Qualifying Examination – Fall 1998
Networks

Note: This exam is meant to take 1.5 hours. This duration of time is an indication as to the level of detail your answers should contain. Answers should be in the form of written essays (i.e., complete and well-formed sentences and paragraphs).

One of the main issues in networking is connecting multiple local networks into a single internetwork. Two ways of doing this are with bridges (called a switch in twisted-pair networks) and routers.

1. (40 points) Discuss the differences between bridges and routers in terms of:
   - what network layer or layers they operate at,
   - how visible they are to hosts on the internetwork,
   - how they decide what to do with and where to send network traffic (and how this affects efficiency),
   - how large of internetworks they can create, both numerically and geographically (practically speaking), and
   - what level of effort is needed from humans in setting them up.
2. (30 points) Discuss the two main types of routing algorithms that are in use in routers. Compare and contrast them in terms of their basic strategies, what information the routers communicate, and with whom they communicate.
3. (30 points) Since real-world devices sometimes fail, it is desirable to build redundancy into a network such that the network can continue operating despite a certain number of device or connection failures. Discuss what problems redundancy causes for bridges and routers, then discuss how this it handled by bridges and routers, and how this handling effects resource usage.