Solutions to End of Chapter 13 Problems

Problem 1. **Primary advantage:** Using a bridge separates collision domains which raises the bandwidth and thus improved performance.

Secondary advantages: (1) Bridges enhance reliability, since a single bad user (outputting continuously) will not disable all hosts, (2) if bridges are used, the bad user will only kill his segment and, (3) bridges can be used to enhance security, since we can isolate portions of the network and only forward frames where they must go.

Problem 2. A switch is an N-port bridge where N is the number of stations on the LAN. When using a switch, the bandwidth is only shared between the station and the switch, and the group of N users are divided into N collision domains.

Problem 3. The minimum length of an Ethernet frame is 64 bytes. Subtracting off the fixed-size header fields (source and destination addresses, length/type and CRC), we see that the minimum length of the data received from the network layer (that goes into the Data and Padding field) is 46 bytes (64 bytes – 18 bytes = 46 bytes).

Thus, in the scenario for this problem, we must add (46 bytes – 42 bytes) = 4 bytes of padding to the data.

Problem 4. The minimum length of an Ethernet frame is 64 bytes. The useful data in that Ethernet frame is 46 bytes. The ratio is (46 bytes/64 bytes) = 0.71875.

Problem 5. The text string "Hello World" is 11 characters, or 11 bytes. The minimum size of the "data & padding" portion of the frame is 46 bytes. 46-11 = 35, so we will need 35 bytes of padding.

<table>
<thead>
<tr>
<th>Destination</th>
<th>Source</th>
<th>Length</th>
<th>Hello World</th>
<th>Padding</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA BB CC DD EE FF 11 22 33 44 55 66</td>
<td>00 2e 48 65 6c 6f 20 57 6f 72 6c 64</td>
<td>00 00 00 00 00 00 00 00 00 00 00 00</td>
<td>00 00 00 00 00 00 00 00 00 00 00 00</td>
<td></td>
</tr>
<tr>
<td>Padding</td>
<td>CRC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Problem 6. (a) 10Mbps/4 users = 2.5Mbps
(b) 10Mbps/2 users = 5Mbps
(c) 10Mbps/3 users = 3.33Mbps
(d) 10Mbps/7 users = 1.43Mbps

Problem 7. (a) 10 Mbps / 6 hosts equals approximately 1.67 Mbps per host
(b) 10 Mbps / 4 hosts = 2.5 Mbps per host