

Section B

4)

a) Mobile-phone network operators are typically allocated fixed amounts of radio spectrum, yet manage to support an increasing number of users. Explain how this is possible. Your answer should include a description of the network configuration and physical dependencies on transmission and reception characteristics. [10]

b) Explain how a mobile system is tracked through the network structure you describe in part a) during the time a connection/call is in progress. State why the network structure and tracking mechanism could cause problems when:

i) there is a fast-moving mobile system

ii) adaptive data transmission protocols (e.g. TCP) are being used at higher layers

Suggest possible solutions for the problems you describe in i) and ii). [15]

5)

a) Explain the difference between a *proactive* and a *reactive* routing protocol as used in an ad hoc mobile network, pointing out the advantages and disadvantages of each. Describe, in general, the three main components of a reactive routing protocol. [13]

b) Discuss the considerations that must be taken into account when considering a reactive routing protocol for ad hoc networks. [Hint: bear in mind the three main components that you list in your answer to part a).] [12]

[TURN OVER]

6) *Power is the limiting factor in determining the usefulness of mobile systems.*

- a) To what extent do you agree with this statement? Justify your answer. [8]
- b) Where can power be saved? Design and discuss an architectural framework which encompasses power saving techniques that can be used at levels from the hardware up to the application. In answering this you should address several points:
 - i) Outline the power saving techniques that you believe should be incorporated and identify the level at which they are applicable.
 - ii) Do these techniques operate independently of one another or should there be some central (e.g. operating system) control. If the latter, then what form should it take and how should it operate?
 - iii) Are different combinations of techniques applicable to different environments. Thus, say, are the techniques for nodes in an ad hoc network fundamentally different from those in a cellular network? How can your system reconfigure itself with respect to a changing environment?
 - iv) Are there any problems that your system does not address but which you feel are important? [17]

[END OF SECTION B]

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