

PRINCE OF SONGKLA UNIVERSITY  
FACULTY OF ENGINEERING

Midterm Examination Semester 2:

Academic Year : 2004

Date : 20 December 2004

Time : 9.00 – 12.00

Subject : 240-544 Telecom., Wireless and Mobile Networking      Room : R300

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**Instruction:**

- Make sure that there are 6 questions 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.
- No palm pilots or other hand held computers are 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) FISU means Fill-In Signal Unit.
- e) MSU contains signaling messages for link supervision.
- f) ACM – Address Complete Message is sent from USER B to USER A.
- g) Charging of the call starts when ANM (Answer) message is received at LE A.
- h) A-interface is between Base Station Controller and Mobile Station Core.

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.

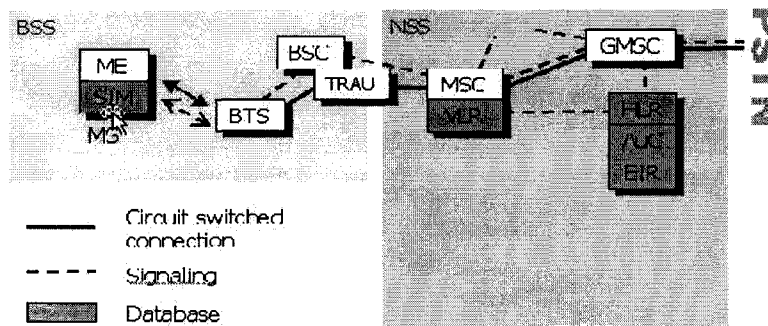
2. Answer the following questions

- a) 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 interworking with other networks. Also, give the name of the transport protocol over IP protocol recommended by the IETF Sigtrans working group. [5 points]
- b) 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. [5 points]

3. a) Explain the term Location Area as used in a cellular radio communications system. [10 points]
- b) Sketch the message sequence flow between a mobile station and other parts of a GSM network when a Location Area Update is performed. [5 points]
4. From the given GSM network architecture below,
- Draw a picture of how the GPRS network is integrated to the GSM system.
  - Explain the significance of each functional part added.

[15 points]

### GSM: circuit switched connections



5. According to a GSM mobile user makes a phone call, complete the following table, which shows signals (connected to traffic channels) that are sent /received in order, for setting up a call between Mobile Terminal (MT) and Base Station (BS).

**MT to BS** means the MT sends that message to the BS.  
**BS to MT** means the BS sends that message to the MT.

[2 points]

	MT to BS	BS to MT
	(1) <i>RACH</i>	
		(2) <i>AGCH</i>
(3)	SDCCH	SDCCH
(4)	TCH	TCH

- 6.
- a. 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]
- b. Explain how Scrambling Codes (PN Codes) and Orthogonal Codes are used to distinguish each mobile station and data channels coming from each base station in WCDMA. [5 points]

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