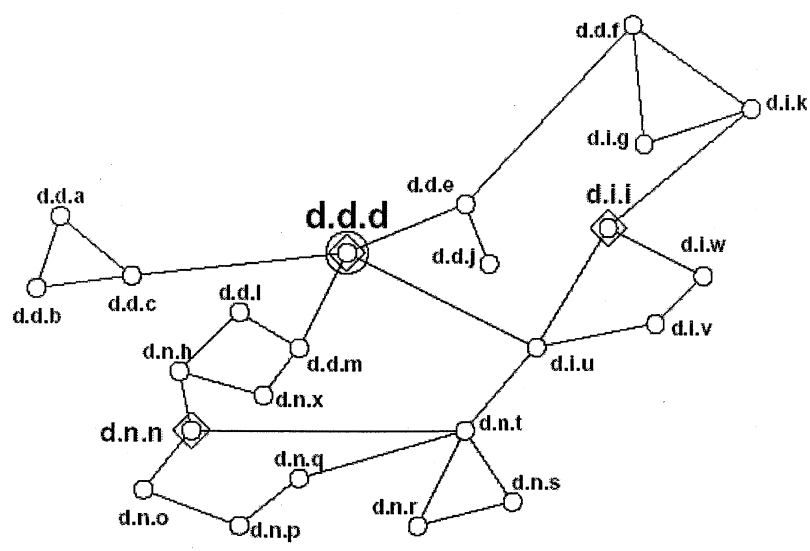


資格考試科目：高等計算機網路

1. (15%) For M/M/c queueing system, given a customer is queued, please find out his/her waiting time dist. is $P(D|D>0) \sim \exp(c\mu - \lambda)$
2. (15%) Landmark Routing



All routers (small circles) are LM0. Diamonds denote LM1 and large circles LM2. In addition, $r_0 = 2$, $r_1 = 4$, and $r_2 = 8$.

- a · Please show the routing table for Router x (d.n.p)?
 - b · How to go from d.n.h to d.i.g?
 - c · How does the path length in (b) compare to the shortest path?
3. (15%) Suppose users share a 1Mbps link. Also suppose each user requires 100kbps when transmitting, but each user transmits only 10 percent of the time.
 - a. When circuit switching is used, how many users can be supported?
 - b. Suppose there are 40 users. Find the probability that at any given time, exactly n users are transmitting simultaneously.
 4. (15%) Why do you think P2P file-sharing applications are so popular. Please give the reasons as possibly as you can.
 5. (15%) Consider a broadcast channel with N nodes and a transmission rate of R bps. Suppose the broadcast channel users polling (with an additional polling node) for multiple access. Suppose the amount of time from when a node completes transmission until the subsequent node is permitted to transmit (that is, the polling delay) is t_{poll} . Suppose that within a polling round, a given node is allowed to transmit at most Q bits. What is the maximum throughput of the broadcast channel?

6. (25 %) TCP congestion control

- a. Why is congestion control needed in the Internet?
- b. How does TCP figure out when congestion occurs?
- c. What will TCP do when congestion occurs?
- d. Why are new versions of TCP for high-speed transmission needed?