Section B

4)

a) Explain how the Coda file system supports disconnected operation. Your answer should include details of what must happen before a disconnection, what happens during it, and what happens after reconnection. [15]

b) How, if at all, would you adapt the caching strategy in a layered environment in which vertical handoffs could be predicted with reasonable accuracy. [10]

5) ACME delivery services provide national and international parcel delivery services. Being a forward-looking company, they wish to consider ways in which they might be able to exploit the new technology of low power radio as it becomes available and cheap enough to use in disposable packaging. They believe that it will allow them to keep track of individual packages and thus allow consumers to track deliveries.

Each package has a radio label attached by the pickup driver, after which it is transported to a regional site in a lorry containing maybe hundreds of packages. There it is automatically sorted (using radio label) and transported to one of a small number of national sites in a very large container. There it is sorted and transported to another regional centre, from where it is delivered.

a) Devise and analyse a communications architecture that would allow labels to be tracked effectively. Identify any circumstances under which the system would fail to perform as expected. [10]

b) Under certain circumstances it is more expensive to receive than to transmit in terms of power consumed for low powered radio devices. Assuming that this is generally true, suggest and justify adaptations to a MAC protocol of your choice aimed at ensuring that it is as power efficient as you can make it. You may assume that it is exclusively for use in the above environment but should state any further assumptions you make. [15]

[TURN OVER]

6) A communications company, AirComm, is planning to offer a nationwide mobile communications service. The service will offer voice and data services through a custom handset, and will allow seamless roaming across the country. They will build their own network and their own mobile handsets for their customers to use. AirComm have been allocated a fixed radio frequency (RF) bandwidth, which they will deploy using a cell-based allocation plan.

a) AirComm will offer a "music download" service to their customers, where customers can download audio files that will be stored on, and then played by, their AirComm handsets. The AirComm engineers are testing the download application, which makes use of TCP/IP (Transmission Control Protocol over Internet Protocol) for downloading the audio files. The engineers find that the download performance is quite poor, and well below the capacity of the channel, even when the handset is not moving. Describe what the problem might be, and give brief details of three possible solutions, each of which requires none (or minimal) changes to TCP and no changes at all to IP. [13]

b) AirComm would also like to offer the users the ability to use their handsets for direct data communication (not voice) with other AirComm users within the same small area. To support this, the AirComm handsets support packet-mode, connectionless data transmission to a range of about 5m radius. This communication would be such that the individual handsets would not need to use any resources from the AirComm network. The individual handsets would be able to organise connectivity between themselves to ensure that all stations are reachable. Describe how this might be achieved for a group of users who are, for example, in a hotel lobby, all of whom use AirComm, and where not all of the users are within 5m of each other all of the time. Your answer should include a description of a suitable protocol for allowing connectivity to be set-up and maintained between the handsets as the users move about in the hotel lobby. [12]

[END OF SECTION B]

[END OF PAPER]