

## Network Technologies

### Course Description

This course introduces the fundamentals of network technologies. Students are exposed to and learn basic network terminology in order to prepare for further courses in networking. Classes cover all the fundamental information behind LANs, WANs and their technologies, including an overview of network devices, the OSI and TCP models of networking and the different topologies used in networking. The Lab classes introduce students to the hands on techniques to install, configure and troubleshoot a physical network environment. Use of the program WireShark in the lab will allow for the examination of broadcast/unicast/multicast traffic, frame and packet structure (relate to OSI and TCP/IP model), three-way handshake, syn-ack, TCP and UDP data flows and sniffing an unencrypted conversation and/or authentication attempts.

Upon successful completion, the student can apply the acquired knowledge towards completing the “Cisco Certified Entry Networking Technician” accreditation from Cisco Systems ([www.cisco.com](http://www.cisco.com))

### Course Learning Outcomes

Upon successful completion, students will be able to:

1. Describe the theory behind Network technologies, protocols and standards.
2. Demonstrate the ability to manipulate and convert hexadecimal numbers.
3. Demonstrate the ability to use binary to decimal conversions to manipulate IP subnets.
4. Perform basic Router setup and understand there functions.
5. Perform basic Switch setup and understand there functions.
6. Create a simple routed LAN.

## Essential Employability Skills

Upon successful completion, students will be able to:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
3. Execute mathematical operations accurately.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.
6. Locate, select, organize, and document information using appropriate technology and information systems.

## Text & Learning Materials

Lammle, T. 2013 CCENT: Cisco Certified Entry Networking Technician Study Guide, Second Edition

ISBN: 978-1-118-43525-0

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<b>Class</b>	<b>Topics</b>	<b>Readings/ Materials</b>	<b>Outcomes</b>	<b>Evaluations/ Assignments</b>
1	Introduction to Networking	Chapter 1	Students will be able to: 1)list the advantages of networked computing relative to standalone computing (1) 2)distinguish between client/server & peer to peer networks (1) 3)describe several specific uses for a network	Lab 1: 1) Networking vs standalone 2) client / server and peer-to- peer Networks 3) Uses of a Network 4) Non technical / soft skills
2	Introduction to OSI Model	Chapter 1	Students will be able to: 1) be familiar with International organizations that set standards (1) 2) describe the purpose of OSI model and the function of each of its layers (1) 3) understand how nodes communicate through the OSI model 4) discuss the structure and purpose of data packets and frames 5) understand the difference between the two types of addressing	Lab 2: 1) standards for Networking 2) practicality of OSI model 3) purpose of data packets and frames 4) addressing in OSI model (introduction)  Research Assignment: Compare OSI and TCP networking models
3	Network devices: An overview	Chapter 2	Students will be able to: 1) explain basic network device concepts (1, 4, 5) 2) discuss network segmentation (1, 4, 5) 3) explain the role of addresses in a network 4) describe IP address components	Lab 3: 1) Hubs & Repeaters 2) Wireless access points 3) Bridges, Switches & routers 4) setting up a SOHO router 5) Peer-to-peer network with hub
4	Ethernet Operations	Chapter 2	Students will be able to: 1) identify characteristics of various protocols (1) 2) understand how the OSI model correlates to the Network Protocols (1) 3) describe the TCP/IP suite and describe its functions (1) 4) understand the addressing schemes for various protocols (1)	Lab 4: 1) CSMA/CD 2) Ethernet 3) Duplex Communications 4) broadcast, collision and failure domains 5) Intro to WireShark

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5	TCP/IP: An Overview	Chapter 3	Students will be able to: 1) describe the upper layer protocols (1) 2) explain the differences between Ports and Sockets and the use of common Port numbers 3) describe the function of a 3-way handshake (1)	Lab 5: 1) packet sniffing with Wireshark
6	TCP/IP: In Depth	Chapter 4	Students will be able to: 1) explain the methods of network design unique to TCP/IP, CIDR, NAT & ICS (1, 4) 2) differentiate between public & private networks 3) describe Subnet Classfull IP environments	Lab 6: 1) IP addressing, classes & subnetting 2) Identifying broadcast, collision and failure domains
7	Frame Transmission	Chapter 4	Students will be able to: 1) Further describe the actions of a router on a network (4, 1) 2) differentiate between network topologies (1) 3) understand basic network design (1, 4, 5)	Lab 7: 1) Internetwork Networking Layer 2) 3 layer Hierarchical Model
8	TCP/IP: Subnetting	Chapter 5	Students will be able to: 1) construct subnets 2) analyze and fully describe IP addresses including scope, first, last and broadcast addresses 3) identify local, remote and invalid address pairs	Lab 8: 1) Subnetting in depth 2) review
9	Variable Length Subnet Masks	Chapter 6	Students will be able to: 1) explain the difference between Classfull and Classless Networking (3) 2) explain the benefits of VLSM (3, 1) 3) perform VLSM subnetting of Classless IP environments	Lab 9: 1) create VLSM Classfull and Classless IP environments 2) further review

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10	IPv4 vs. IPv6	Chapter 7	Students will be able to: 1) explain the need to move to IPv6 (1) 2) describe the IPv6 network address (3) 3) describe the transition from IPv4 to IPv6 (1, 2, 3)	Lab 10: 1) Working with Hexadecimal Numbers 2) configuring and troubleshooting IPv6 network
11	Switch and IOS Basics	Chapter 8	Students will be able to: 1) Connect to a Switch & Router (5) 2) Explain the basic IOS setup (5) 3) demonstrate an ability to perform basic Switch and Router setup	Lab 11: 1) configuring and monitoring IOS LAN 2) configuring and monitoring IOS WAN
12	Basic network setup		Students will further demonstrate the ability to set up a small network using both Routers and Switches in a lab environment. (6)	Course review: Small network setup

\* Numbers in parentheses refer to Course Learning Outcomes