



Fundamentals of Wireless LAN



Academy Day 2007 IT-Bildungsnetz

02.06.2007 Fulda

Jörg Brodka don.2000gmx.de

Inhalt

Allgemeine Einführung in W-LAN

- Technik
- Möglichkeiten
- Grenzen

Fundamentals of Wireless-LAN

- Curriculum
- Labs, Geräte

Die Umsetzung

- Umsetzung der Bildungsinitiative Networking

Fragen und Antworten



Allgemeine Einführung in Wireless-LAN

W-LAN: Wireless Local Area Networks

Technologie zur drahtlosen Datenübertragung

Allgemeine Einführung in Wireless-LAN

Funknetze haben sich als moderne Kommunikationsinfrastruktur etabliert

- beliebig viele Endgeräte
- Verbindung mehrerer Räume – ohne Kabel
- Unabhängig vom Betriebssystem

Allgemeine Einführung in Wireless-LAN

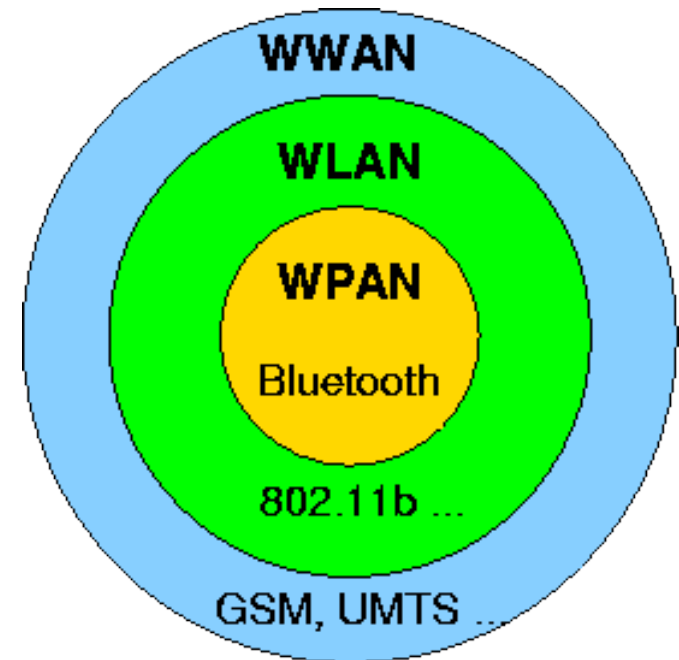
- mobile Anwender können sich auch außerhalb des Büros in das Firmennetz einloggen
- in Schulen ist man nicht auf spezielle Computer-Räume angewiesen
- keine aufwändige Verkabelung bei Konferenzen
- Schüler können eigene Notebooks verwenden

