

MOBILE NETWORKS

EXAM

Duration: 1h30

23.01.2015

Write your name and number in all the exam sheets.

All the questions have the same weight in the final mark.

Answer to 5 of the 8 questions below, at your choice.

1. Explain the concept of MIMO (*Multiple-Input-Multiple-Output*). In your answer, explain the major characteristic of the radio channel that is explored by this technique.
2. Describe the architecture of GSM networks by presenting an illustrative diagram, by identifying its components, and by describing the functionality of those components.
3. Identify the major aspects of evolution that were observed between the first (1G) and second (2G) generations of mobile cellular networks.
4. Describe the role of the HLR and VLR components in GSM networks, highlighting the differences between them.
5. Explain how subscribers are authenticated in GSM networks.
6. One of the techniques used by the HSDPA service to improve the network throughput is known as "Node B Scheduling". Explain what is the impact of this technique for subscribers that are far away from the centre of the cell.
7. In GSM networks, the SIM card plays an important role in the security framework. Identify the key data items and functions stored within the SIM card, and explain their role in the confidentiality service.
8. The mobile telecommunication systems based on low-orbit satellite constellations (LEO) have some advantages over those systems based on geo-stationary satellites (GEO). Describe those advantages.