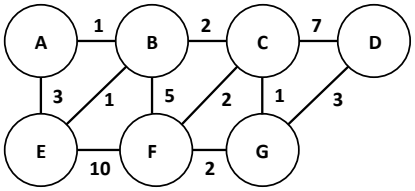
COMPUTER SCIENCE TRIPOS Part IB – 2015 – Paper 5

5 Computer Networking (AWM)



(*a*) In the above network, use Dijkstra's shortest-path algorithm to compute the shortest path from E to all network nodes. Show your working in a table: each column indicating a destination node, each row indicating an iteration of the algorithm. [10 marks]

(*b*) In 2008 an ISP was reported to have hijacked traffic for YouTube causing traffic for YouTube to be diverted into the ISP's network.

At the time, YouTube used only three IP addresses;
208.65.153.238, 208.65.153.251 and 208.65.153.253, announced as a single prefix 208.65.152.0/22.

Despite YouTube using only three addresses, each browser's YouTube URL requests are ultimately routed to the closest of over a dozen data-centres Google operates world-wide.

(*i*) Describe two concepts from the course that make this possible. [2 marks]

(*ii*) State the smallest advertised netblock that would identify all YouTube addresses. [1 mark]

(*iii*) In an attempt to resolve the problem, YouTube advertised the netblock 208.65.153.0/24, but this was the same netblock as advertised by the rogue ISP. Why would this not solve the problem? [2 marks]

(*iv*) YouTube advertised two smaller netblocks, each one half of 208.65.153.0/24. Why should this now work? [2 marks]

(*v*) BGP networks may optionally filter netblocks that are below a given size. This filtering affected the YouTube fix in (*b*)(*iv*), but not that in (*b*)(*iii*). Estimate the size of the netblock filter. [1 mark]

(*vi*) Why does BGP implement such filtering? [2 marks]