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EXAMINATIONS 2013 / 2014 Semester 1 resit
AHOLIADAU 2013 / 2014

FACULTY OF: APPLIED DESIGN AND ENGINEERING
SCHOOL OF APPLIED COMPUTING

NAME OF COURSE/PROGRAMME: MSc. Computer Networks

YEAR OR LEVEL: 7

NAME OF MODULE/UNIT/EXAM PAPER: Emerging Network Technologies

MODULE NO: M7X00667

DATE OF EXAMINATION:

EXAMINATION TIMES:

START TIME:

FINISH TIME:

TIME ALLOWED: 2 hours

INSTRUCTIONS TO CANDIDATES:

Answer three out of four questions. Each question carries equal marks.

Only basic calculators are permitted. Scientific calculators especially with internal memories are not allowed.

Candidates are not permitted to bring dictionaries; text books/case studies or any other reference materials into the exam room.

QUESTION ONE

a) What do you think the word "Distribution system" means in the IEE 802.11 architecture?

(1 Marks)

b) Wireless Mesh Networks (WMN) can be classified into **three** types of architecture. Name and briefly explain them.

(9 marks)

c) If you were asked by a company to outline the WLAN configuration with the view to set-up a new IT infrastructure. Outline the WLAN configuration to the company using a feasible diagram and also explain the WLAN requirements to the company.

(15 marks)

QUESTION TWO

a) What is your understanding of the IEEE 802.16 standards and its architecture? Compare the architecture to the OSI model.

(10 marks)

b) What are some of the services that supported 802.16? Do a comparison of these services.

(10 marks)

c) The Network Manager from a newly formed Internet Provider company requires your expertise to provide him with any security concerns or issues in WiMAX. Outline the security concerns or issues for the Network Manager.

(5 marks)

QUESTION THREE

a) Both LTE-A and WiMAX technologies offer high speed Broadband Internet services. Some people think LTE-A is better because it support larger bandwidth and reduce costs for operators. Discus this argument.

(9 marks)

b) Explain two types of cellular networks interference.

(4 marks)

c) Consider figure 1 below with a single high-power transmitter which provides a radio communication service to a city with total bandwidth available is 35MHz and each user requires 40 KHz of bandwidth for voice communication.

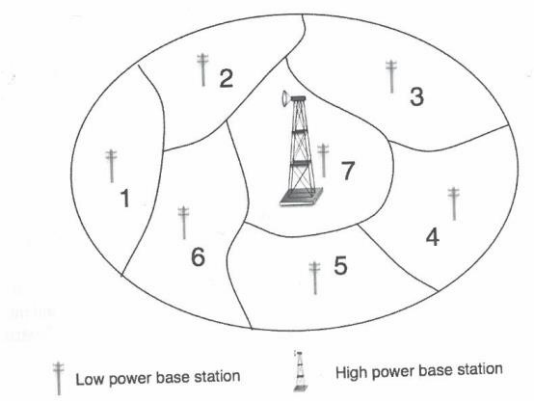


FIGURE 1

i. If one antenna is use to cover the entire town,
    1. How many users can be supported simultaneously?

ii. If the city is split into hexagonal cells with seven cells per cluster
    1. How much allocated spectrum each cell has?
    2. Hence, how many users can each cell supported?

iii. If a cellular topology was employed where 20 lower power antennas are opportunistically located to minimize both kinds of interference:
    1. Now, what is the total number of simultaneous users?

Note that the number of users supported simultaneously (capacity) can be calculated using the formula: $n = \frac{k(\frac{S}{N})}{W}$ Where S is the total spectrum, W is the bandwidth needed per user, N is the cluster size, and k is the number of cells required to cover a given area.

(12 marks)

QUESTION FOUR

a) What are the factors used to compare encoding scheme? List the basic encoding techniques.

(9 marks)

b) Refer to figure 2 below, explain how cognitive radio (CR) can be used to autonomously exploit unused spectrum.

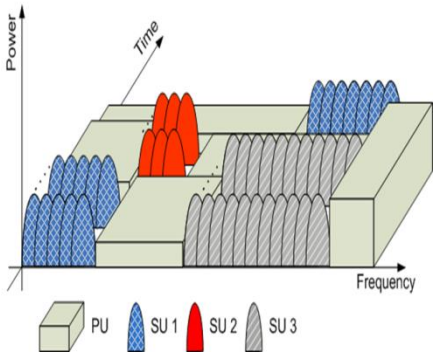


FIGURE 2

(10 marks)

c) Explain some of the challenges and issues in multichannel assignments.

(6 marks)