Allgemeine Einführung in Wireless-LAN

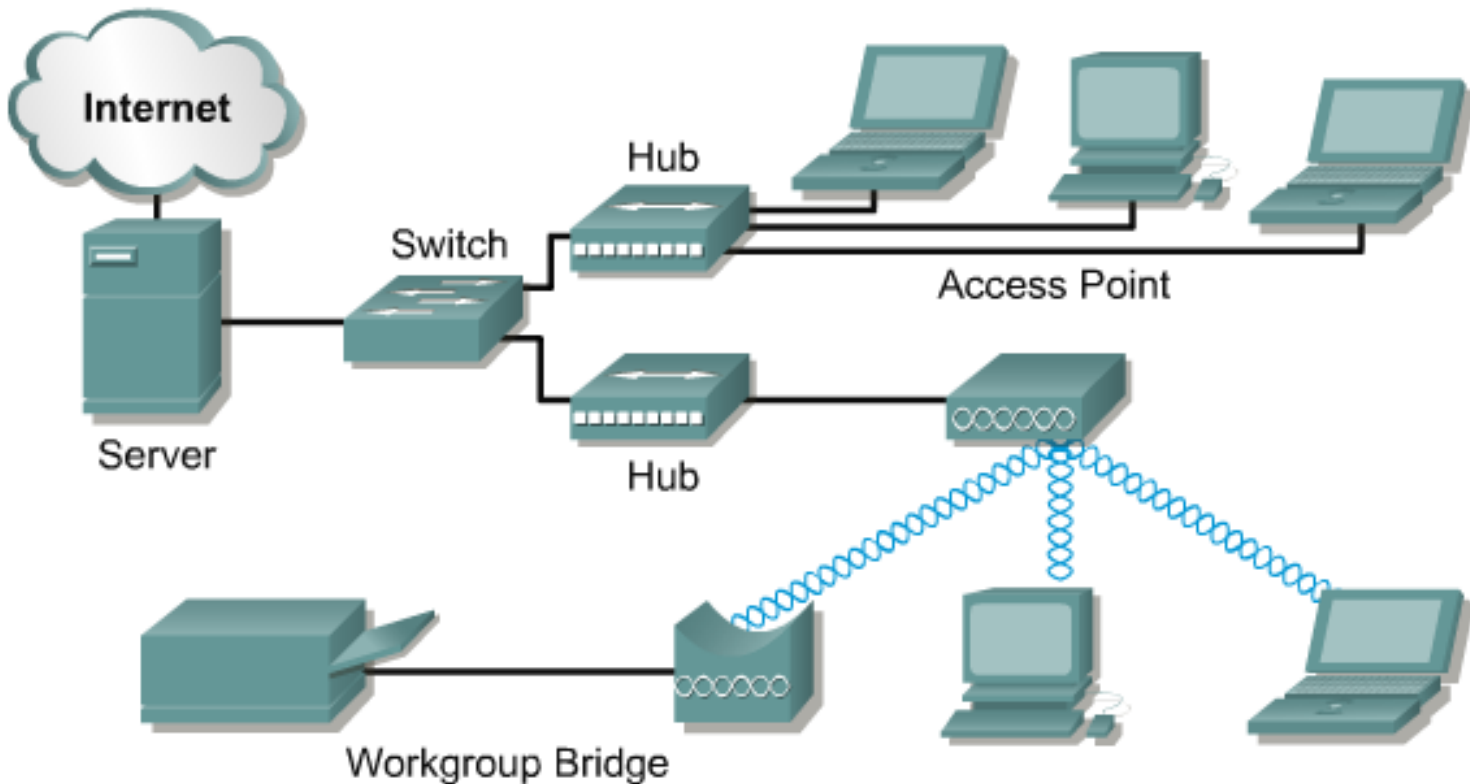
Einsatzorte von W-LAN:

- Hotels, Flughäfen, Bahnhöfen
- Kleine und große Büros
- Krankenhäuser, Einkaufszentren
- Schulen
- Zu Hause

...überall dort, wo Kommunikation mobil sein muss

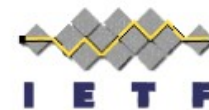


Allgemeine Einführung in Wireless-LAN



Wireless LAN (WLAN) as an extension to wired LAN

Allgemeine Einführung in Wireless-LAN



Official Standards



IEEE 802.11

- Design specifications for high performance WLANs
- Wireless Security, Interoperability, Quality of Service (QoS)

Wi-Fi Certification by the Wi-Fi Alliance:

- Ensures user level interoperability: the products of all vendors should work together.
- Successful testing earns a "seal of approval."
- Cisco is a founding member.

Allgemeine Einführung in Wireless-LAN

IEEE 802.11

A: 5GHz, in Deutschland unbedeutend (USA)

