

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination Semester 2:

Academic Year : 2006

Date : 19 December 2006

Time : 9.00 – 12.00

Subject : 240-544 Telecom., Wireless and Mobile Networking

Room : R300

Instruction:

- Make sure that there are 9 questions (108 points) in your exam paper.
- This exam is closed book and you have 3 hours to complete your exam.
- All of your answers can be written in either Thai or English.
- Dictionary and Calculator are allowed.
- Palm pilots or other hand held computers are not allowed.

1. True or False?

[10 points]

- a) When using Common-associated Signaling (CAS), setting up a circuit switched connection is very fast.
- b) When using Common Channel Signaling (CCS), end-to-end signaling is not possible after call setup.
- c) In SS7 link status signal unit contains signaling messages for link quality monitoring
- d) Charging of the call starts when ANM (Answer) message is received at LE A.
- e) In GSM, the IMSI identifier is used for identification of stolen equipment
- f) In GSM, both user and network are authenticated
- g) The SGSN module works as a GSM or 3GPP gateway to Internet Network.
- h) In GPRS, IP Multimedia subsystem (IMS) is take care of all signaling within the core network.

Please fill in the full words (note: not only acronyms):

- i) In _____ systems, signaling is transmitted in voice channels, whereas _____ systems use dedicated signaling channels.

2. Answer the following questions

- 2a) Explain why most commonly used (Layer 4) Internet protocols, such as UDP or TCP, are not suitable to transport SS7 signaling within IP networks and inter-working with other networks. Also, give the name of the transport protocol over IP protocol recommended by the IETF Sigtrans working group.

[10 points]

2b) If you have to design a voice-over-IP system that allows inter-networking signaling between voice services in traditional public switched telephone network (PSTN) and IP network, explain the concept of your design, especially details of functional units that reside at the telephone gateway.

[10 points]

3. How is the “Soft handover” done in WCDMA or UMTS network? Compare its benefit against “Hard handover” found in analog cellular networks. [10 points]

4. Answer the following questions

4a) Explain the term Location Area as used in a cellular radio communications system. [5 points]

4b) Based on the guideline provided in the figure 1 below, explain the message sequence flows between a mobile station and other parts of a GSM network when a Location Area Update is performed (i.e. when moving from PLMN1 to PLMN2). Please draw pictures to support your explanation. [10 marks]

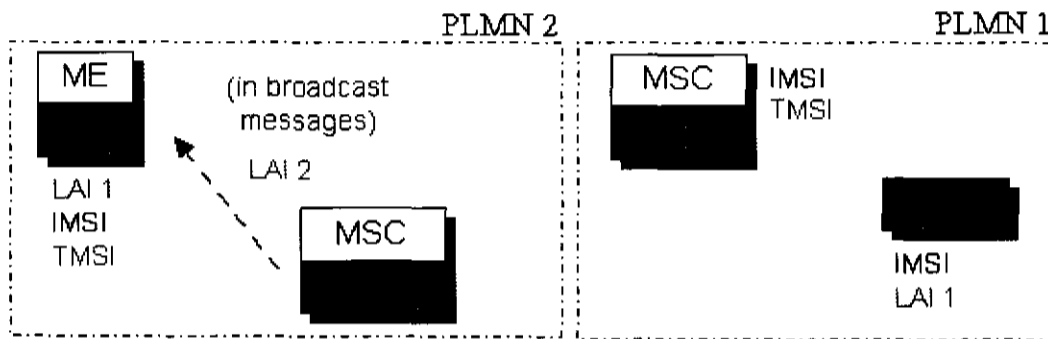


Figure 1

5. From the given GSM network architecture in Figure 2 below,

- Draw a picture of how the GPRS network is integrated to the GSM system.
- Explain the significance of each functional part added.

[10 points]

GSM: circuit switched connections

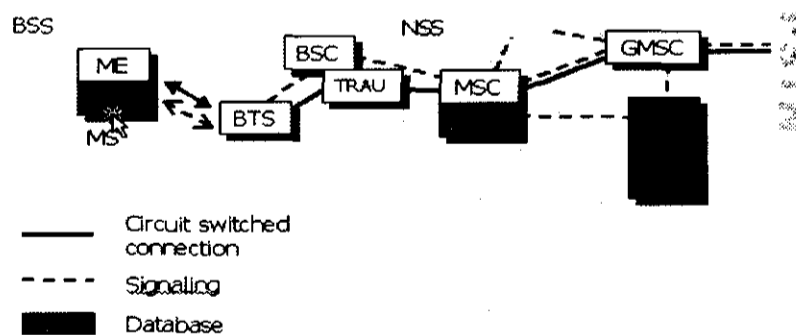


Figure 2

6. Explain the Random Access Channel (RACH) Procedure that is implemented the following WCDMA physical layer procedures: [5 points]
7. What are the service classes of UMTS? Explain the key features of these classes and differences between them? [8 points]
8. Explain the principle of spreading and despreading in WCDMA. How it affects the spectrum of the transmitted signal? What are the benefits of spreading? [10 points]
9. From the 3GPP Release 5 network architecture given in Figure 3, explain the key role of IP Multimedia System (IMS). [10 points]

[10 points]

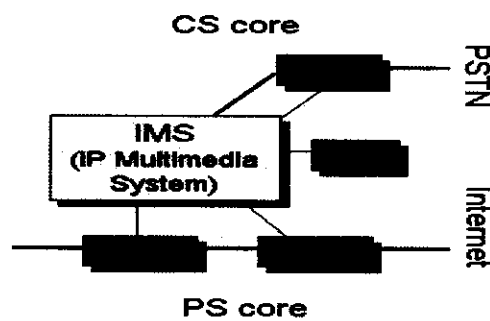


Figure 3

Suntorn Witosurapot
December 2006