

Please fill in the names with CAPITAL letters

Date	Name 1	Name 2	Name 3	Zaliczenie

## WLAN Laboratory

### Lab 9. Analysis of the WLAN spectrum

#### Objective:

The aim of the exercises is to familiarize with the typical spectrum of WLAN signals, recognition of problems associated with the WLAN frequency interference and other phenomena associated with the radio spectrum.

#### Student Prerequisites:

- knowledge of the basic WLAN concept,
- familiarity with the self-learning material of the course,
- basic knowledge of the Windows,

#### Hardware and Software to be used in this lab assignment:

- computer PC, WLAN AP device, Spectrum analyzer, Device with Bluetooth interface (smartphone).

#### Description of the Experiment:

The student analyzes the WLAN traffic seen in the laboratory. Different types of frames are counted and compared. It is performed observation and assessment of traffic generated by various WLAN. Is performed frames capture and filtering according to established criteria.

#### Lab Scenario:

1. By using AirMagnet's Spectrum Analyzer, measure signal strength in the bands used by WLAN, 2.4 GHz and 5 GHz. What is observed typical power level of signals (peak power) and the noise power (average) in the bands:

No.	Band	Peak power [dBm]	Average power [dBm]
1			
2			

2. Is the radio spectrum can be observed signal from the transmitters or interferers other than the standard network LAN (802.11a /g/n)? If so, describe what interference source a present and where in frequency?

3. Describe the 2 strongest interference source. (Use the diagram of the power in the time and frequency):

No.	Central frequency	Kind of source	Peak power [dBm]	spectrum width
1				
2				

4. What is the signal spectrum WLAN 802.11g and 802.11b. Sketch examples of observed waveforms, describe differences.
  
5. With the help of 802.11n APs and PC client stations generate traffic with standard 802.11n and 40 MHz band channel wide.
6. Observe and sketch below the shape of the signal of spectrum 802.11n in 40MHz band..
  
7. Initiate transmission in Bluetooth (eg. Upload a photo or melody between mobile phones equipped with Bluetooth) then follow the graph of energy level and the chart time-frequency signals in the 2.4 GHz band during data transmission via Bluetooth (eg. Upload a photo with mobile phones.).
8. Specify the frequency range used by BT .....
9. Sketch observed image of Bluetooth spectrum.

**Questions:**

1. Explain why the Bluetooth signal spectrum looks in this way.
2. Did you notice interference between Bluetooth and 802.11 if so, review the essence of the interference.

What mechanisms in the system, the WLAN and Bluetooth allow them to reduce the negative impact of interference between the systems?

**References:**

[1] E. Perahia, R. Stacey, “Next Generation Wireless LANs 802.11n and 802.11ac”, Cambridge University Press, 2013  
 [2] P. Roshan, J. Leary, “802.11 Wireless LAN Fundamentals” Cisco Press, 2004.