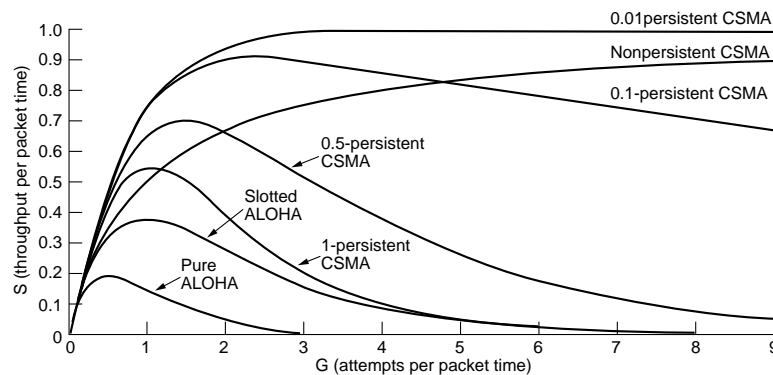


## Part I

*This part covers the same material as the midterm exam.*

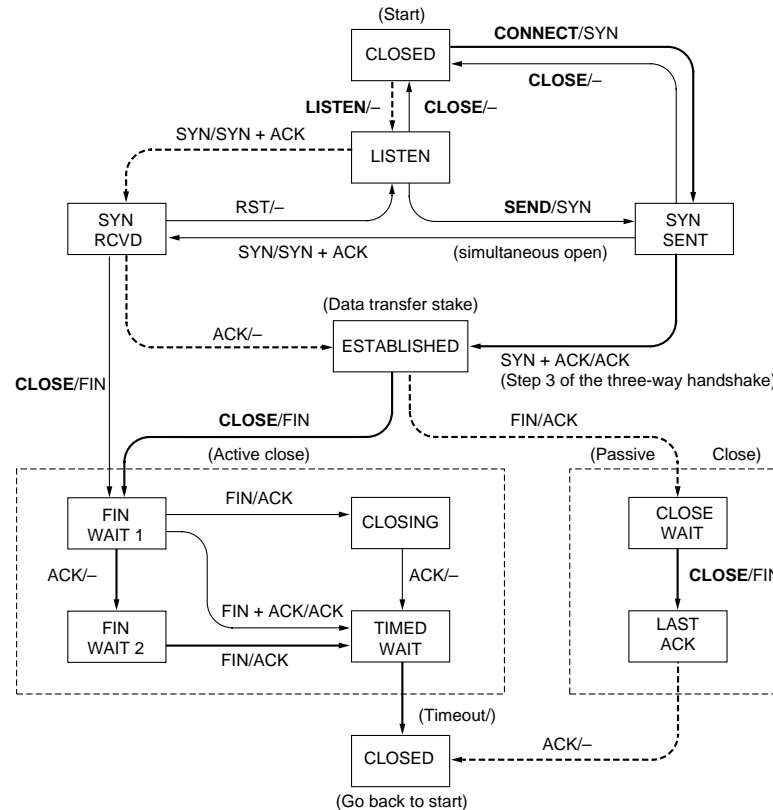
- 1a Why is it necessary, for example in Ethernet, to specify a *minimal* frame length? 10pt
- 1b Explain the principle of p-persistent CSMA protocols. 5pt
- 1c The figure below shows, for different random-access protocols, the channel utilization as function of the traffic. It appears that 0.01-persistent CSMA protocols are the best choice. Is this conclusion correct? 10pt



- 2a What is the difference between *go-back-N* and *selective repeat* in sliding-window protocols? 5pt
- 2b Why is it useful to have a large window size when dealing with slow connections such as with satellites? 5pt
- 3 ATM cells consist of a 5-byte header and a 48-byte payload field. There are no cell delimiters such as, for example, flag bytes. How can a receiver know it has received a complete cell when all it gets is a stream of bits? 10pt

## Part II

- 4a Explain why TCP uses a congestion window in TCP, and how its size is determined. 5pt
- 4b Explain how deadlock can occur in TCP when giving a *buffer credit grant*, and how that deadlock is generally resolved. 5pt
- 4c The figure below shows the state-transition diagram for setting up and tearing down a TCP connection. The thick dashed line represents the normal path for a server; the thick solid line that of a client. What happens according to this diagram when the ACK sent by the client when changing state from “SYN SENT” to “ESTABLISHED,” is lost? What happens normally in TCP? 10pt



- 5a DNS supports iterative as well as recursive name look-ups. Explain the difference between the two. 10pt
- 5b To off-load servers, DNS makes extensive use of *caches*. When will DNS caching *not* be effective? 5pt
- 5c Give at least two methods other than name services like DNS, to look-up addresses in computer networks. Give an example of each method. 10pt

**Final grade:** (1) Add, per part, the total points. (2) Let  $T$  denote the total points for the midterm exam ( $0 \leq T \leq 45$ );  $D1$  the total points for part I;  $D2$  the total points for part II. The final number of points  $E$  is equal to  $\max\{T, D1\} + D2 + 10$ .