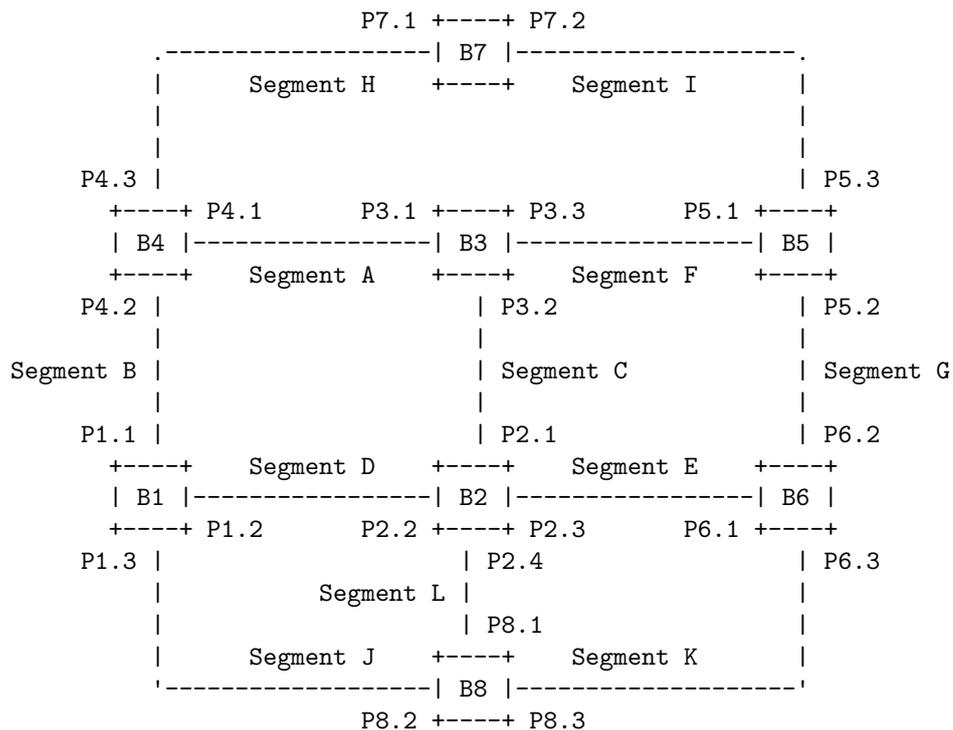**CN 2019 Problem Sheet #2**

Problem 2.1: *spanning tree protocol*   ((1+1+1)+(1+1+1) = 6 points)

Consider the network topology shown below. The cost of all network segments is the same. The priority of all bridges is the same. In case of a tie, use the bridge with the lowest ID or the port with the lowest ID.

```
                    P7.1 +----+ P7.2
        .------------------| B7 |--------------------.
        |       Segment H  +----+     Segment I      |
        |                                            |
        |                                            |
   P4.3 |                                            | P5.3
     +----+ P4.1        P3.1 +----+ P3.3        P5.1 +----+
     | B4 |-----------------| B3 |----------------| B5 |
     +----+     Segment A    +----+     Segment F    +----+
   P4.2 |                        | P3.2                 | P5.2
        |                        |                      |
 Segment B |                     | Segment C            | Segment G
        |                        |                      |
   P1.1 |                        | P2.1                 | P6.2
     +----+     Segment D    +----+     Segment E    +----+
     | B1 |-----------------| B2 |----------------| B6 |
     +----+ P1.2        P2.2 +----+ P2.3        P6.1 +----+
   P1.3 |                        | P2.4                 | P6.3
        |          Segment L |                          |
        |                        | P8.1                 |
        |       Segment J    +----+     Segment K       |
        '------------------| B8 |--------------------'
                    P8.2 +----+ P8.3
```

a) The network has been turned on and a spanning tree is being established.

   (i) Identify the root bridge and the root port of all non-root bridges

   (ii) Identify the designated port for each segment

   (iii) Identify the ports that will be blocked

b) Bridge B1 fails and a new spanning tree is established.

   (i) Identify the root bridge and the root port of all non-root bridges

   (ii) Identify the designated port for each segment

   (iii) Identify the ports that will be blocked

Problem 2.2: *analysis of packet traces*   (1+2+1 = 4 points)

One way to learn about computer networks is to inspect packet traces. A powerful tool to analyze packet traces is wireshark, https://www.wireshark.org/. A common file format for packet traces are `pcap` files (packet capturing files). To answer the following questions, you have to get the `pcap` file linked to this assignment on the course web page.

a) Look at the capture file properties. How many packets and bytes have been captured? Then look at the endpoint statistics to find details about Ethernet broadcasts. How many packets and bytes have been broadcasted? What is the percentage of broadcast packets and broadcast bytes?

b) Filter the packets for bridge PDUs. The wireshark filter expression is simply 'stp' (short for spanning tree protocol). Which MAC address is sending bridge PDUs? To which destination address are bridge PDUs sent? How frequently are bridge PDUs sent? What is the bridge identifier (priority plus MAC address) of the root bridge?

c) The spanning tree protocol used by bridges uses LLC encapsulation. Are there any other protocols in the trace that use LLC encapsulation? Try to filter for LLC and then select the names from the 'Protocol' column of the main window.