



UNIVERSITY TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER 2 SESSION 2008/2009

SUBJECT NAME : MOBILE RADIO COMMUNICATION
SYSTEM

SUBJECT CODE : DEP 2213

COURSE : 2 DET

EXAMINATION DATE : APRIL 2009

DURATION : 2 HOURS

INSTRUCTION : ANSWER (ALL) QUESTION

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

ANSWER ALL QUESTION

- Q1 (a)** Designing a cellular network is a challenging task that invites engineers to exercise all of their knowledge in telecommunications. Although it may not be necessary to work as an expert in all of the fields, the interrelationship among the areas involved impels the designer to naturally search for a deeper understanding of the main phenomena. List down the eight (8) technical aspect that must be considered in a cellular network planning
(8 marks)
- (b)** List down the five (5) technical performance parameters that need to be concern to reach good cellular service transmission quality
(5 marks)
- (c)** List down the seven (7) steps in a cellular system design.
(7 marks)
- Q2 (a)** Write down the operating frequency for GSM-900 and GSM-1900 to have full duplex communication as show in Table Q2 (a) and give two reason why it must run on that frequency value.
(4 marks)
- (b)** Explain why the GSM-1800 used 75 MHz (x2) system bandwidth and how that value could be calculated as show in Table Q2 (a)?
(4 marks)
- (c)** Give the full name of three (3) access method abbreviations as show in Table Q2 (a). Among the three methods, identified one (1) method can support the highest user capacity per time slot of audio conversation session?
(4 marks)
- (d)** If there were many users need an access to the Internet or World Wide Web (WWW) for online electronic mail (e-mail), which system in Table Q2 (a) is the best to support the demand and write down the frequency modulation technique used in a full name of its abbreviation?
(4 marks)
- (e)** Gives one (1) system that work in the reserved band that operate for small range of mobility (normally in house cordless communication for fixed line access) and one (1) system that work in Industrial Science Medical (ISM) band that operate at the lowest power consumption.
(4 marks)

- Q3 (a)** Complete the signal description in the Table Q3 (a) below, by referring to the Figure Q3 (a).

Name	Exchange	Description
Um	MS - BS	
Abis	BS - BSC	
A	BSC - MSC	

(6 marks)

- (b) Why is there a need for a VLR as shown in Figure Q3 (a)?
(2 marks)
- (c) How does a GMSC differ from an MSC?
(4 marks)
- (d) Briefly explain hard handoffs and soft handoffs concept in mobile communications.
(8 marks)
- Q4 (a)** Define the Code Division Multiple Access and Multiple Input Multiple Output abbreviation and briefly explain why this concept very important in the wireless mobile communication technology?
(8 marks)
- (b) How is the effect of interference different from the effect of fading on system performance?
(4 marks)
- (c) List five (5) methods can be used to mitigate interference?
(5 marks)
- (d) What are the three (3) key factors that affect the system capacity, and which are within the control of the operator?
(3 marks)
- Q5 (a)** What is trunking gain, and what are its implications to the cellular operator?
(5 marks)

- (b) Between the large and the small cluster size, choose the best sizes and why?
(4 marks)
- (c) What would be the effect of increasing the size of a location area from 10 cells to 100 cells?
(4 marks)
- (d) If a large cell is replaced by a number of smaller cells (this is a technique often used to enhance capacity) what would the network planner do to the location areas?
(2 marks)
- (e) Why periodic locations are updates necessary?
(5 marks)

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Table Q2 (a)

System / Net	GSM-900	GSM-1800	GSM-1900	W-CDMA UNITS	TD-CDMA UNITS
Frequency	890-915 (up), 935-960MHz	1710-1785 (up), 1805-1880MHz	1850-1910 (up) 1930-1990MHz	1920-1980 (up) / 2110-2170MHz	1900-1920 / 2010-2025MHz
System Bandwidth	25MHz (x2)	75MHz (x2)	60MHz (x2)	60MHz (x2)	20/15MHz
Duplex Method	FDD (45MHz)	FDD (95MHz)	FDD (80MHz)	FDD (120MHz)	TDD
Access Method	FDMA/TDMA	FDMA/TDMA	FDMA/TDMA	FDMA/CDMA	FDMA/TDMA
Modulation	GFSK, BT=0.3	GFSK, BT=0.3	GFSK, BT=0.3	QPSK	QPSK
Channel bandwidth	200kHz	200kHz	200kHz	5MHz	5MHz
Datarate	9.6...171.2kb/s	9.6...171.2kb/s	9.6...171.2kb/s	16...384kb/s (1.92MB/s)	up to 2Mbps
Mobility	250km/h	130km/h	130km/h	300km/h	
MS-Power	13...33dBm	4...30dBm	4...30dBm	21...33dBm	21...33dBm
Distance	ca. 10km	ca. 8km	ca. 8km	ca. 10km	Indoor

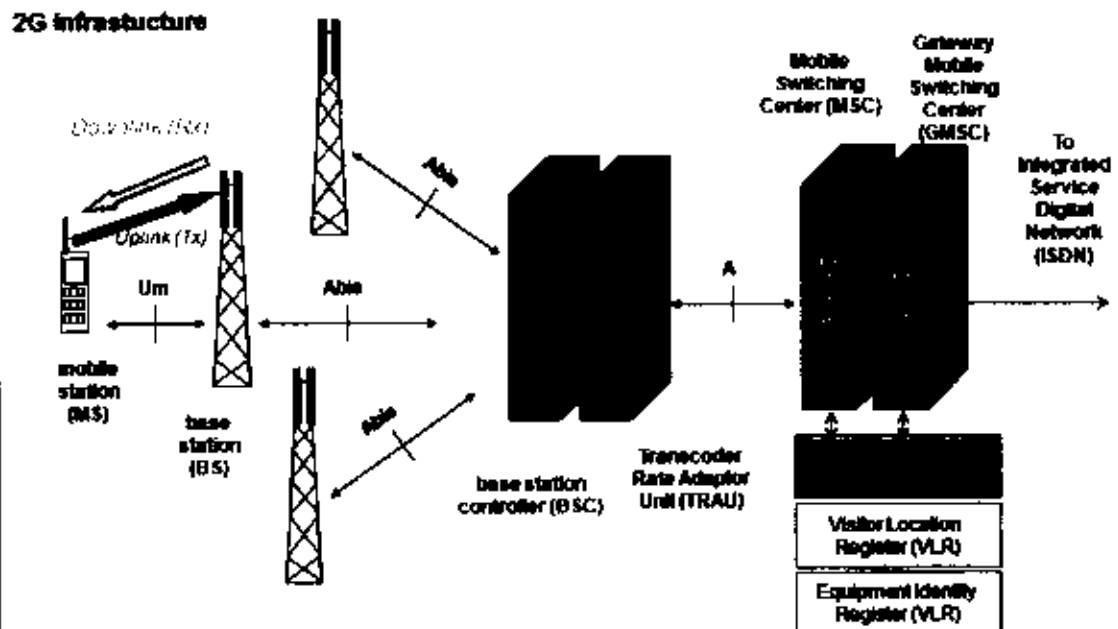


Figure Q3 (a)