Tongji: Mobile Computing Systems
Final Exam, Summer 2007
Duration: 60 minutes
Instructor: Professor Kunz

Name: **Student number:**

Answer all questions on this exam paper. Each explanation should be as brief as possible; you may also want to use diagrams where appropriate.

Question 1. Data in Cellular Networks (10 marks)

Outline the evolution of data services in cellular networks, from AMPS to 3rd generation cellular systems and beyond.

Question 2. Bluetooth (10 marks)

One common problem in mobile computing is that devices are battery-operated and therefore very power-constrained. Explain all the ways in which energy conservation is taken into account in Bluetooth's design. Does Bluetooth's energy conservation mechanism differ from what IEEE 802.11 offers?

Question 3. Mobile IP (10 marks)

Describe Route Optimization in Mobile IP for IPv4. Explain the problem with routing in the standard Mobile IP solution, sketch the operation of the route optimization protocol, and list potential problems with the route optimization solution discussed in class.

Question 4. MANETs (10 marks)

Describe the various categories of MANET routing protocols, as standardized by the IETF. Explain the relative strengths and weaknesses of each category.

Question 5. TCP over Wireless Links (10 marks)

As discussed in class, TCP performs typically poorly in networks where packet loss is not due to congestion. In a mobile environment, where packets could get lost due to poor wireless link quality, handoffs, and route failures in a MANET, TCP needs to be complemented with additional mechanisms, as discussed in the course. Summarize the strength and weaknesses of link-layer retransmission schemes.