S-72.2211 Mobile Communication Systems and Services

Spring 2008

In the exam there will be five tasks. There will be two-three conceptual tasks, where the understanding of concepts discussed in the course will be examined, and three-two calculations of the type performed in the excercises, homework, and lecture notes & handouts. Some equations will be given, but not all.

Three kinds of course material have been distributed

1) Handouts of slides discussed in the lectures
    - Cellular system basic terminology
    - Mobile comm system generations and services
    - Mobility Management
    - Noise, Interference and capacity
    - Radio Resource Management
    - Link budget
    - Channel models
    - Frequency reuse and hexagonal cellular system model
    - Sectorization
    - GSM as an example of a 2^{nd} generation cellular system
    - 2.5 G cellular systems
    - Basic principles of CDMA (in internet)
    - 3G cellular systems
    - 3G evolution (in internet)
2) Lecture notes on GSM as an example of a 2G system (Edita Handouts 3, pages 1-99)
3) Solution of Demo Exercises (Edita Handouts 3, pages 100 – 112, and in the internet)

This material has been distributed in three parts by Edita, as well as some parts over the internet. The parts starting from “Cellular system basic terminology” to “sectorization” are in Edita Handouts 1, with pages numbered from 1 to 62. The parts starting from “GSM .. .” to “3G cellular systems” are in Edita Handouts 2, with pages numbered from 1 to 62.

Mostof the distributed material is recommended reading for the exam. Part of the material is “For Your Information”, and not required in the exam. The FYI parts are as follows:

1) Handouts of slides discussed in the lectures
    - Cellular system basic terminology
        i. p. 4, lower slide: Bandwidth allocations
    - Frequency reuse and hexagonal cellular system model
        i. p. 54, lower slide: reuse pattern equations
    - GSM as an example of a 2G system
        i. p. 14, lower slide: table of power class details
        ii. p. 18-19 channel coding for data and SACCH

iii. p. 26, lower slide: details of SDCCH and SACCH mapping

- 2.5 G cellular systems
  i. p. 31, upper: evolution details
  ii. p. 39 upper: MCS details
- 3G cellular systems
  i. p. 42 lower: numeric values of bearer service requirements
  ii. p. 51 upper – p. 53 upper: details of channels
  iii. p. 53 lower: details of channel mapping
  iv. p. 59 upper: TDD burst types
  v. p. 61 lower – p 62: acronyms

2) Lecture notes on GSM as an example of a 2G system
   vi. Development of GSM, Table 2, p.9
   vii. Interfaces, Table 4, p. 12
   viii. Tables of Bearer services, p. 25-28
   ix. Table of supplementary services, p. 30-31
   x. Frequency band details Tables 5-7, p. 32-33
   xi. Speech codec details pp. 37-38, 40-43
   xii. Channel coding for circuit switched data and SACCH, p 45(end)-46, second figure on page 47, p. 48, first fig p. 49
   xiii. Power class details p.55
   xiv. details of logical channel parameters p. 59
   xv. permitted channel combinations p. 60
   xvi. Transceiver performance requirements pp. 65-73
   xvii. Cell selection in idle mode pp. 80-81
   xviii. Cell selectin and reselection criteria (2) pp. 84-85
   xix. parameters in handovers & handover phases p. 89-90

In general, only the most important acronyms are expected to be known by heart, such as TDM(A), FDM(A), CDM(A), FDD, TDD, QPSK, PSK, QAM, (G)MSK, AWGN, ,AMC, MCS, AMR, CQI, DTX, DRX, RRM, RNC, BSC, MS, BS, MSC, as well as the names of systems. In particular, acronyms of channels are not expected to be known.