

2. Distributed computing

Peer-to-peer networking (P2P) is a means of connecting computers where all participating computers are equal. P2P can be achieved over internet connections, where individual computers can contact each other without the need to enter into a client-server relationship. They often operate outside the domain name system (DNS) and thus have considerable autonomy from servers.

One way in which P2P can be implemented is for a user to run client software which is given the IP address of one or more participating computers:

- the software contacts the participating computers directly
- a request for a file is sent to that computer
- if the file is on that computer, the file is sent back to the computer replacing the request
- otherwise, the request is passed on to other participating computers
- each participating computer stores the IP addresses of some other participating computers
- the request can be passed on repeatedly
- the request has a “time-to-live” (TTL) or pre-determined length of time that the requests can be passed on, so that the process does not go on forever.

- (a) (i) Define the term *IP address*. *[2 marks]*
- (ii) Describe the relationship between the server and a client in a network. *[2 marks]*
- (iii) Identify **two** steps a DNS server takes to help a user locate a particular web page. *[2 marks]*
- (b) (i) Explain **one** reason why a user may use more than one web browser. *[2 marks]*
- (ii) Explain **two** reasons why the illegal copying of music on a P2P network is more difficult to prosecute than that on client-server networks. *[4 marks]*
- (c) A company is based at various geographical locations. The senior managing team is considering the use of web-based P2P networking in order to make business-related files available to its staff. To what extent would this be an effective way to share its business data? *[8 marks]*