

**COURSE NUMBER:** CE3640

**COURSE TITLE:** Unified Communications

**COURSE DESCRIPTION:**

This course provides students with an understanding of unified communications topics such as Voice over IP. Topics include unified communications components and technologies, PSTN architecture, VoIP, protocols and signaling, and unified communications deployment. Upon completion of this course students may choose to pursue professional certification such as CCNA Voice.

**PREREQUISITES:** CE3160 - L2/L4 Switching and  
CE1210 - Basic Network Communications I  
OR  
CE2130 – IP Routing (Qatar only) and  
CE2400 – Switching and Wireless (Qatar only)

**CO-REQUISITES:** None

**CREDIT VALUE:** Five (5)

**COURSE HOURS PER WEEK:** Four (4)

**LAB HOURS PER WEEK:** Three (3)

**SUGGESTED TEXT:**

Cioara, J., Cavanaugh, M. J., & Krake, K. A. (2008). *CCNA voice official exam certification guide (640-460 IIUC)*. Cisco Press: San Jose. ISBN-10: 1-58720-207-7 or ISBN-13: 978-1-58720-207-0

Schmidt, C. A., & Friend, E. (2007). *IP telephony using CallManager Express*. Cisco Press: Indianapolis, IN. ISBN: 1-58713-176-5

**LEARNING RESOURCES:**

Cisco Packet Tracer

**MAJOR TOPICS:**

- 1.0 Components of a Unified Communications Architecture
- 2.0 PSTN Components and Technologies
- 3.0 VoIP Components and Technologies

- 4.0 Gateways and PSTN Connectivity
- 5.0 VoIP Network Support
- 6.0 Configuring Unified Communications
- 7.0 Implementing Voicemail
- 8.0 Maintenance and Operations Tasks to Support VoIP

## **LEARNING OBJECTIVES:**

Upon completing this course, a proficient student should be able to:

### **1.0 Components of a Unified Communications Architecture**

- 1.1 Describe the function of the infrastructure in a UC environment
- 1.2 Describe the function of endpoints in a UC environment
- 1.3 Describe the function of the call processing agent in a UC environment
- 1.4 Describe the function of messaging in a UC environment
- 1.5 Describe the function of auto attendants and IVRs in a UC environment
- 1.6 Describe the function of contact center in a UC environment
- 1.7 Describe the applications available in the UC environment, including Mobility, Presence, and Telepresence
- 1.8 Describe how the Unified Communications components work together to create a Unified Communications Architecture

### **2.0 PSTN Components and Technologies**

- 2.1 Describe the services provided by the PSTN
- 2.2 Describe time division and statistical multiplexing
- 2.3 Describe supervisory, informational, and address signaling
- 2.4 Describe numbering plans
- 2.5 Describe analog circuits
- 2.6 Describe digital voice circuits
- 2.7 Describe PBX, trunk lines, key-systems, and tie lines

### **3.0 VoIP Components and Technologies**

- 3.1 Describe the process of voice packetization
- 3.2 Describe RTP and RTCP
  - 3.2.1 Monitor RTP and RTCP traffic using a protocol analyzer
- 3.3 Describe the function of and differences between codecs
- 3.4 Describe H.323, MGCP, SIP, and SCCP signaling protocols
  - 3.4.1 Configure communications between one or more endpoints using a VOIP signaling protocol

### **4.0 Gateways and PSTN Connectivity**

- 4.1 Describe the function and application of a dial plan
  - 4.1.1 Develop and implement a dial plan to support a SOHO environment
- 4.2 Describe the function and application of voice Gateways
  - 4.2.1 Configure a voice gateway for communications between two voice networks
- 4.3 Describe the function and application of voice ports in a Gateway
  - 4.3.1 Configure voice ports for appropriate FXS and FXO operation
- 4.4 Describe the function and operation of call-legs
- 4.5 Describe and configure voice dial peers
- 4.6 Describe the differences between PSTN and Internet Telephony Service Provider circuits

## **5.0 VoIP Network Support**

- 5.1 Describe the purpose of VLANs in a VoIP environment
- 5.2 Describe the environmental considerations to support VoIP
- 5.3 Configure switched infrastructure to support voice and data VLANs
- 5.4 Describe the purpose and operation of PoE
- 5.5 Identify the factors that impact voice quality
- 5.6 Describe how QoS addresses voice quality issues
- 5.7 Identify where QoS is deployed in the unified communications infrastructure
  - 5.7.1 Configure QoS to support VoIP in a switched LAN environment
  - 5.7.2 Configure QoS to support VoIP in a frame relay network
  - 5.7.3 Configure QoS to support VoIP on a T1

## **6.0 Configuring Unified Communications**

- 6.1 Describe the appropriate software components needed to support endpoints
  - 6.1.1 Configure a Windows PC client for unified communications
  - 6.1.2 Configure a Linux PC client for unified communications
  - 6.1.3 Install and configure a softphone application for a given VoIP network
- 6.2 Describe the requirements and correct settings for DNS, DHCP, NTP, and TFTP
- 6.3 Configure DNS, DHCP, NTP and TFTP on a router
- 6.4 Configure DNS, DHCP, NTP and TFTP on a Linux server
- 6.5 Configure DNS, DHCP, NTP and TFTP on a Windows server
- 6.6 Describe the differences between key system and PBX mode
- 6.7 Describe the differences between the different types of ephones and ephone-dns
  - 6.7.1 Configure ephones and ephone-dns for a SOHO VoIP network
- 6.8 Configure endpoints for use with a unified communications infrastructure environment such as Cisco Unified Communications Manager Express
- 6.9 Configure call-transfer per design specifications

- 6.10 Configure voice productivity features, including hunt groups, call park, call pickup, paging groups, and paging/intercom
- 6.11 Configure Music on Hold

## **7.0 Implementing Voicemail**

- 7.1 Describe a unified communications voicemail hardware platform
  - 7.1.1 Evaluate and select appropriate voicemail hardware for a given application
- 7.2 Configure the foundational elements required for a unified communications manager to support a voicemail solution
- 7.3 Describe the features available in a common voicemail solution such as Cisco Unity Express
- 7.4 Configure AutoAttendant services
- 7.5 Configure basic voicemail features

## **8.0 Maintenance and Operations Tasks to Support VoIP**

- 8.1 Describe basic troubleshooting methods for unified communications infrastructures such as Cisco Unified Communications Manager Express
- 8.2 Explain basic troubleshooting methods for voicemail platforms such as Cisco Unity Express
- 8.3 Explain basic maintenance and troubleshooting methods for unified communications equipment such as the UC500

### **EVALUATION:**

Quizzes	10%
Labs	10%
Projects	20%
Practical Exam	20%
Final Exam	40%

**DATE DEVELOPED:** June 2010

**DATE REVIEWED:**

**REVISION NUMBER:** 1

**DATE REVISED:** February 2011

*Note to instructor: Check PIRS to ensure this outline is the most current version.*