Technische Universität München
Lehrstuhl Informatik VIII
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Master Course Computer Networks

Homework 1
(submission until November 4th via SVN)
(submission of corrected version until November 7th via SVN)

Note: Each subproblem gives you 0, 1 or 2 points. See the slides from October 29th for more information on the 0.3 bonus.
Note 2: Subproblems marked by * can be solved without preceding results.

Understanding Ethernet (Wiresharking by hand)

Figure 1 shows the hexdump of some frame captured on a wired network (Ethernet II frame format). The dump contains the whole frame starting with the frame header, excluding the frame trailer:

```
0000   ff ff ff ff ff ff 3c 97 0e ca ff ee 08 06 00 01
0010   08 00 06 04 00 01 3c 97 0e ca ff ee 83 9f 0f 31
0020   ff ff ff ff ff ff 7f 03 0d 25
```

Figure 1: Hexdump, leftmost column indicates the hex offset from the beginning of the frame.

a)* What are the Layer 2 source and destination addresses in Figure 1? How does a switch react to this packet? What does a router do with it?

b)* What is the *Ethertype* in the frame shown in Figure 1? What is it generally good for? Explain the purpose of the protocol corresponding to this *Ethertype*.

c)* What other data is sent before and after the frame shown in Figure 1 to make it a valid Ethernet transmission? Explain the purpose of this data.

d)* How are the bits of Ethernet frames sent over the wire? Write down the bits that are sent from byte offset `0x0c` – `0x0e` (three bytes in total), assuming that the first byte has offset `0x00`.

e) Is it reasonable to see this type of frame in IPv6-only networks? If not, what are the alternatives?

f) Is it reasonable to see this specific frame in Figure 1 in IPv4 networks? Evaluate wether there will be a meaningful response to this frame?

The following two links help you figuring out which protocols are encapsulated by the Ethernet header:

- http://www.iana.org/assignments/ieee-802-numbers/ieee-802-numbers.xml
- http://www.iana.org/assignments/protocol-numbers/protocol-numbers.xml

Most protocols used in the Internet are described in a Request for Comment (RFC). The RFCs can be found on http://www.ietf.org.

If you don't know what Wireshark is, it's time to figure it out. Play around with this tool.

Spanning Tree Protocol (Trees stop the flooding)

In this exercise we will look at the Spanning Tree Protocol. Given is the following topology shown in Figure 2. The bridge IDs of B1 to B5 correspond to their number, i.e. B1 has ID 1, B2 has ID 2, etc. Assume equal costs for each bridge port.

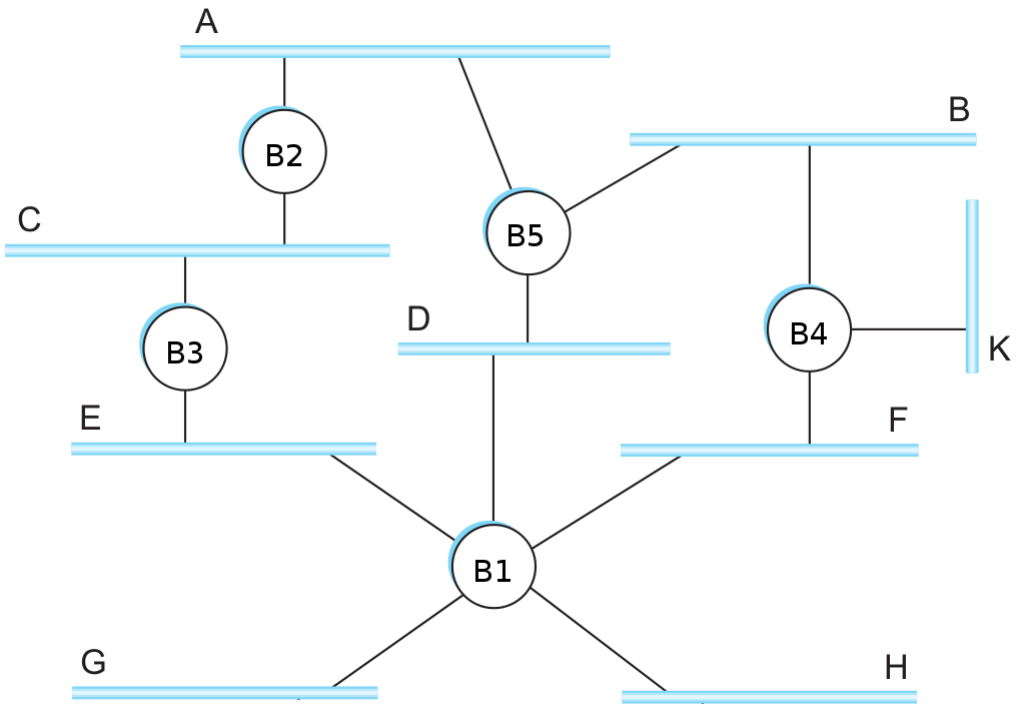

Figure 2: Spanning tree topology with five bridges.

a)* In what scenario is the Spanning Tree Protocol useful?

b)* How does the spanning tree look like after the Spanning Tree Algorithm was executed on Figure 2?

c)* What happens when B1 does not send spanning tree algorithm messages and

(I) B1 drops all spanning tree algorithm messages?

(II) B1 forwards all spanning tree messages?

In the SVN repository https://projects.net.in.tum.de/svn-tum/mccnw13/ in the pub/ folder you can find chapter 3 of *Computer Networks* by Peterson and Davies as an additional reference.

The slides from October 29th explain the SVN submission process.