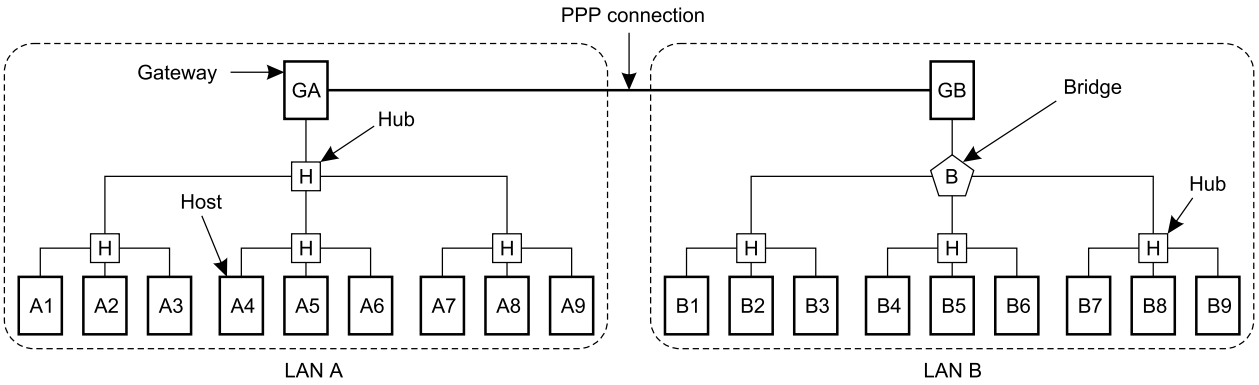
Dept. Math. & Comp. Sc.	Computer Networks
Vrije Universiteit	08.06.2001

Part I

This part covers the same material as the midterm exam.

1a Explain the difference between packet switching, message switching, and circuit switching. *5pt*

1b Which type of switching does ATM deploy? Be sure to explain your answer. *5pt*



2a Consider the two above alternative organizations for LAN *A* and LAN *B* of a 10 Mbps Ethernet-based LAN. Explain what the main differences between using a hub and a bridge in the two LANs are. *5pt*

2b Suppose host *A*1 sends an Ethernet frame to host *B*3. Which hosts will actually be able to sense the frame by means of their network interface? Explain your answer. *5pt*

2c Gateway *GA* and *GB* will have to negotiate the quality-of-service (QoS) of their connection. Give two minimal QoS requirements to hide that LAN *A* and LAN *B* are not a single Ethernet LAN. *5pt*

2d Assume that the PPP connection is replaced with a 100 Mbps Ethernet. How does this affect the possible QoS between *GA* and *GB*? Explain your answer. *5pt*

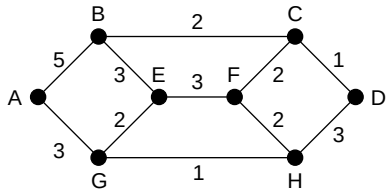
3a Explain the principle working of the pure ALOHA protocol. *5pt*

3b With slotted ALOHA, it is possible to transmit only at fixed moments. How can hosts reach agreement on those moments? *5pt*

3c Why is the performance of slotted ALOHA twice as good as pure ALOHA? *5pt*

Part II

4a Compute a minimal spanning tree with root *A* for the following network. *5pt*



4b Computing a spanning tree requires that a router knows the topology of the network. How can it get this information? *5pt*

4c When a router receives an IPv4 packet, it lowers the packet's time-to-live (TTL) value by one. If the TTL value drops to zero, the packet is discarded and an ICMP message is returned to the sender. How can this mechanism be used to trace the route a packet will follow when going from *A* to *B*? *10pt*

5a Consider an implementation of TCP on an IP network with ATM routers only. Do the TCP packets of the same connection follow the same route? Explain your answer. *5pt*

5b Explain what a 3-way handshake establishes when setting up a TCP connection, and show which messages are exchanged. *5pt*

5c Explain how closing a connection in TCP normally works, assuming that messages are not lost. *5pt*

5d Devise a relatively simple version of TCP in which a minimal number of messages are exchanged for sending a request to a server, and sending the response back to the requesting client. *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* $\max\{T, D1\} + D2 + 10$.