
The University of Queensland
School of Information Technology and Electrical Engineering
Semester Two, 2009

COMS3200/COMS7201 – Tutorial 1

Questions

The first four questions involve mathematical calculations designed to give you an idea of the numbers of topologies that may be possible, how network capacity gets utilised and how big the Internet is expected to get.

1. A collection of five routers is to be connected in a point-to-point subnet. Between each pair of routers, the designers may put a high-speed line, a medium-speed line, a low-speed line or no line. If it takes 50ms of computer time to generate and inspect each topology, how long will it take to inspect all of them?
2. A disadvantage of a broadcast subnet is the capacity wasted due to multiple hosts attempting to access the channel at the same time. As a simplistic example, suppose that time is divided into discrete slots, with each of the n hosts attempting to use the channel with probability p during each slot. What fraction of the slots are wasted due to collisions?
3. A system has an n -layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h -byte header is added. What fraction of the network bandwidth is filled with headers?
4. The Internet is roughly doubling in size every 18 months. Although no one really knows for sure, one estimate put the number of hosts on it at 85 million (July 2000). Use this data to compute the expected number of hosts in July 2009. When (approximately) will the number of Internet hosts pass 10 billion? (The world population is expected to reach 9 billion in 2050.)
5. List two ways in which the OSI reference model and the TCP reference model are the same. Now list two ways in which they differ.
6. What are the principal differences between connectionless communication and connection-oriented communication and between reliable and unreliable communication?