

**Exercise  
Mobile Business I  
WS 2024/2025**

Work sheet 1  
Technology Basics I

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**Exercise 1 (Cell-based communication, L02)**

- 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.
- d) Explain the term “digital dividend”.

**Exercise 2 (Data Transmission Paradigms for data transmission in communication networks, L02)**

What are the characteristics (including advantages and disadvantages) of  
(i) packet-oriented and  
(ii) circuit-switched mobile data services?

### **Exercise 3 (Mobile Telecommunication Infrastructures, L02)**

- a) Which 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.
- d) Which additional security features have been implemented in 3G (UMTS) networks, compared to those of GSM?

### **Exercise 4 (Classic Mobile Communication Services, L04)**

- a) Which are the so-called Classic Mobile Communication Services introduced with 2G digital mobile networks?
- b) Please describe each one of these services.
- c) Mobile Data is one of the Classic Mobile Communication Services above. When looking at GSM networks, which are the relevant Mobile Data Services?

### **Exercise 5 (Wireless LAN Components and Infrastructures, L03)**

- 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?