



UNIVERSIDAD DE GUADALAJARA

CENTRO UNIVERSITARIO DE LA COSTA

DIVISIÓN DE INGENIERÍAS

DEPARTAMENTO DE CIENCIAS Y TECNOLOGÍAS DE LA INFORMACIÓN Y COMUNICACION

2016B

ACADEMIA DE REDES Y TELECOMUNICACIONES					
I	NOMBRE DE LA MATERIA	Redes Emergentes e Inalámbricas			
	TIPO DE ASIGNATURA	Curso-Taller	CLAVE	IF123	
II	CARRERA	Ingeniería en Telemática			
	ÁREA DE FORMACIÓN	Básica Especializante Obligatoria			
III	PRERREQUISITOS	Ninguno			
IV	CARGA GLOBAL TOTAL	64 hrs.	TEORÍA	48 hrs.	PRÁCTICA 32 hrs.
V	VALOR EN CRÉDITOS	8			
FECHA DE CREACIÓN		FECHA DE MODIFICACIÓN	Julio de 2016	FECHA DE EVALUACIÓN	Julio de 2016

VI. OBJETIVO GENERAL

Este curso ofrece a los alumnos los conocimientos necesarios de las Redes Inalámbricas de una manera sencilla y comprensible para obtener las bases y de esta manera capacitar al alumno para los cambios radicales en el área de las Telecomunicaciones.

OBJETIVOS PARTICULARES:

El alumno adquiere habilidades para el diseño, instalación, configuración, operación y solución de problemas de los estándares 802.11 de las redes inalámbricas

El alumno repasa los conceptos de tecnologías, dispositivos, seguridad, diseño realiza practicas enfatizando en aplicaciones de prácticas reales y habilidades adquiridas.

VII. CONTENIDO TEMÁTICO

Presentación del Curso:

El alumno obtiene los conocimientos necesarios de las redes inalámbricas de una manera sencilla y comprensible, y así aplicar las aptitudes y habilidades en la resolución de casos reales que las organizaciones privadas y públicas lo demandan conforme a los cambios que se presentan en las tecnologías de la Información.

Module 1: Introduction to Wireless LANs

1.1 Introduction to Wireless LANs

1.1.1 What is a wireless LAN?

1.1.2 No more wires?

1.1.3 Why wireless?

1.1.4 Evolution of wireless LANs

1.2 Networking Media

1.2.1 Physical layer media

1.2.2 STP

1.2.3 UTP

1.2.4 Coaxial cable

1.2.5 Optical fiber

1.2.6 Atmosphere: the wireless médium

1.2.7 Media installation

Lab: Wireless Component and Media Identification

1.3 Wireless Technologies

1.3.1 Overview





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Interactive Activity: From LAN to WLAN

1.3.2 Digital wireless and celular

1.4 Components and Topologies

1.4.1 Components overview

Interactive Activity: Devices Function at OSI Layers

1.4.2 Client adapters

1.4.3 Access points

1.4.4 Bridges

1.4.5 Antennas

1.4.6 Cables and accessories

1.4.7 802.11 enabled devices

2.3 Physical Layer (PHY)

2.3.1 Scope and functions

2.3.2 IEEE 802.11b (High-Rate) DSSS PHY specification

2.3.3 802.11b modulation

2.3.4 IEEE 802.11a PHY specification

2.3.5 IEEE 802.11g PHY specification

2.3.6 FHSS and Infrared (IR) PHY specifications

2.4 Client Adapters

2.4.1 Introduction

Photozoom: Cisco Aironet Client Adapters

2.4.2 Parts of the client adapter

2.4.3 Driver types and client support

Lab: Install a WLAN adapter card

2.4.4 Network configurations using the client adapters

2.5 Aironet Client Utility (ACU)

2.5.1 Overview

2.5.2 Installation

Lab: Install Aironet Client Utility (ACU)

2.5.3 Create and select profiles

2.5.4 Edit, import, and export profiles

2.5.5 Manage profiles

Lab: Configure Auto Profiles

2.5.6 Configure the client adapter

Demonstration Activity: The Aironet Client Utility

2.5.7 Aironet Client monitor (ACM)

2.5.8 Configure the client IP address

2.6 ACU Monitoring and Troubles

2.6.5 Link Status Meter

Interactive Activity: Link Status Meter and Free Space Loss Simulator

Lab: ACU Utilities

Lab: Creating an Adhoc Network

Module Summary

Module Quiz

Module 3: Wireless Radio Technology

Module Overview

3.1 Waves

3.1.1 Overview of waves Interactive Activity: Longitudinal Pulse





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Interactive Activity: Digital Modulation

