6. For the digital stream, it takes $\frac{56}{65536}$ seconds until there are enough bytes to make a packet. Once the packet is created it takes $\left(\frac{1}{2\,\text{Mbps}}\right) \times 56$ bytes along with the 10 millisecond propagation delay, which is a total of 11.068 milliseconds.

9. (a) $\frac{1\,\text{Gbps}}{100\,\text{kbps}} = 10485$ Users.

   (b) Using simple algebra we can use $p \times M = N$ to see that $p = \frac{N}{M}$.

11. $\frac{1}{2\,\text{Mbps}} \times \left(4.5\,\text{packets} \times 1500\,\frac{\text{bytes}}{\text{packet}}\right) = 25.749$ milliseconds. More generally, $\frac{1}{R} \times \left(\left(n + \frac{x}{L}\right) \times L\right)$ is the queueing delay.

23. Transferring the data would take $\frac{1}{100\,\text{Mbps}} \times 20\,\text{Terabytes} = 19.418$ days. Because of this, I would pay for FedEx overnight delivery.

30. (a) It will take $\frac{1}{2\,\text{Mbps}} \times 8 \times 10^6\,\text{bits} = 3.815$ seconds to get to the first packet switch. The total time to get to the destination will be $3 \times \left(\frac{1}{2\,\text{Mbps}} \times 8 \times 10^6\,\text{bits}\right) = 11.444$ seconds.

   (b) For the first packet to get to the destination, it'll take $3 \times \left(\frac{1}{2\,\text{Mbps}} \times 2000\,\text{bits}\right) = 2.861$ milliseconds. The second packet will arrive $4 \times \left(\frac{1}{2\,\text{Mbps}} \times 200\,\text{bits}\right) = 3.815$ milliseconds after the transfer starts.

   (c) Since there are 4000 packets total, and the last one will have to wait until the one before it has been transfered to the first packet switch before it can start transferring. This means it will take a total of $4003 \times \left(\frac{1}{2\,\text{Mbps}} \times 2000\,\text{bits}\right) = 3.818$ seconds to transfer the entire file using message segmentation. This is a lot quicker than sending the file whole, which takes 11.444 seconds, as seen in (a).

   (d) Message Segmentation has two main drawbacks. Firstly, since each packet has a header, there is more data being used with this method. Secondly, the packets all have to be put back together at the destination.