

I. CATALOG DESCRIPTION:

A. Department Information:

Division:	Business and Information Technology
Department:	OIS/MIS
Course ID:	MIS 093
Course Title:	Fundamentals of WANs, Wide Area Networks , Semester Four (Cisco Networking Academy)
Units:	3
Lecture:	2
Laboratory:	3
Prerequisite:	MIS 092

Course Description:

The fourth semester of the Cisco Academy provides students with classroom and laboratory experience in designing, configuring, installing and implementing a Wide Area Network. It includes but is not limited to WAN topologies, interfaces, protocols, and frame encapsulation.

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II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One.

III. EXPECTED OUTCOMES FOR STUDENTS

Upon completion of the course, the student will be able to:

- A. Demonstrate substantial conceptual understanding of LAN switching, VLANs, LAN Design, Routing Protocols, ACLs, and IGRP
- B. Perform switch and router configurations relevant to switching modes, VLANs, IGRP, ACLs, and IPX
- C. Attain a working knowledge of WAN vocabulary
- D. Explain the relevance of T1 leased lines, Frame Relay, ISDN, and PPP to the TCS
- E. Perform simple one, two, and three-level (core, distribution, access) WAN designs
- F. Apply the WAN design process introduced in Chapter 3 to their TCS
- G. Progress on WAN TCS tasks, including WAN user requirements document, WAN link speeds and upgrade paths, WAN traffic flow, WAN electronics and media lists, and WAN logical and physical topologies
- H. Make necessary changes to the local router configurations
- I. Explain the 4-phase PPP session process
- J. Add PPP, PAP, and CHAP to their local router configurations
- K. Attain a working vocabulary of ISDN technology
- L. Apply ISDN to their local router configuration
- M. Link ISDN to their TCS
- N. Achieve a working vocabulary of Frame Relay technology
- O. Apply Frame Relay to their local router configuration
- P. Connect Frame Relay to their TCS
- Q. Describe WAN-related network management tasks
- R. Answer 80 percent OSI-related questions and perform any IP address-related calculations that might appear on any CCNA Exam
- S. Execute complex router configurations using any command covered in the CNAP

IV. CONTENT:

- A. Review
 - 1. LAN Switching
 - 2. Virtual LANs
 - 3. LAN Design
 - 4. Routing Protocols
 - 5. Access List Overview
 - 6. IPX Routing Overview
- B. WANs
 - 1. Technology
 - 2. WAN Devices
 - 3. How WANs Relate to the OSI Model
 - 4. WAN Encapsulation Formulas
 - 5. WAN Link Options
- C. WAN Design
 - 1. WAN Communication
 - 2. The First Steps in WAN Design
 - 3. How to Identify and Select Networking Capabilities
- D. Point-to-Point Protocol
 - 1. PPP
 - 2. PPP Session Establishment
 - 3. PPP Authentication
- E. Integrated Services Digital Network (ISDN)
 - 1. ISDN
 - 2. How ISDN Relates to the OSI Reference Model
 - 3. ISDN Uses
 - 4. ISDN Services: BRI and PRI
 - 5. ISDN Configuration Tasks
 - 6. Dial-on-Demand Routing
- F. Frame Relay
 - 1. Frame Relay Technology
 - 2. LMI: Cisco's Implementation of Frame Relay
 - 3. LMI Features
 - 4. Frame Relay Subinterfaces
 - 5. The Configuration of Basic Frame Relay
- G. Network Management
 - 1. The Administrative Side of Network Management
 - 2. Monitoring the Network
 - 3. Troubleshooting Networks
- H. Network + Certification Exam Review
 - 1. Basic Networking Knowledge
 - 2. Understand Physical Layer
 - 3. The Data Link Layer
 - 4. The Network Layer
 - 5. The Transport Layer
 - 6. TCP/IP Fundamentals
 - 7. TCP/IP Suite: Utilities
 - 8. Remote Connectivity
 - 9. Security
 - 10. Implementing Installation of the Network
 - 11. Maintaining and Supporting the Network
 - 12. Troubleshooting the Network

- I. CCNA Exam Preparation
 - 1. OSI Model
 - 2. Creating Subnets
 - 3. Router Commands
 - 4. LAN Switching
 - 5. Microsegmentation of a Network
 - 6. Switching Methods
 - 7. The Benefits of Virtual LANs (VLANs)
 - 8. Spanning Tree Protocol
 - 9. Skills Based Sample

- V. METHODS OF INSTRUCTION:
 - A. Lecture
 - B. Web-based Interactive Labs
 - C. Demonstration
 - D. Web-based Training
 - E. Discussion
 - F. Group Activity

- VI. TYPICAL ASSIGNMENTS:
 - A. Web-based Interactive Labs
 - 1. Using the curriculum's interactive flash capability, create an extended access control list on the simulated router.
 - 2. Take the interactive quiz related to ISDN and review the appropriate material from the curriculum for any incorrect responses.
 - B. Written Assignments
 - 1. In your engineering journal, record a summary of Frame Relay operation.
 - 2. Construct a reference table of all acronyms related to PPP, ISDN, and Frame Relay that include their meanings and importance to their particular technologies.

- VII. EVALUATION:
 - A. Methods of evaluation:
 - 1. Problem Solving Exercises and Skills Demonstration
 - a. Use the Ping, Tracert, and Telnet troubleshooting tools to solve a connectivity problem between routers A and E.
 - b. Correctly configure the first serial port of Router A for PPP encapsulation with CHAP authentication.
 - 2. Objective Tests and Written Assignments
 - a. What is the router command to set the ISDN switch type?
 - b. Typical Written Assignment
Describe the ISDN components and the reference points that would be used in a connection from TE2 device to the phone company central office.
 - 3. Lab Activities
 - a. Examine the configuration of the router lab setup and make changes to switch the appropriate serial ports on Routers A and B from HDLC to PPP encapsulation.
 - b. Typical Lab Activity
Design a three-level WAN layout for a school district.

- B. Frequency of evaluation:
 - 1. On-line chapter examinations as each exercise/lesson is completed; the software provides immediate feedback and review
 - 2. Group work evaluated weekly
 - 3. Skill-based final exam
 - 4. On-line final exam for CCNA

VIII. TYPICAL TEXT(S):

- A. Cisco Systems, Inc., *Cisco Networking Academy Program: Second Year Companion Guide, 2001*, San Jose, California.
- C. Cisco Systems, Inc., *Cisco Networking Academy Program; Engineering Journal and Workbook, 2nd Ed.*, 2001, San Jose, California.
- D. Lorenz, L., *Cisco Networking Academy Program Lab Companion: Lab Companion, 2nd Ed.*, 2001, San Jose, California

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Zip disk