

**Practical Exercises for  
Mobile Business I  
WS 2010/2011**

**Work sheet 1  
Technology Basics**

Professur für M-Business  
& Multilateral Security

Institut für Wirtschaftsinformatik

**Prof. Dr. Kai Rannenberg**

Telefon +49 (0)69-798 34701  
Telefax +49 (0)69-798 35004  
E-Mail kai.rannenberg@m-chair.net

**Dipl. Wirt.-Inf. Stephan Heim**  
Email: Stephan.Heim@m-chair.net

**Dipl. Kfm. Lars Wolos**  
Email: Lars.Wolos@m-chair.net

28. Oktober 2010

**Exercise 1 (Mobile Communication Services)**

- a) Which are the three basic services in a GSM network?
- b) Please describe each one of these services.
- c) When establishing a data connection over a GSM network, which are the relevant Mobile Data Services?
- d) Please state the advantages and disadvantages of
  - (i) packet-oriented and
  - (ii) circuit-switched mobile data services.

**Exercise 2 (Architecture of the GSM system)**

- a) What are the three “security services” offered by GSM?
- b) Please outline and comment on the security model of the GSM infrastructure regarding subscriber authentication (challenge-response procedure for subscriber authentication).
- c) Name the weaknesses of the GSM security model and describe in particular the possible consequences resulting from these weaknesses.

### Exercise 3 (3G/UMTS, 4G, LTE)

- a) What are the additional security features which were implemented in 3G (UMTS) networks compared to those of GSM?
- b) What are the characteristics of 4G networks, how does LTE relate to 4G and what does it mean?

### Exercise 4 (Cell-based communication)

- a) What does cell-based communication mean and what are the implications (basic principle, physical form, dependencies)?
- b) Write down the advantages and drawbacks of cellular networks compared to alternative solutions.
- c) In this context, explain “Multiplexing” and why it is used in communication systems.

### Exercise 5 (Wireless LAN)

- a) What are the components in a Wireless LAN?
- b) Name two types of Wireless LAN networks.
- c) In a wireless LAN environment, what is a so-called “Distribution system”? Also please explain Wireless LAN roaming within a distribution system.
- d) There are numerous methods for Wireless LAN encryption. Which one of these offers reasonably secure encryption, using a pre-shared key?

#### ***Processed Lectures:***

- **Lecture 2:** Mobile Telecommunication Infrastructures
- **Lecture 3:** Wireless internet-oriented Infrastructures and Protocols
- **Lecture 4:** Mobile Communication Services