2010 Paper 7 Question 3

Advanced Systems Topics

(a) (i) Explain the collision detection mechanism applied in standard wired medium access control associated with CSMA and indicate why this might be unsuitable for wireless networks. [2 marks]

(ii) Describe how CSMA/CA (Collision Avoidance) works and explain its limitations. [2 marks]

(iii) Illustrate how MACAW works and indicate its limitations on the exposed terminal problem through an example. [3 marks]

(iv) Would the deployment of MACAW be needed in an installation of a MAC protocol for a single base station that communicates with some mobile terminals? Why? [3 marks]

(b) You are called upon, as expert, to design and deploy a wireless sensor network to monitor environmental factors in a 500 m^2 area within a forest.

(i) Describe the network architecture you would deploy to collect sensed data in the forest. [2 marks]

(ii) Briefly illustrate **two** different MAC layer protocols for sensor networks and then indicate which one you would employ for your network and why. [4 marks]

(iii) Explain the salient characteristics of Directed Diffusion (DD). Describe the process through which DD is able to reconfigure when sensor nodes fail in the network. [4 marks]