3.1.2 Sine waves

Interactive Activity: Amplitude and Frequency

Interactive Activity: Amplitude, Frequency, and Phase

3.1.3 Analog to digital conversion

Interactive Activity: Analog to Digital Conversion

3.2 Mathematics for Studying Radio

3.2.1 Watts

3.2.2 Decibels

3.2.3 Decibel references

Interactive Activity: Calculating Decibels

Interactive Activity: Using Decibels

Lab: Wireless Mathematics

3.3 Electromagnetic (EM) Waves

3.3.1 Basics of EM waves

Interactive Activity: Propagation of Light in Matter

Interactive Activity: Electromagnetic Fields

Interactive Activity: Electromagnetic Calculator

3.3.2 EM spectrum chart

Interactive Activity: Electromagnetic Spectrum

3.3.3 Fourier synthesis

3.3.4 Spectrum uses

3.4 Signals

3.4.1 Viewing signals in time

3.4.2 Viewing signals in frequency

3.4.3 Signals in time and frequency

Interactive Activity: Tone Generator Modulation

3.4.4 Noise in time and frequency

3.5 Modulation Techniques

3.5.1 Carrier frequency

3.5.2 Basic modulation techniques

Interactive Activity: Digital Modulation

3.5.3 FHSS

Interactive Activity: Frequency Hopping Spread Spectrum

3.5.4 DSSS

3.5.5 OFDM

3.6 Multiple Access and Bandwidth

3.6.1 Multiple access to shared medium

3.6.2 WLAN DSSS and CSMA/CA

Interactive Activity: Allocating Communications Resources

3.6.3 Bandwidth

3.7 Radio Wave Propagation

3.7.1 Propagation of RF

3.7.2 Refraction

Interactive Activity: Optical Refraction

3.7.3 Reflection

Interactive Activity: Law of Reflection

3.7.4 Diffraction and scattering

3.7.5 Multipath





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Interactive Activity: Multipath

3.7.6 Path-loss

Interactive Activity: The Free-Space Loss (FSL) Equation

Interactive Activity: Free Space Loss Simulation

Module Summary

Module Quiz

Module 4: Wireless Topologies

Module Overview

4.1 Components

4.1.1 Laptops and workstations

4.1.2 Mobile computers, PDAs, and barcode readers

4.1.3 Clients and adapters

4.1.4 Access points and bridges

4.1.5 Antennas

4.1.6 Ethernet and wired LANs

Interactive Activity: Layer Launch

Interactive Activity: Devices Function at OSI Layers

4.2 WLAN Topologies

4.2.1 Modularity

Interactive Activity: Cisco Three-Layer Internetwork Design Model

4.2.2 WLAN categories

Interactive Activity: Bridged WLANs

4.2.3 Local area networks (LAN)

4.2.4 Wireless repeater

4.2.5 System redundancy and load balancing

4.2.6 Roaming

4.2.7 Scalability

4.3 Channel Setup

4.3.1 Overview

4.3.2 Access point coverage and comparison

4.3.3 Multirate implementation

4.3.4 Channel usage and interference

4.4 Bridge Topologies

4.4.1 Root modes

4.4.2 Point-to-point configuration

Interactive Activity: Bridge's Line of Sight

4.4.3 Point-to-multipoint configuration

4.4.4 Distance limitations

4.4.5 Bandwidth

4.5 Sample Topologies

4.5.1 Basic topologies

Interactive Activity: Name that Topology

4.5.2 Campus topologies

4.5.3 WLAN addition to AVVID

Interactive Activity: Vocabulary Check

Interactive Activity: Cisco Integrated Solution

Lab: Topology Design with Cisco Network Designer (CND)

4.6 VLAN, QoS, and Proxy Mobile IP

4.6.1 VLAN features

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4.6.2 Quality of Service (QoS) feature

4.6.3 DCF

4.6.4 Proxy mobile IP

Module Summary

Module Quiz

Module 5: Access Points

Module Overview

5.1 Access Point Connection

5.1.1 Introduction

Photozoom: Cisco AP1100 Access Point

Photozoom: Aironet 1200 series

Photozoom: Cisco AP350 Access Point

5.1.2 Radio upgrade

5.1.3 Cable and power the AP

5.1.4 LED Indicators

5.1.5 Connecting to

5.2 Basic Configuration

5.2.1 Configure IP address and SSID via IPSU

5.2.2 Navigating the GUI

Lab: Configuring Basic AP Settings

5.2.3 Configure basic settings via GUI

5.2.4 Navigating the CLI

Lab: Using features of the Internetworking Operating System (IOS) command line interface (CLI)