B: 2,4 GHz, 100mW Senderausgangsleistung,
11MBit/s

G: 2,4 GHz, 100mW ERP, 54MBit/s

Allgemeine Einführung in Wireless-LAN

Sicherheit



Allgemeine Einführung in Wireless-LAN

Sicherheit



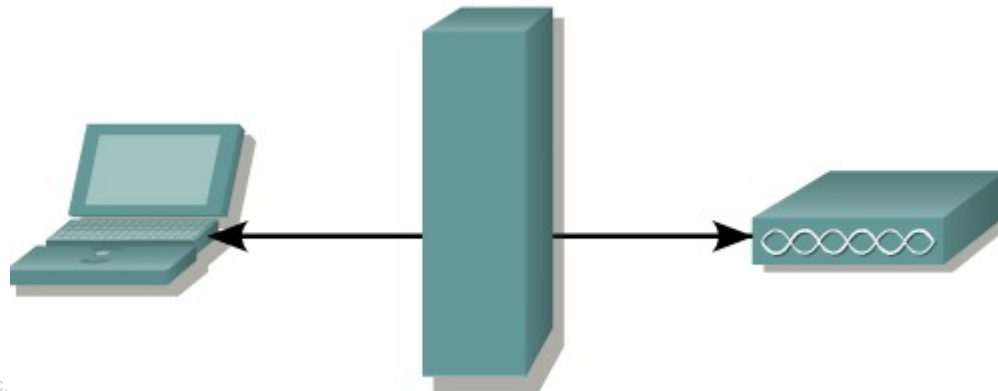
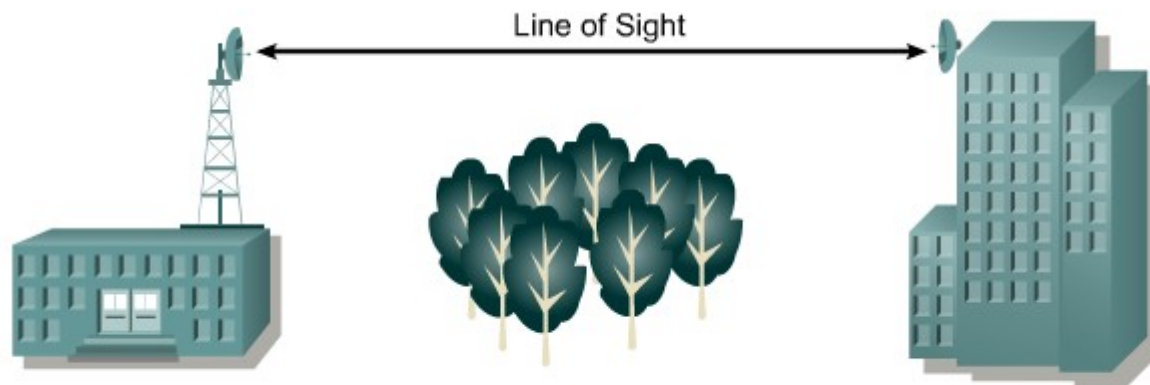
Allgemeine Einführung in Wireless-LAN

Sicherheit

- SSID unterdrücken
- MAC Tabelle
- WEP-Verschlüsselung (40/128Bit)
- WPA – Verschlüsselung (dyn. Schlüssel)
- zusätzlich:VPN über W-LAN (IPSec-Verbindungen)

Allgemeine Einführung in Wireless-LAN

Grenzen



Fundamentals of Wireless LAN

Was bietet das Curriculum?

Was bietet das Curriculum?

Einordnung

„Wlan Bereich - Home“ Abdeckung durch das neue IT-Essentials 4.0 Curriculum

Sicherheitsaspekte im Wlan Bereich -
Security Curriculum

Fundamentals of Wireless LAN



CISCO NETWORKING ACADEMY PROGRAM



- Modules
- 1: Introduction to Wireless LANs
 - 2: IEEE 802.11 and Network Interface Cards
 - 3: Wireless Radio Technology
 - 4: Wireless Topologies
 - 5: Access Points (APs)
 - 6: Bridges
 - 7: Antennas
 - 8: Security
 - 9: Applications, Design and Site Survey Preparation
 - 10: Site Survey and Installation
 - 11: Troubleshooting, Management, Monitoring and Diagnostics
 - 12: Emerging Technologies
 - A1: Physical Layer

Fundamentals of Wireless LANs v1.1

This introductory course focuses on the design, installation, configuration, operation, and troubleshooting of 802.11a, 802.11b, and 802.11g Wireless LANs. A comprehensive overview of wireless technologies, devices, security, design, and best practices with a particular emphasis on real world applications and skills is covered.

Fundamentals of Wireless LAN

Fundamentals of Wireless LANs v1.1

This introductory course focuses on the design, installation, configuration, operation, and troubleshooting of 802.11a, 802.11b, and 802.11g Wireless LANs. A comprehensive overview of wireless technologies, devices, security, design, and best practices with a particular emphasis on real world applications and skills is covered.

