Bonus Tasks:
802.11 Hands-On Exercise

Mobile Networking
Secure Mobile Networking Lab - SEEMOO
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Organization

- **Participation**: You have to participate in the regular 802.11 hands-on exercise and submit a report if you want to participate in the bonus system.
- **Attendance**: Sign the attendance list that we hand out during the hands-on exercise if you want to get the bonus.
- **Plagiarism**: Write your own report. Even though you may share recorded datasets with your team members, you are not allowed to share or copy answers.
- **Submission**: Upload your answers to Moodle as a PDF named `201812DD_groupGG_lastname_firstname_bonus.pdf`, where DD is the day of your time slot and GG is your group number according to your Moodle registration.
- **Deadline**: Upload your report before 20:00 on Thursday, 20th December 2018. This is a hard deadline. Delayed submissions will not be accepted.

Bonus Task 1: Coexistence of UDP and TCP (4 Points)

Assess the coexistence of TCP and UDP within the same network. In order to do so, run both a UDP server and a TCP server on netbook N1. Further, run a UDP client and a TCP client on two other netbooks. Gradually increase the offered load of the UDP client until it reaches saturation throughput. Record the achieved throughput of both UDP and TCP.

Questions

- B1.1 (2 Points): Plot the achieved throughput of the UDP and the TCP clients over the offered UDP load.
- B1.2 (2 Points): Explain your observations. Take the flow control mechanism of TCP and the 802.11 MAC layer into account. You can use Wireshark screenshots or plots to back your explanation.

Bonus Task 2: Observations with Wireshark (6 Points)

- B2.1 (1 Point): What protocols encapsulate the actual payload data generated with `iperf`? How many bytes of overhead do they introduce, respectively? Provide Wireshark screenshots with your answer.
- B2.2 (1 Point): What is the radiotap header? How many bytes does it have? Does it cause significant communication overhead compared to the other protocols?
- B2.3 (1 Point): The length of which field in Wireshark corresponds to the setting of iperf's packet buffer length (`-l`) parameter when using UDP? Provide a Wireshark screenshot with your answer.
- B2.4 (1 Point): In Task 4 of the regular exercise, frame fragmentation was used. What is the payload size of the transmitted frame fragments and how does it relate to the respective frame fragmentation threshold? Provide Wireshark screenshots with your answer and explain your observations.
- B2.5 (2 Point): What kind of fragmentation can you observe in an experiment with UDP traffic, very large packet sizes (e.g., `iperf --udp -l 10000`), and without 802.11 frame fragmentation? At which layer does it take place and what is the fragment size? Do the sizes of the individual fragments add up exactly to the value passed to iperf's `-l` parameter? Provide Wireshark screenshots with your answer and explain your observations.