5.2.5 Configure basic settings via CLI

Demonstration Activity: Configure IP Address using VxWorks Menu

Demonstration Activity: Configure Radio Interface using VxWorks Menu

Lab: Manage AP Configuration and Image Files

5.3 Verify AP Operation

5.3.1 Overview

5.3.2 Summary status (HOME) page

5.3.3 Network map

5.3.4 Associations

5.3.5 ACM and ACU

Lab: Configure Ethernet/FastEthernet Interface

5.4 Network Interface Configuration

5.4.1 Overview

5.4.2 IP address

5.4.3 Configure the FastEthernet interface

5.4.4 Configure radio interfaces via GUI

Demonstration Activity: AP Radio Advanced

Lab: Configure Radio Interfaces through the GUI

5.4.5 Configure radio interfaces via IOS CLI

Lab: Configure Radio Interface through the IOS CLI

5.4.6 Verify radio status

5.4.7 Carrier busy test

5.4.8 Debugging the radio

Lab: Configure an AP as a repeater through the IOS CLI

5.5 Configure Services





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- 5.5.1 Overview
- 5.5.2 Telnet/SSH
- 5.5.3 Hot standby
- 5.5.4 CDP
- 5.5.5 DNS
- 5.5.6 HTTP
- 5.5.7 Proxy Mobile IP
- 5.5.8 QoS
- 5.5.9 NTP
- 5.6 Wireless Services
 - 5.6.1 Overview
 - 5.6.2 AP
 - 5.6.3 WDS
- Module Summary
- Module Quiz

Module 6: Bridges

Module Overview

6.1 Bridge Connection

6.1.1 Introduction

Photozoom: Cisco BR350 Wireless Bridge

Photozoom: Cisco 1400 Wireless Bridge

6.1.2 Bridge roles in the network

6.1.3 Cable and power the bridge

6.1.4 LED indicators

6.1.5 Connecting to the bridge

6.1.6 Reset the bridge

6.2 Basic Configuration

6.2.1 Configure IP address and SSID via IPSU

6.2.2 Navigating the GUI

6.2.3 Configure basic settings via GUI

Demonstration Activity: Using the IP Setup Utility (IPSU)

6.2.4 Navigating the menu

6.2.5 Configure basic settings via menu

Configuring the radio and Ethernet ports

6.3 Configuring the radio and Ethernet ports

6.3.1 Basic radio port configuration

6.3.2 Extended radio configuration – hardware page

6.3.3 Extended radio configuration – advanced page

6.3.4 Configuring the Ethernet port – identification page

6.3.5 Configuring the Ethernet port – hardware page

6.3.6 Configuring the Ethernet port – advanced page

Lab: Configure Site-to-Site Wireless Link

6.4 Configuring Services

6.4.1 Configuring time services

6.4.2 Configuring boot services

6.4.3 Configuring name services

6.4.4 Configuring routing setup

Lab: Configure Bridge Services

6.5 Cisco Services





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6.5.1 Services overview

6.5.2 CDP

6.5.3 Firmware upgrade and distribution

Lab: Manage Bridge Configuration and Image Files

6.5.4 Hot standby management

6.5.5 Manage system configuration

Lab: Configure Layer 3 Site-to-Site Wireless Link—OPTIONAL Challenge Lab

6.6 1400 Series Bridge

6.6.1 Overview

6.6.2 Models and options

6.6.3 Components and accessories

6.6.4 IOS features

Module Summary

Module Quiz

Module 7: Antennas

7.1.1 Introduction

7.1.2 Variables

7.1.3 Bandwidth

7.1.4 Beamwidth

Lab: Antenna Setup

7.1.5 Gain

7.1.6 Polarization

7.1.7 Radiation patterns

7.1.8 Diversity

Interactive Activity: Diversity

Lab: Configure AP Diversity Settings

Lab: Configure Bridge Diversity Settings

7.2 Omnidirectional Antennas

7.2.1 Introduction

7.2.2 2.2 dBi Dipole “rubber duck” Antennas)

7.2.3 Ceiling antennas

7.2.4 Mast antennas

7.2.5 Pillar antennas

7.2.6 Integrated antennas

Lab: Omnidirectional Antennas

7.3 Directional Antennas

7.3.1 Introduction

7.3.2 Patch antennas

7.3.3 Yagi

7.3.4 Solid dish

Lab: Directional Antennas

7.3.5 5 GHz sector

7.4 Cable and Accessories

7.4.1 Cable selection

7.4.2 Cable loss

7.4.3 Cable connectors and splitters

7.4.4 Amplifiers

7.4.5 Lightning arrestor

7.5 Link Engineering and RF Path Planning