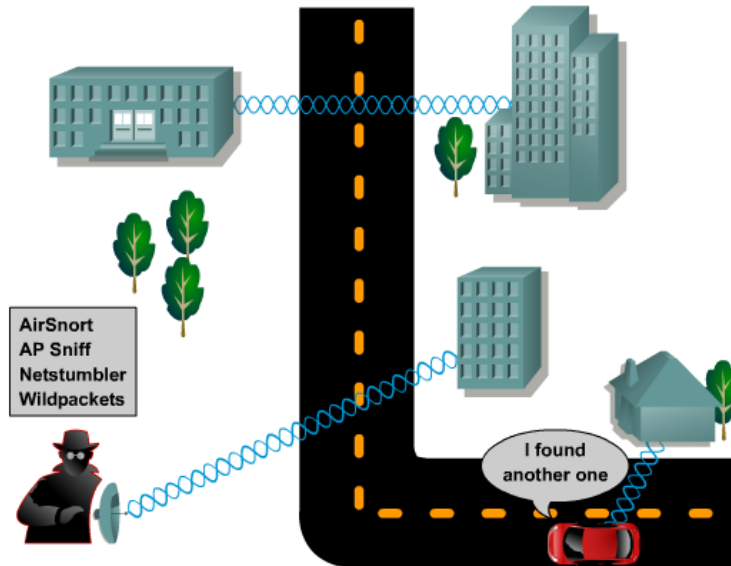
Fundamentals of Wireless LAN



WLAN Threats

FIGURES

1



All contents copyright © 2003 Cisco Systems, Inc. All rights reserved.

8.1 Security Fundamentals

8.1.3 WLAN threats

There are four primary classes of threats to wireless security:

1. Unstructured threats
2. Structured threats
3. External threats
4. Internal threats

Unstructured threats consist of inexperienced individuals using easily available hacking tools such as shell scripts and password crackers. Structured threats come from hackers who are more highly motivated and technically competent. These people know wireless system vulnerabilities, and they can understand and develop exploit-code, scripts, and programs. External threats are individuals or organizations working from outside of the company. They do not have authorized access to the wireless network. They work their way into a network mainly from outside the building such as parking lots, adjacent buildings or common areas. These are the type of threats that people spend the most time and money protecting against. Internal threats occur when someone has authorized access to the network with either an account on a server or physical access to the wire. According to the FBI, internal access and misuse account for 60 to 80 percent of reported incidents.

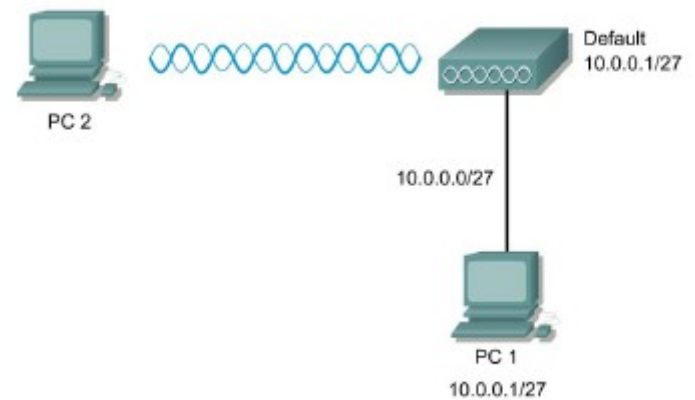
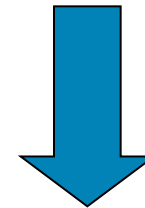
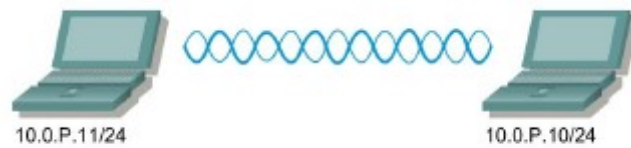
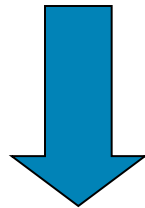
Wireless access can be a great threat to network

