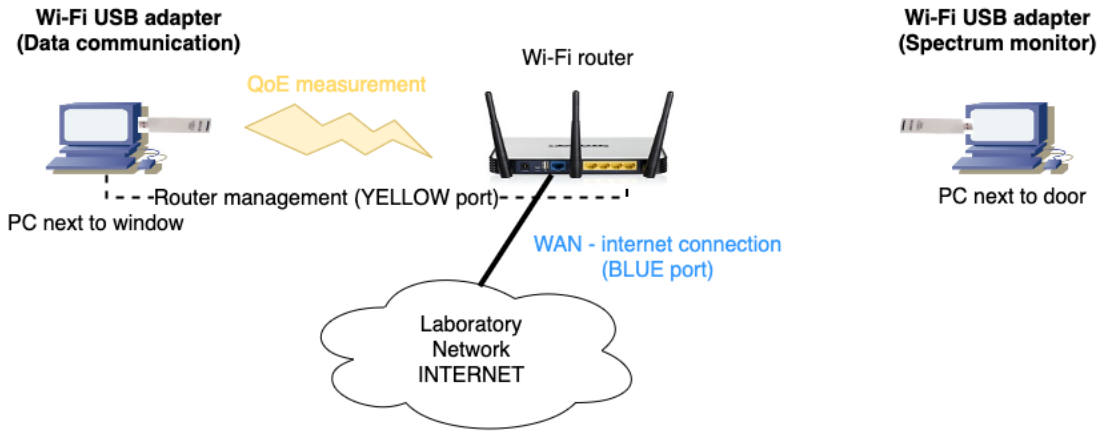
Configuration and hacking of Wi-Fi
Laboratory Assignment

Assignment
Use the TP-Link Wi-Fi home router Archer C6 v2 to implement a fully secure home network that connects user devices via Ethernet and wirelessly via Wi-Fi to the Internet. Configure the Wi-Fi wireless network to provide the best user experience. Verify the functionality of the entire network.

The sample network topology in the lab:



Measurement instructions
Do not leave the router in its default configuration - a significant security risk!

Set up your router's Wi-Fi network in an area of the spectrum with the least overlap with other networks and perform a quality user experience assessment.

Set your router's Wi-Fi network to the area of the spectrum where there will be the most significant overlap with other networks and perform a quality of user experience evaluation. You can decide with your peers in different groups to implement a considerable channel overlap.

As part of the user experience monitoring, focus on analyzing the Wi-Fi network's throughput, response, and loss rate. Verify response and loss rates for packet sizes 64 B, 512 B, 1024 B, and 1400 B, and send intervals of 100 ms, 500 ms, and 1 s. Use available test tools that emulate typical user behavior on the network to measure throughput.

The Wi-Fi network connection and quality parameters can be verified using a TP-Link WN821ND USB network adapter, laptop, or mobile phone.

Remember that the maximum transmit power of the wireless router is a composite of the device TX Power and the antenna gain.

Home Preparation

- Review concepts and technologies used in telecommunications, computer systems, and especially IP networks: IP address, network mask, default gateway, DHCP client, DHCP server, username, username, password, WAN port, LAN port, switch, router, wireless interface, SSID, WPA/WPA2 (PSK, Enterprise), DNS, ARP.
- As part of your home preparation, prepare the TP-Link Archer C6 v2 router settings you will apply in the lab. You can use the materials available on LMS Moodle or the router emulator available at: https://www.tp-link.com/cz/support/emulator/ as a resource. Prepare the setup in such detail that you have all necessary interfaces, IP addressing, and Wi-Fi network configuration, including security ready. Also, please focus on the protection of the router itself. Ensure you have a proven preparation (paper, notebook).
- Familiarize yourself with the controls of the Wi-Fi network analysis software; see the links below or similar. Learn to use the selected programs to capture and identify all the necessary parameters of your monitoring Wi-Fi network.
    - Linux: http://sf.net/projects/linssid
    - Windows: http://www.netstumbler.com/downloads/
    - Mac OS: https://istumbler.net
- Familiarize yourself with the measurement applications for measuring higher-layer communication network parameters. Be sure to focus on the following applications when familiarizing yourself:
    - https://nettest.cz
    - https://www.speedtest.net
- Familiarize yourself with the **ping** program, which can determine the round trip time (RTT) packet loss. Learn how to use this program to generate artificial load on the network by changing the size and frequency of packets generated.
- According to your preference, learn about the possibilities of in-depth analysis of Wi-Fi networks in Windows, Linux, and Mac OS environments.