WSN – Exam 2018

Exam:

- Individual oral examination (20 mins incl. grading) with no preparation
- Examined in English covering both:
    o General topic from list of questions – see below (~10-12mins)
    o Project report (~2-5 mins)
- Grade based on project report and oral examination performance
    o An overall grade by use of 7-scale
    o External censor
- Syllabus materials are not allowed to bring into the exam, but **5 key words** are allowed per exam question. Project report is also allowed.
- Dates:
    o Monday 18/6-2018 – start at 10:00 @ Room 235E.
    o Tuesday 19/6-2018– start at TBD @ Room 235E.
- Exam-list will be uploaded on Blackboard
- Project report must be turned in no later than **28/5-2018@23:59**
    o Required to qualify for exam
    o Report PDF version and sources files on Blackboard– "Assignment"

Examination questions

Q1: Describe the architecture and primary tasks of a WSN node including the main HW components characteristics and their energy consumption characteristics. Explain the typical methods to save energy according to the energy consumption characteristics of different hardware components. Give examples.

Q2: Describe the possible energy sources for WSN nodes including energy harvesting. What are the pro and cons of the different sources? Describe the energy modeling of transmitter and receiver. What aspects should be taken into account when deciding if using single hop and multi-hop? Explain the typical methods to save energy using examples.

Q3: What are the optimization goals of WSNs? What are the basic design principles in WSNs? Give one or two examples in the protocol design which can reflect the design principles.

Q4: Explain the pro and cons of contention based MAC protocols and schedule based MAC protocols. What are the main energy issues in WSN MAC? Describe the basic schemes of SMAC and its additional functions. Explain how SMAC tackles the energy issues in its design.

Q5: Explain the difference of distributed MAC and centralized MAC. What is preferable for most use cases in WSNs and Why? What are the main energy issues in WSN MAC? Clear channel assessment (CCA) and low power listening (LPL) are the two highlight features of BMAC. Explain how CCA and LPL work in BMAC.

Q6: Explain the basic two approaches for error control in WSNs. What are the pros and cons of each approach? What are the tradeoffs between FEC, ARQ and transmission power? What is the difference of

reliability in the link layer and in the transport layer? Explain the tradeoff between pure end-to-end reliability and end-to-end reliability plus link layer retransmission.

Q7: Explain the data centric networking, the motivation using it in WSNs and its difference comparing with ID-based routing. Explain how directed diffusion works.

Q8: Explain the motivation to use data aggregation in WSN. What is the relation between data aggregation and networking in WSNs? Explain how data aggregation works, the challenges of data aggregation, and the pros and cons using data aggregation.

Q9: Explain why TCP is not suitable for transport layer in WSN. Explain how PSFQ and ESRT work? What is the difference between PSFQ and ESRT?

Q10: Explain the possible vulnerabilities and security attacks at different protocol layers in WSNs and the corresponding countermeasures.

Syllabus

Syllabus includes lecture slides, notes, articles and the relevant chapters/sections of the text book