Fundamentals of Wireless LAN

Adhoc – Netz

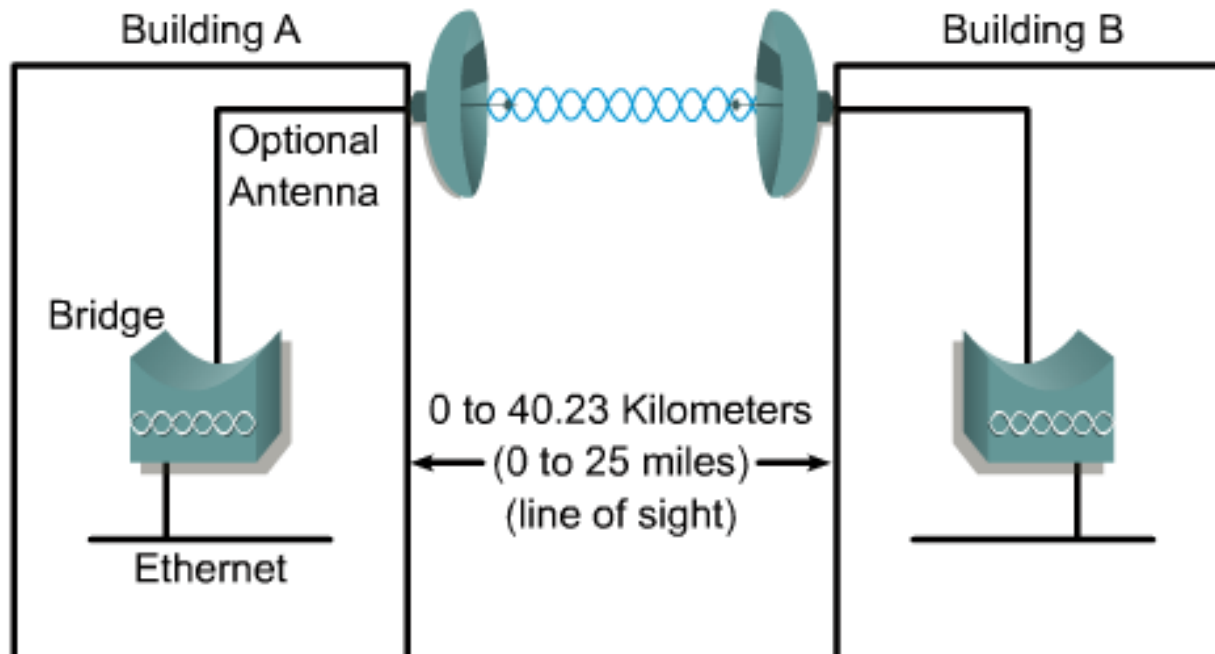
vs.

