**GOETHE
UNIVERSITÄT
FRANKFURT AM MAIN**

**Practical Exercises for
Mobile Business I
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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?