

2006 Paper 8 Question 5

Advanced Systems Topics

Modern peer-to-peer (P2P) systems are typically described as *structured* or *unstructured*.

- (a) Compare and contrast these two approaches. Include a discussion of the general topology, membership management and query mechanisms. Use examples to support your answer. [6 marks]
- (b) Which approach is more resilient to *churn*? Justify your answer. [2 marks]
- (c) One early criticism of P2P systems was that they did not consider network latencies. Describe how one can add proximity awareness to:
 - (i) unstructured P2P systems; [1 mark]
 - (ii) structured P2P systems. [3 marks]
- (d) *Swarming* P2P systems like BitTorrent are designed for efficient (and incentive compatible) download of large files. However, it is typically not possible to use the file until it has downloaded in its entirety. Sketch the design of a swarming P2P system which supports streaming video – that is, allows playback of video to overlap the ongoing download of the remainder of the stream. Comment on how efficient (in terms of network resources) your system would be in comparison with a system like BitTorrent. [8 marks]