Infrastruktur-Modus



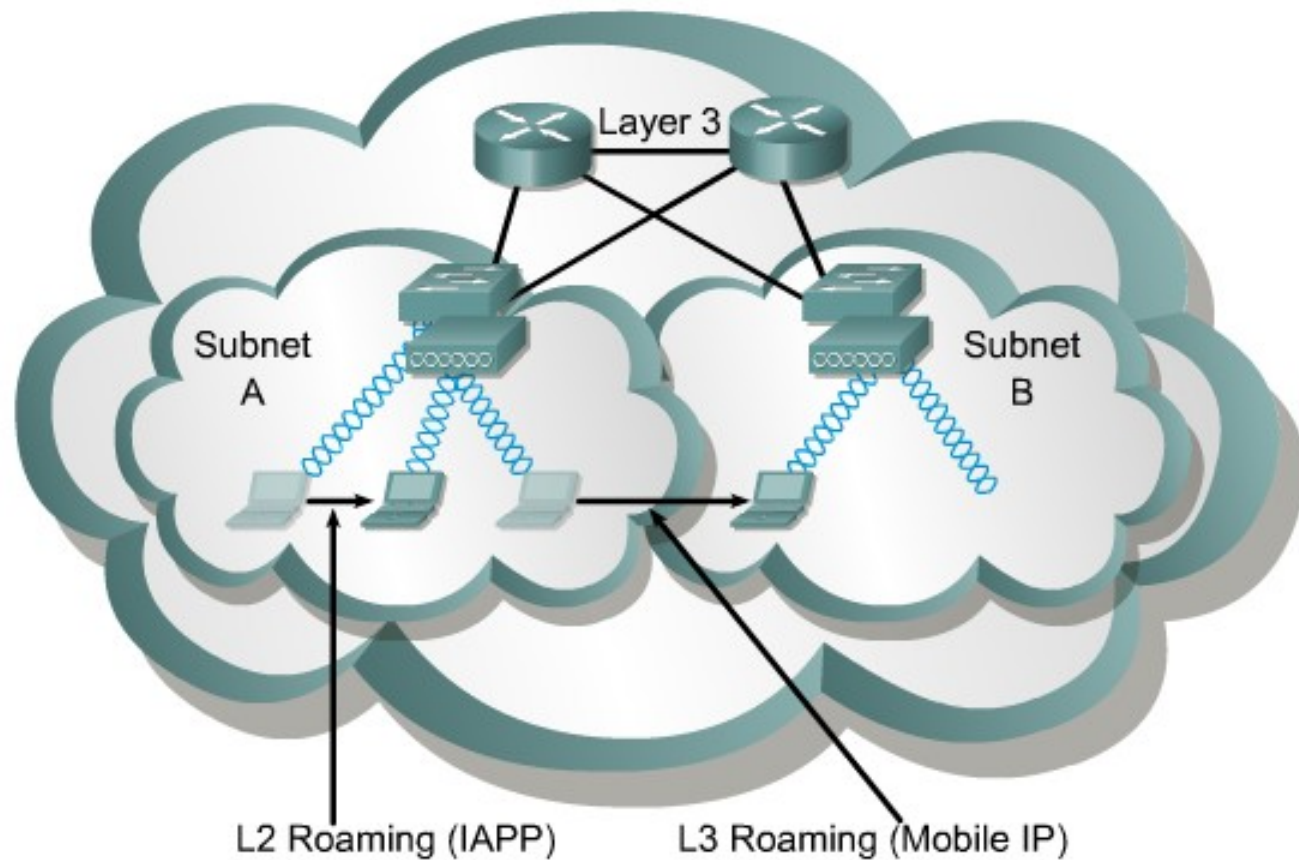
Fundamentals of Wireless LAN

Bridging



Fundamentals of Wireless LAN

Roaming



Fundamentals of Wireless LAN

Interactive Activity

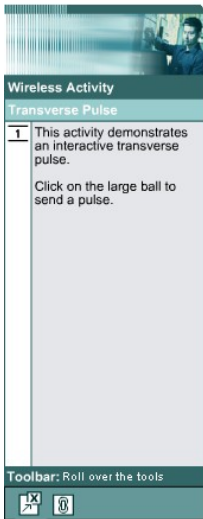
Wireless Activity

Transverse Pulse

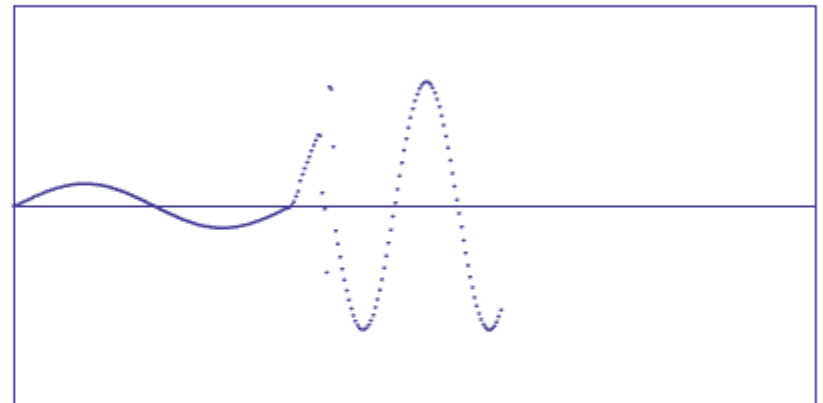
1 This activity demonstrates an interactive transverse pulse.

Click on the large ball to send a pulse.

