



Exam in TSKS03 Wireless Systems

- Exam code:** TEN1
- Date:** 2013-10-23 **Time:** 8:00–12:00
- Place:** TER3
- Teacher:** Mikael Olofsson, tel: 281343
- Visiting exam:** 9 and 11
- Administrator:** Carina Lindström, 013-284423, carina.e.lindstrom@liu.se
- Department:** ISY
- Allowed aids:** None
- Number of tasks:** 9
- Solutions:** Will be published within three days after the exam at <http://www.commsys.isy.liu.se/TSKS03>
- Result:** You get a message about your result via an automatic email from Ladok. Note that we cannot file your result if you are not registered on the course. That also means that you will not get an automated email about your result if you are not registered on the course.
- Exam return:** 2013-11-15, 12.15–13.00, Mikael Olofssons office, Building B, top floor, corridor A between entrances 27–29. After that in the student office of Dept. of EE. (ISY), Building B, Corridor D, between Entrances 27–29, right next to Café Java.
- Important:** **Solutions and answers must be given in English.**

Grading: This exam consists of nine questions. Each question can give you 2, 4 or 6 points. Totally, you can get 36 points. Grade limits:

- Grade three: 16 points,
- Grade four: 22 points,
- Grade five: 28 points.

Sloppy solutions and solutions that are hard to read are subject to hard judgement, as are unreasonable answers.

- 1 3G/WCDMA differentiates between *soft handover* and *softer handover*. Explain why handover is needed and explain the difference between soft and softer handover. (2p)
- 2 A modulation method used by Bluetooth is $\pi/4$ -DQPSK. Explain that method and explain how it relates to ordinary DPSK. Name one obvious benefit of DPSK over ordinary PSK. (2p)
- 3 One method used in LTE is labelled *SC-FDMA*. Explain that method. What problem is it supposed to solve? (2p)
- 4 Explain the difference between DPSK and PSK. How should PSK senders and receivers be adjusted, if they are to be used for DPSK? Name one advantage of DPSK over PSK, and name one advantage of PSK over DPSK. (4p)
- 5 In mobile cellular communication, the users are allowed to move. Name and describe three impacts on communication due to mobility. (4p)
- 6 The demands on synchronization are high for DS-SS-SSA. Consider an access system based on M-sequences. How would the communication be affected, and why, if the spreading sequence would be delayed in the receiver? How much is a small and a large delay in this situation? (4p)
- 7 Describe the generation of (6p)
 - a. M-sequences,
 - b. Gold sequences,
 - c. small set of Kasami sequences.

- 8 About WPAN: (6p)
- a. What does WPAN mean?
 - b. Give three examples of systems that fall into this category.
 - c. Give two characteristics that those three systems have in common.
- 9 Are the following claims true or false? You do not need to explain your answer. (6p)
- a. Source coding are error control techniques.
 - b. All PCM methods are examples of predictive coding.
 - c. Walsh codes are spreading sequences.
 - d. To generate a Gold sequence, you need two primitive polynomials.
 - e. The near-far effect is dealt with using power control.
 - f. MSK is based on the Discrete Fourier Transform.

For each of the claims above, a correct answer gives you +1 point, while an incorrect answer gives you -1 point. No answer give you 0 points for that claim. You cannot get less than 0 points totally from this task.