

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination Semester II :

Academic Year : 2002

Date : 21 December 2002 Time : 13.30 – 16.30 Room : Corridor in front of CE dept.

Subject : 240-544 Telecommunication, Wireless and Mobile Networking

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 either in Thai or English.
- Dictionary and Calculator are allowed.
- No palm pilots or other hand held computers are allowed.

Signaling Number 7 (SS7)

1. True or False? (8 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 signalling 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 signalling 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.
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. (2 points)
 - b) Explain in details about the architecture of VoIP gateway (or Softswitch architecture) that allows inter-networking signaling between voice services in traditional PSTN and IP network. (10 points)

Wireless Wide Area Network: Global system for mobile communication (GSM) and General Packet Radio Service (GPRS)

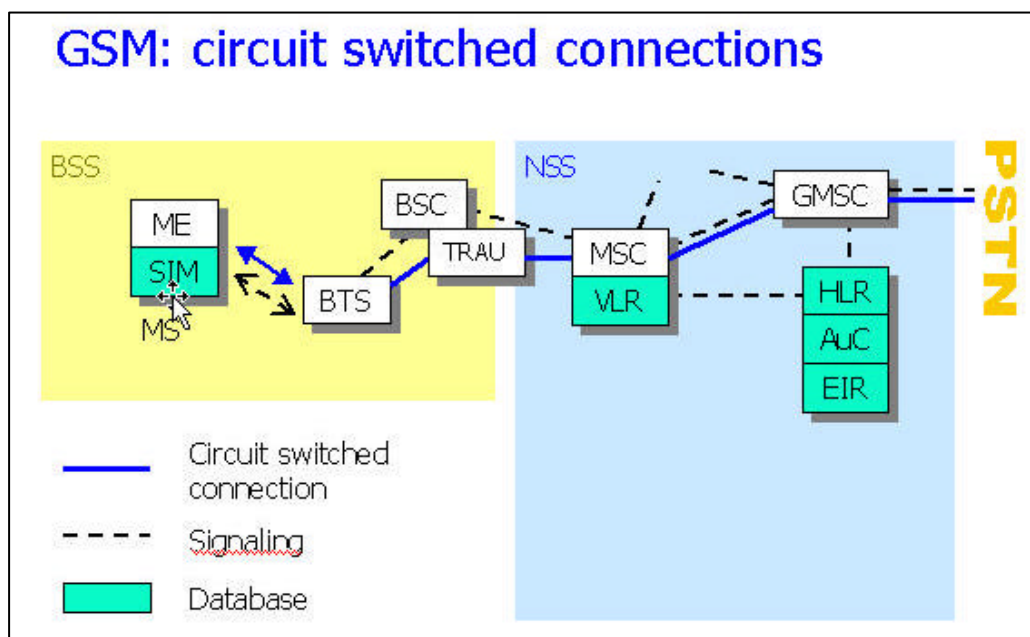
3. Answer the following questions

- What is the multiple-access technology used in GSM? Explain briefly its operation. (2 points)
- Describe the security methods (e.g. authentication, ciphering (over the air interface)) used in GSM. (8 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.

(10 points)



Wireless Wide Area Network: Universal Mobile Terrestrial System (UMTS)

5. Answer the following questions

- What are channelization codes (spreading sequences) in WCDMA? Why do we need this technique in WCDMA network? (3 points)
- How is the “soft handover” done in WCDMA or UMTS network? Compare its benefit against “hard handover” found in analog cellular networks. (3 points)
- What are the service classes of UMTS? Explain the key features of and differences between these classes? (4 points)

6. Draw a figure of the UMTS system architecture with the network elements included and describe the logical network elements including the interfaces between these elements (10 points)

Suntorn Witosurapot

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