Toolbar: Roll over the tools



$$\text{Voltage} = \text{Amplitude} * \text{Sin} (2 * \text{PI} * \text{Frequency} * \text{Time} - \text{Phi})$$
$$V = A * \sin(2 * \pi * f * t - \phi)$$



Amplitude : 0 | | 1

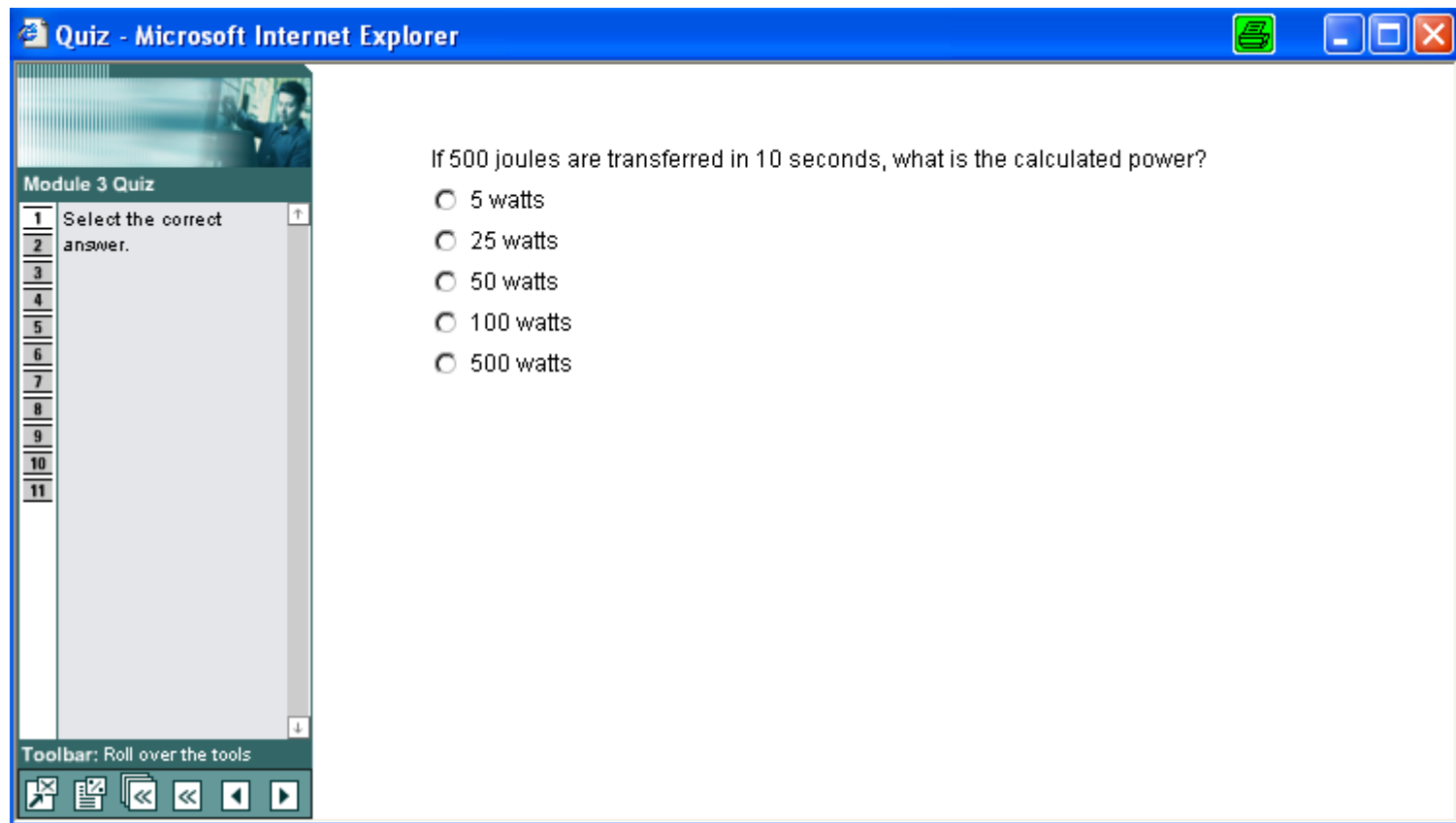
Frequency : 0 | | 1

Phase : 0 | | 1

Time : 6

Voltage : -0.51

Fundamentals of Wireless LAN



The screenshot shows a Microsoft Internet Explorer browser window titled "Quiz - Microsoft Internet Explorer". The window contains a quiz interface with a sidebar on the left and a main content area on the right. The sidebar, titled "Module 3 Quiz", shows a list of questions numbered 1 through 11. Question 1 is selected and contains the text "Select the correct answer." The main content area displays a question: "If 500 joules are transferred in 10 seconds, what is the calculated power?" followed by five radio button options: "5 watts", "25 watts", "50 watts", "100 watts", and "500 watts". The browser's toolbar at the bottom includes icons for back, forward, and search.

