




**Certified Wireless Network Administrator (CWNA)
PW0-106**

Chapter 16
Site Survey Systems and Devices

Chapter 17 Overview

- Site Survey Defined
- Site Survey Tools
- Coverage Analysis



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Site Survey Defined

- The process of spectrum and coverage analysis with the intention of planning a WLAN
 - Coverage analysis
 - Interference source identification
 - Placement and configuration of devices

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Protocol and Spectrum Analysis

- Protocol analysis involves capturing and analyzing actual WLAN frames
- Spectrum analysis investigates only the RF activity in a space
- Two categories exist
 - Standalone
 - Integrated

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Spectrum Analysis



The image shows a screenshot of a spectrum analyzer software interface. The interface displays a signal spectrum with a prominent peak. A physical Wi-Spy DBx wireless network analyzer device is overlaid on the bottom right of the screenshot. The device is black with a small antenna and the text 'wi-spy DBx' printed on it.

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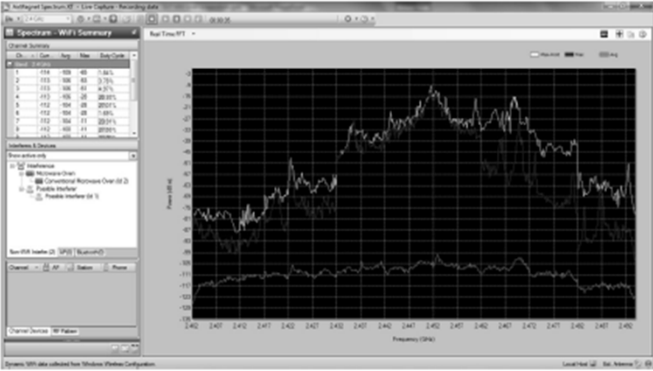
Potential sources of interference in the 2.4 GHz ISM band

- Microwave ovens
- 2.4 GHz cordless phones, DSSS and FHSS
- Fluorescent bulbs
- 2.4 GHz video cameras
- Elevator motors
- Cauterizing devices
- Plasma cutters
- Bluetooth radios
- Nearby 802.11, 802.11b, 802.11g, or 802.11n (2.4 GHz) WLANs

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Microwave oven spectrum use



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Potential sources of interference in 5 GHz U-NII bands

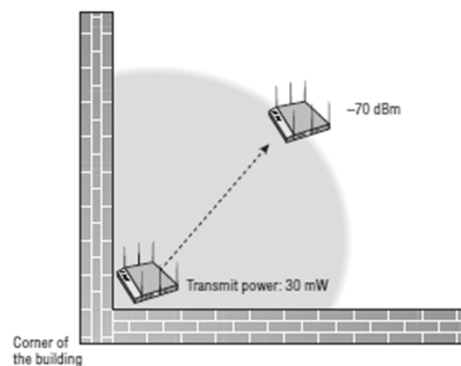
- 5 GHz cordless phones
- Radar
- Perimeter sensors
- Digital satellite
- Nearby 5 GHz WLANs
- Outdoor wireless 5 GHz bridges

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Coverage Analysis

- Proper coverage analysis must be performed using some type of received signal strength measurement tool
- Common mistake is leaving the access point radio at the default full-power setting, which can cause hidden node
- Good starting point for a 2.4 GHz access point is 25 mW transmit power

Starting coverage cell



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Second AP location

Corner of the building

First AP

Second AP

-70 dBm

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Signal-to-Noise Ratio (SNR)

Wi-Fi signal

SNR

Noise floor

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12

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Recommended coverage for a 2.4 GHz VoWiFi network

Data rate	Minimum received signal	Minimum signal-to-noise ratio
54Mbps	-71 dBm	25 dB
36Mbps	-73 dBm	18 dB
24Mbps	-77 dBm	12 dB
12/11 Mbps	-82 dBm	10 dB
6/5.5 Mbps	-89 dBm	8 dB
2Mbps	-91 dBm	6 dB
1 Mbps	-94 dBm	4 dB

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VoWiFi Cell Recommendation

The radius of each cell should provide a signal greater than -60 dBm.

