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WLAN Laboratory

Lab 10. WLAN link performance measurement

Objective:

The aim of the exercise is to measure the actual performance transmissions on the WLAN. The student learns the tools to measure throughput on IP link level.

Student Prerequisites:

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

Hardware and Software to be used in this lab assignment:

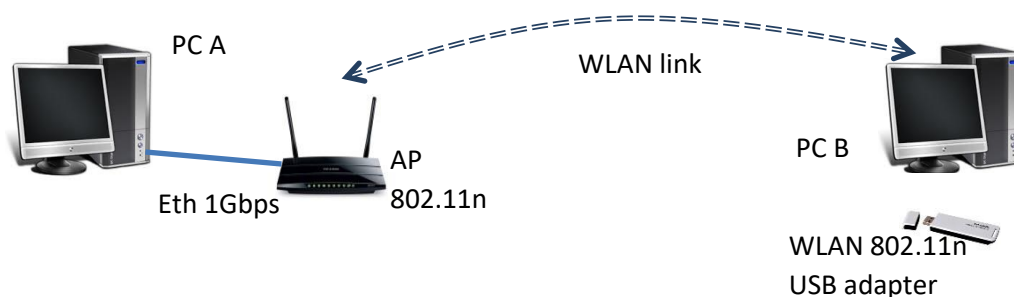
- 2x computer PC, WLAN AP device with 802.11a/b/g/n, iperf (linux) or jperf (windows) program tool, 802.11n USB network adapter with 802.11a/b/g/n.

Description of the Experiment:

Student creates a WLAN connection with a predetermined standard and then measures the maximum throughput of the link. The measurement is done using a software tool 'iperf'.

Lab Scenario:

You must configure measurement set constructed as shown in the diagram below.
In the case of PC "A" it must have an Ethernet port speeds of 1 Gbps.
In case of PC "B" you have to use WLAN network adapter conform with 802.11n.
Connect PC "A" to access point (conform with 802.11n) and set up an WLAN link to PC "B".



1. With the help of PING command test the correct operation of WLAN link.
2. Login to AP configuration interface and set radio to mode 802.11g, check the WLAN link with PING command.

3. On PC “B” run iperf tool in the “server” mode, on PC “A” run iperf tool in a client mode. Set IP of PC “B” as a server address in PC “A”.
4. Set time of test to 3min (180s), set time between fractional measurements to 10s and set number of parallel TCP link to 10.
5. Perform the speed test 3 times and write the results to the table below.
6. Set AP configuration to 802.11n mode in 2.4 GHz and 20 MHz channel wide and repeat the measurements procedure (points 4 and 5). Save the result in the table below.
7. Set AP configuration to 802.11n mode in 5 GHz and 20 MHz channel wide and repeat the measurements procedure (points 4 and 5). Save the result in the table below.
8. Set AP configuration to 802.11n mode in 5 GHz and 40 MHz channel wide and repeat the measurements procedure (points 4 and 5). Save the result in the table below.

AP mode	Result 1	Result 2	Result 3	Result average	Nominal PHY-layer speed
802.11g 2.4GHz, 20MHz					
802.11n 2.4GHz, 20MHz					
802.11n 5GHz, 20MHz					
802.11n 5GHz, 40MHz					

9. Identify a nominal PHY-layer speed limit for each measurement setup and write in the table above.
10. Draw below an example for partial measurement results in relation to time.

Questions:

1. Explain why the measurement results are different from the theoretical.
2. Did you notice a strong speed variation during the test? Please explain the reason of these variations.
3. What is the difference between Physical Layer speed and Data Layer speed?

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.

