible
- 6.7 Interpret JSON encoded data

Applying Security Protocols

Introduction
Objective

Welcome to the Applying Security Protocols practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Configuring Standard and Extended Access Lists
- Exercise 2 - Configuring Named Access Lists
- Exercise 3 - Configuring Access Lists to Restrict Remote Access
- Exercise 4 - Configuring Layer 2 Security Features

After completing this lab, you will be able to:

- Create standard access lists.
- Create an extended access list.
- Configure a named access list.
- Configure remote access.
- Configure DHCP snooping.
- Configure dynamic ARP inspection.
- Configure port security.

Exam Objectives:

The following exam objectives are covered in this lab:

- 5.6 Configure and verify access control lists
- 5.7 Configure layer 2 security features (DHCP snooping, dynamic ARP inspection, and port security)

QoS for Routing Configuration Using PHB

Introduction
Objective

Welcome to the QoS for Routing Configuration using PHB practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Forwarding Per-Hop Behavior (PHB) for QoS

After completing this lab, you will be able to:

- Know about QoS.
- Know about classification and marking.
- Configure classification and marking.
- Know about queuing and congestion.
- Know about congestion avoidance.
- Know about policing and shaping.
- Configure policing.

Exam Objectives:

The following exam objective is covered in this lab:

- 4.7 Explain the forwarding per-hop behavior (PHB) for QoS such as classification, marking, queuing, congestion, policing, shaping

Security Mitigation Techniques

Introduction
Objective

Welcome to the Security Mitigation Techniques practice lab. In this module, you will be provided with the instructions and devices needed to develop your hands-on skills.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Key Security Concepts
- Exercise 2 - Security Program Elements
- Exercise 3 - AAA and Local User Accounts
- Exercise 4 - Password Policy

After completing this lab, you will be able to:

- Know about threats, vulnerabilities, and exploits.
- Know about mitigation techniques.
- Explain user awareness and training.
- Know about physical access control.
- Describe AAA framework.
- Configure local user accounts.
- Know about password policy and password alternatives.

Exam Objectives:

The following exam objectives are covered in this lab:

- 5.1 Define key security concepts (threats, vulnerabilities, exploits, and mitigation techniques)
- 5.2 Describe security program elements (user awareness, training, and physical access control)
- 5.3 Configure device access control using local passwords
- 5.4 Describe security password policies elements, such as management, complexity, and password alternatives (multifactor authentication, certificates, and biometrics)
- 5.8 Differentiate authentication, authorization, and accounting concepts

Wireless Architecture and Application

Introduction
Objective

Welcome to the Wireless Architecture and Application practice lab. In this module, you will be provided with the information needed to develop your knowledge.

Overview
Learning Outcomes:

In this module, you will complete the following exercises:

- Exercise 1 - Wireless Principles
- Exercise 2 - Cisco Wireless Architectures and AP Modes
- Exercise 3 - Physical Infrastructure Connections of WLAN Components
- Exercise 4 - AP and WLC Management Access Connections
- Exercise 5 - Configure the Components of a Wireless LAN Access for Client Connectivity
- Exercise 6 - Wireless Security Protocols
- Exercise 7 - Configure WLAN Using WPA2-PSK Security Standard

After completing this lab, you will be able to:

- Know about wireless communication.
- Compare wired and wireless networks.
- Know about wireless channels.
- Explain overlapping and nonoverlapping channels.
- Know about service set identifier (SSID).
- Know about radio frequency (RF).
- Explain encryption.
- Explain ad hoc network.
- Know about infrastructure network.
- Know about split-MAC or controller architecture.
- Explain wireless AP modes.
- Know about connection of access point and wireless LAN controller to switch.
- Explain wireless LAN controller and AP interfaces.
- Know about wireless LAN controller management access.
- Know about TACACS and RADIUS.
- Configure WLAN.
- Complete WLAN configuration.
- Know about wireless security protocols.

- Know about types of Wi-Fi Protected Access (WPA).
- Configure WPA2 with PSK.

Exam Objectives:

The following exam objectives are covered in this lab:

- 1.11 Describe wireless principles
- 2.6 Compare Cisco Wireless Architectures and AP modes
- 2.7 Describe physical infrastructure connections of WLAN components (AP, WLC, access/trunk ports, and LAG)
- 2.8 Describe AP and WLC management access connections (Telnet, SSH, HTTP, HTTPS, console, and TACACS+/RADIUS)
- 2.9 Configure the components of a wireless LAN access for client connectivity using GUI only such as WLAN creation, security settings, QoS profiles, and advanced WLAN settings
- 5.9 Describe wireless security protocols (WPA, WPA2, and WPA3)
- 5.10 Configure WLAN using WPA2 PSK using the GUI