Cells on the same channel should be separated by a distance that provides a signal difference of at least 20 dB.

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AP Placement – Semidirectional Antennas

300 feet

400 feet

AP 1 Channel 1, AP 2 Channel 11, AP 3 Channel 6, AP 4 Channel 1, AP 5 Channel 6, AP 6 Channel 1, AP 7 Channel 11

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AP Placement – Omnidirectional Antennas

AP 2 Channel 11 Omni, AP 3 Channel 1 Omni, AP 4 Channel 1 Omni, AP 5 Channel 11 Omni, AP 1 Channel 6 Unidirectional

Hallway

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Site Survey Tools (Indoor)

- Spectrum analyzer
- Blueprints
- Signal strength measurement software
- 802.11 client cards
- Access points
- WLAN controller
- Battery pack
- Binoculars
- Flashlight
- Walkie-talkies
- Antennas
- Temporary mounts
- Digital camera
- Measuring devices
- Colored tape
- Ladder or forklift

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WLAN mobile site survey mast



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Site Survey Tools (Outdoor)

- Topography map
- Link analysis software
- Calculators
- Maximum tree growth data
- Binoculars
- Walkie-talkies
- Signal generator and wattmeter
- Variable-loss attenuator
- Inclinator
- GPS
- Digital camera
- Spectrum analyzer
- High-power spotlight or sunlight reflector

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Signal generator and wattmeter



The image shows two pieces of equipment. On the left is a signal generator, which is a rectangular device with a large circular dial on the front and several control knobs and ports. On the right is a wattmeter, a smaller rectangular device with a circular dial and several control knobs and ports.



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Coverage Analysis

- Manual
 - Passive
 - Active
- Predictive
- Self-Organizing WLANs

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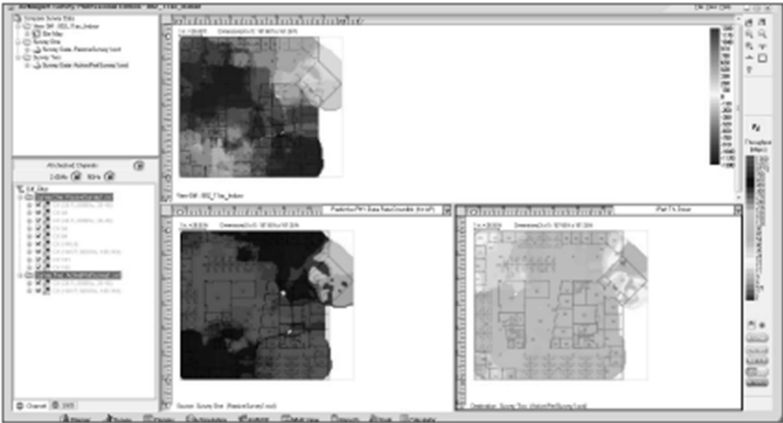
Macintosh detailed Wi-Fi information



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22

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Commercial coverage analysis application



The screenshot displays a software interface for commercial coverage analysis. It features three map windows showing a building layout with signal strength overlays. The top-left window shows a map with a grid overlay. The bottom-left window shows a map with a grid overlay. The bottom-right window shows a map with a grid overlay. The interface includes a sidebar with a tree view of folders and files, and a main toolbar with various icons for navigation and analysis.

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Wireless Network Validation

Fluke AirCheck
Wi-Fi Tester



The image shows a hand holding a Fluke AirCheck Wi-Fi Tester. The device is a handheld, ruggedized device with a color LCD screen displaying a menu of options. The screen shows 'Fluke AirCheck' at the top, followed by 'Wi-Fi Tester' and several menu items like 'Scan', 'Settings', 'Help', and 'Exit'. The device has a circular navigation pad and several function buttons.

Certified Wireless Network Administrator: CWNA – PW0-106 24



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