

**EMBEDDED TECHNIQUES AND SERVICES FOR WIRELESS COMMUNICATION NETWORKS
(WiCoNet)**

Student's Name:
Nationality:
Institution:

FINAL EXAMINATIONS, Friday 24th, 2009

(Classroom: EL5 /Building of Electrical & Computer Engineering-New Wing)

The questions are organized in three (3) Groups and the students should answer the following multiple choice questions

(please mark by circling the correct answers):

Questions of Group 1

Q1.1 *What are the main speech quality impairments in IP networks?* (3 correct answers)

- a) Jitter (X)
- b) Packet loss (X)
- c) User
- d) Service provider
- e) Delay (X)

Q1.2 *Which of the objective intrusive algorithms listed below is currently mainly deployed?* (1 correct answer)

- a) PSQM
- b) PESQ (X)
- c) PAMS
- d) PSQM+

Q1.3 *Near-Far problem is typical for systems:* (1 correct answer)

- a) OFDM
- b) CDMA (X)
- c) TDMA

Q1.4 *Open loop power control serves for:* (1 correct answer)

- a) Setting up the starting transmit power (X)
- b) Setting up the power for ending transmission
- c) BER setting

Q1.5 *Closed loop power control serves for:* (1 correct answer)

- a) Setting up the starting transmit power
- b) Setting up the power for ending transmission
- c) Keeping the received power on constant level (X)

Q1.6 *Hybrid ARQ (H-ARQ) means:* (1 correct answer)

- a) ARQ + FEC (X)
- b) ARQ + repeat of transmission
- c) ARQ + power control
- d) nothing

Q1.7 *Outer loop in power control serves for:* (1 correct answer)

- a) Setting up the requested SIR for closed loop (X)
- b) Decreasing the power for open loop
- c) Setting up BER value for open and closed loop

Q1.8 *What method is basic positioning method in cellular networks?* (1 correct answer)

- a) ToA
- b) DV-Hop
- c) Cell-ID (X)

Q1.9 *The GPS belongs the remote positioning system?* (1 correct answer)

- a) No (X)
- b) Yes

Questions of Group 2

Q2.1 *Which device do you need to shift RF bands along the frequency axis?* (1 correct answer)

- a) Mixer (X)
- b) Matched filter
- c) Automatic gain control
- d) DA converter
- e) NCO

Q2.2 *The first task of the synchronization module in a digital receiver is:* (1 correct answer)

- a) Tracking
- b) Error correction
- c) AD conversion
- d) Acquisition (X)
- e) Decimation

Q2.3 *Which is the most significant loss contribution in a link budget for a satellite link (in the 14 GHz band) between a ground station and a geostationary satellite?* (1 correct answer)

- a) Pointing loss
- b) Free-space loss (X)
- c) Contour loss
- d) Feeder loss
- e) Loss due to wave propagation effects (rain, hail snow)

Q2.4 *What are typical characteristics for the Internet Protocol (IP) as a network layer protocol?* (2 correct answers)

- a) A connection is always established before sending IP packets (connection oriented)
- b) IP packets can travel over different media (media independent) (X)
- c) As a network layer protocol IP manages the process of tracking packets and ensuring their delivery (reliable delivery) (X)
- d) A dotted decimal structure is used for representation of IPv4 addresses

Q2.5 *Choose the correct statement!* (1 correct answer)

- a) In TDMA, the band is subdivided into frequency bands.
- b) In TDMA, each station uses the whole spectrum for a given time period (X)
- c) In TDMA, the modulator must be able to change frequency from burst to burst.
- d) In TDMA, each station has to use a different scrambling sequence.
- e) In TDMA, two stations may send at the same time.

Questions of Group 3

Q3.1 *Pair the network with the correct description* (1 correct answer)

- a) A network supporting national, or larger, coverage to support voice, text and image communication (X)
- b) A network suitable for large office with range of coverage of 100s meters

Cellular Radio Network:

- c) A wireless technology to replace wiring associated with peripheral devices
- d) A physically small network comprising only few devices, each operating in master-slave fashion

- Q3.2 *The downlink of a cellular system (a Base Station transmitting to all Mobile Stations in a cell) can be modelled as:* (1 correct answer)
- a) A Multiple Access Channel
 - b) A Broadcast Channel (X)
 - c) An interference Channel
- Q3.3 *Assume that resource allocation is performed under the criterion of maximizing the sum of the rates of all users (max sum rate). As we keep adding users to the system (without changing the position of the ones that are already in the system):* (1 correct answer)
- a) The sum rate will not decrease (X)
 - b) The sum rate will not increase
 - c) The sum rate may increase or may decrease, depending on the channel conditions
- Q3.4 *Two cells can reuse the same set of channels provided that they are at a suitable distance D, in order to:* (1 correct answer)
- a. Succeed tolerable levels of inter-cell interference (X)
 - b. Decrease the complexity of a DCA algorithm
- Q3.5 *The main reason towards end-to-end All-IP migration*(1 correct answer)
- a) Costs are reduced in order to manage a single network (X)
 - b) Improve security
 - c) Wireless coverage is improved
 - d) None of the above
- Q3.6 *The difference of EDGE as compared to GSM is*(1 correct answer)
- a) Data Rate will be increased up to 384 kbps
 - b) Evolution towards EDGE requires H/W updates at both MS and BSS
 - c) EDGE introduces new modulation schemes
 - d) Combination of A-B-C (X)
- Q3.7 *Which of the following type of interferences play the most important role on the frequency reuse scheme of a wireless cellular network?* (1 correct answer)
- a) Co-channel interference (X)
 - b) Intermodulation interference
 - c) Adjacent channel interference
- Q3.8 *Based on the resonance phenomenon, what is the frequency of a sinusoidal incident field (Far field region) that we notice the highest absorption from a grounded human, 150cm tall? (speed light $c=3 \times 10^8$ m/s)* (1 correct answer)
- a) 50 MHz (X)
 - b) 100 MHz
 - c) 200 MHz
 - d) 400 MHz
- Q3.9 *SAR or Specific Absorption Rate is the international quantity to define safety limits for power absorption from RF fields and it is measured in [W/kg]. A whole-body SAR value of 4 W/kg has been identified as a threshold level of exposure at which harmful biological effects can occur. The relevant limits as defined from ICNIRP (International Commission for Non-Ionizing Radiation Protection) for occupational exposure and exposure of public are:* (1 correct answer)
- a) 4 W/kg and 4W/kg respectively
 - b) 0.4 W/kg and 0.4W/kg respectively
 - c) 0.4W/kg and 0.08W/kg respectively (X)
 - d) 0.08W/kg and 0.4W/kg respectively

Q3.10 *Soft handover in comparison with hard handover:* (1 correct answer)

- a Is an oldest function
- b Creates less interference to nearby UEs
- c Has Faster Application Response Time

(X)

GOOD LUCK TO YOUR EXAMS