Quiz - Microsoft Internet Explorer

Module 3 Quiz

1 Select the correct answer.

2

3

4

5

6

7

8

9

10

11

Toolbar: Roll over the tools

If 500 joules are transferred in 10 seconds, what is the calculated power?

- 5 watts
- 25 watts
- 50 watts
- 100 watts
- 500 watts

Fundamentals of Wireless LAN

Student und Instructor – LAB-Manual



CISCO NETWORKING ACADEMY PROGRAM

Fundamentals of Wireless LANs

Student Lab Manual



CISCO NETWORKING ACADEMY PROGRAM

Fundamentals of Wireless LANs

Instructor Lab Manual



CISCO NETWORKING ACADEMY PROGRAM

Modules

Take the Fundamentals of Wireless LANs Curriculum Tour

Fundamentals of Wireless LANs v1.1
This introductory course focuses on the design, installation, configuration, operation and troubleshooting of 802.11a, 802.11b, and 802.11g Wireless LANs. A comprehensive overview of wireless technologies, devices, security, design, and best practices with a particular emphasis on real world applications and skills is covered.



CISCO NETWORKING ACADEMY PROGRAM

Modules

Take the Fundamentals of Wireless LANs Curriculum Tour

Fundamentals of Wireless LANs v1.1
This introductory course focuses on the design, installation, configuration, operation and troubleshooting of 802.11a, 802.11b, and 802.11g Wireless LANs. A comprehensive overview of wireless technologies, devices, security, design, and best practices with a particular emphasis on real world applications and skills is covered.

Fundamentals of Wireless LAN



Lab 5.3.5 Configure Ethernet/FastEthernet Interface

Estimated Time: 15 minutes

Number of Team Members: Students will work in teams of two.

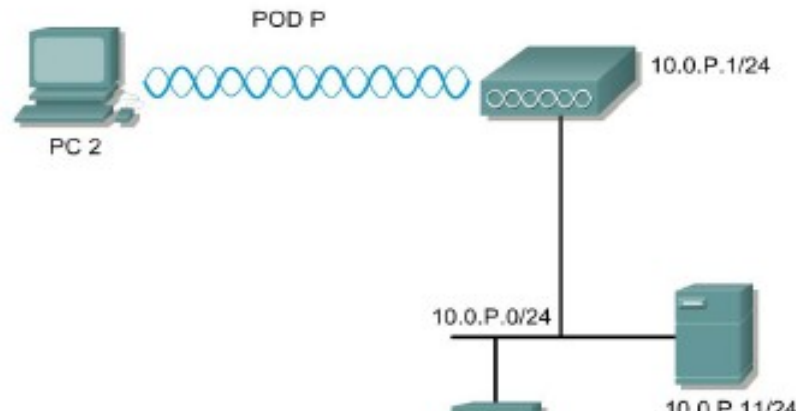
Objective

In this lab, the student will use the AP setting pages to enter speed and duplex information for the AP.

Scenario

This section describes how to configure the AP radio Ethernet and FastEthernet interfaces to lock in speed and duplex settings.

Topology



Fundamentals of Wireless LAN

LAB - Equipment

Clients

- 350 Series (802.11b)
- 5 GHz client adapter (802.11a)



Fundamentals of Wireless LAN

LAB - Equipment

In-building Infrastructure

- 1200 Series (802.11a and 802.11b)
- 1100 Series (802.11b)
- 350 Series (802.11b) *not shown*



Fundamentals of Wireless LAN

LAB - Equipment

Bridging

- 350 Series (802.11b)
 - BR350
 - WGB350
- 1400 Series (802.11a)



Fundamentals of Wireless LAN

LAB - Equipment

Antenna

- 2.4 GHz
- 5 GHz Antennas



Fundamentals of Wireless LAN

LAB - Equipment

Cable and Accessories

- Low Loss Cable
- Antenna Mounts
- Lightning Arrestor
- Wireless IP Phone



Q and A



