**Universidad de León**
**Bachelor Degree on Computer Science and Engineering**
*Course on Computer Networks*

# Weekly Homework no. 6 (WH₆)

*Note that this WH covers only the material given in Lectures of*
*7th and 14th – April-2020*

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**Submission date:** 21st-May-2020
**Submit via:** foces.informatica.unileon@gmail.com
**Format:** Only **pdf** format is accepted. Include your name and ID in the document.

## --- Study Guide ---

1. **To be read carefully**: These weekly homework assignments do count to the supplementary component of your final grade according to the official Course Guide updated on 21st-April. The Weekly Homework is a valuable means for you to remain fully involved with the course while away from campus.

2. At all times, have the textbook by Peterson & Davie at hand. Most of the material that we have taught so far belongs in book chapters 1 and 2. Find the 6th edition to the book, here:

   https://github.com/SystemsApproach/book/releases/download/v6.1/book.pdf

   **Notice** that edition 6 of the textbook doesn't contain end-of-chapter exercises. Ed. 5, either the physical book or the pdf version do have the exercises which I reference in the course materials. Request me any exercise statements that you might need and I'll provide you exercises similar to those in Ed. 5 in case that you don't have access to it.

3. A key resource as you study the lessons contained in the assigned presentations is the Questionnaires, which you can find at the following link under section titled "Questionnaires"

   http://paloalto.unileon.es/cn/

4. Check out the Questionnaires that are to be solved this week and which are listed in the deliverables section, below. By this time, all the course topics needed for these questionnaires have been taught in the Lectures or proposed for self-study while we are away from campus.

   Try to resolve the relevant exercises on your own; only after working your solutions is it acceptable to consult the solutions published in paloalto.unileon.es/cn. I may ask you to submit your personal solution to some exercise from some Q in which case I expect that you add some value to the solution that was already published by me.

5. If you need assistance, contact me via the email given above; I recommend that you send your comments and your questions to the **class forum** in the Agora.

# Weekly Homework (WH₅)

*This section __is__ to be included in your homework submission. These exercises will be assessed. You must submit __your original work__ and cite sources in case you used some.*

## Base documentation

1. **Lecture slides:**

   Spanning Tree: http://paloalto.unileon.es/cn/lect/CN-ST.pdf

   Introd. to IP: http://paloalto.unileon.es/cn/lect/CN-IP.pdf

2. **Various CN Questionnaires and past exams at paloalto.unileon.es/cn**

## Exercises and examples about the lectures

1. **Essential for your on-line exam of 8th-June: Execute these commands in** your Linux system and include their output:

   ```
   a. uname -a
   b. date
   c. ping -c 10 -s 1500 paloalto.unileon.es
   d. openssl version -a
   e. ssh -V
   ```

```
f. ntpstat
g. gcc -v
```

Please, recall that you must have a **tested personal Linux** running in your personal PC with full Internet access, otherwise, you will not be able to do certain exercises included in the exam. Additionally, other exercises entail your connecting to **RemLabB6,** therefore, it is your responsibility to check that you have access to your account in paloalto.unileon.es and that you have **completed the WH practices** in it.

2. **Spanning Tree Protocol. The switches included in Fig. 1 support STP,** consequently, they can collaboratively break any loops that exist in the topology at the time. Respond to the following questions:

   a. Which of the switches will become *root* bridge when executing the ST algorithm?

   b. Do hosts $H_n$ participate in the Spanning Tree Protocol?

   c. Discuss whether host $H_a$ can receive the BPDUs generated by $B_0$, in other words, explain what you would do to have $B_0$ receive and analyze the BPDUs mentioned.
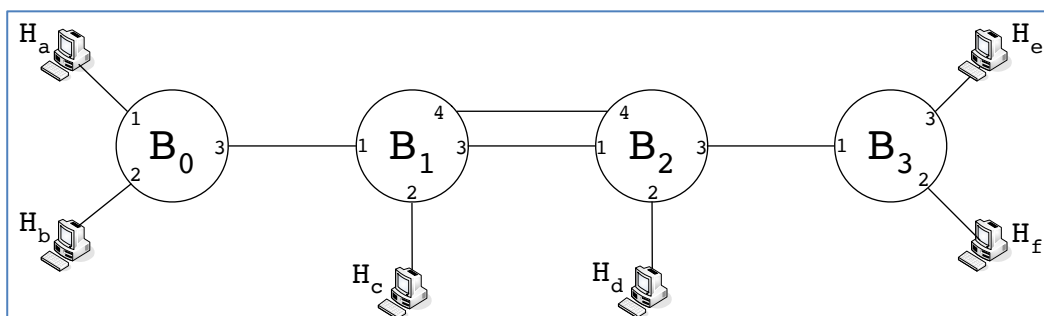


**Figure 1.** Extended LAN for exercise 2.

   d. Obtain the spanning tree corresponding to the network graph in Fig. 1 after the execution of the Spanning Tree Algorithm stabilizes. Take the steps that we developed in the lecture about ST mentioned above.

3. **Obtain the ST resulting from the following switched LAN.** Each of $B_n$ represents a switch and each $L_n$ is a LAN. Again, you are to apply the ST hand calculation that we explained in the lecture about ST.
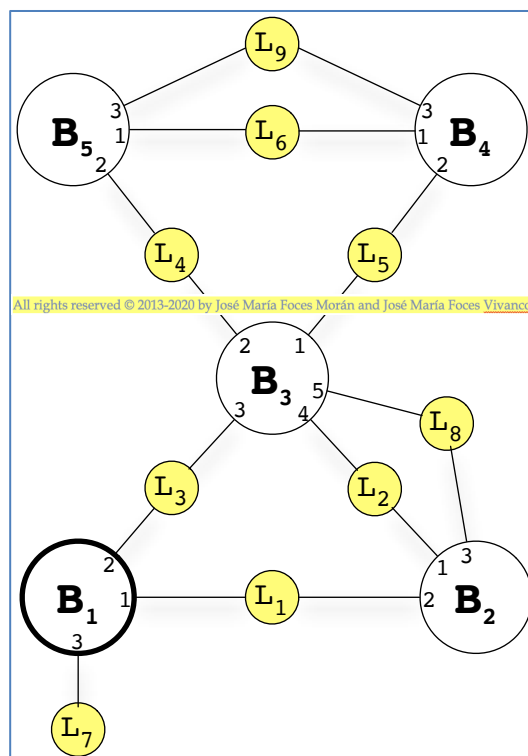
**Figure 2.** Switched LAN for ST hand calculation

4. **Consider anew the topology from Fig. 2. In this case, $L_3$ has a** redundant connection from $B_1$ via new port 4 of $B_1$. Do you think that this loop could be detected and broken by STP? Search past exams and questionnaires in paloalto.unileon.es/cn for similar exercises to justify your answer.

5. **Respond to the following questions about the internetwork in Fig. 3**

   a. **Host B boots a custom Linux kernel that does not include a full** TCP/IP stack but it does have a network driver for its Ethernet NIC. The driver provides a full implementation of the Ethernet datalink; the system includes a standard Linux datalink service interface. What's the technical name to the latter service interface?

   b. **Describe what you would have to do to have host B send a** message 'Hello, world!' to Host A.

   c. **Describe the contents of all the fields of the Ethernet frame** resulting from the send operation from the preceding question.

   d. **What would you have to do to have the same 'Hello, world!'** sent to $R_0$? What will $R_0$ do with the received Ethernet frame.

   e. **Now, we wish to send the same message to Host X, which** belongs in Network 2. Assume that Host X implements a full

TCP/IP stack. Describe with detail, step by step, what would do in this case.

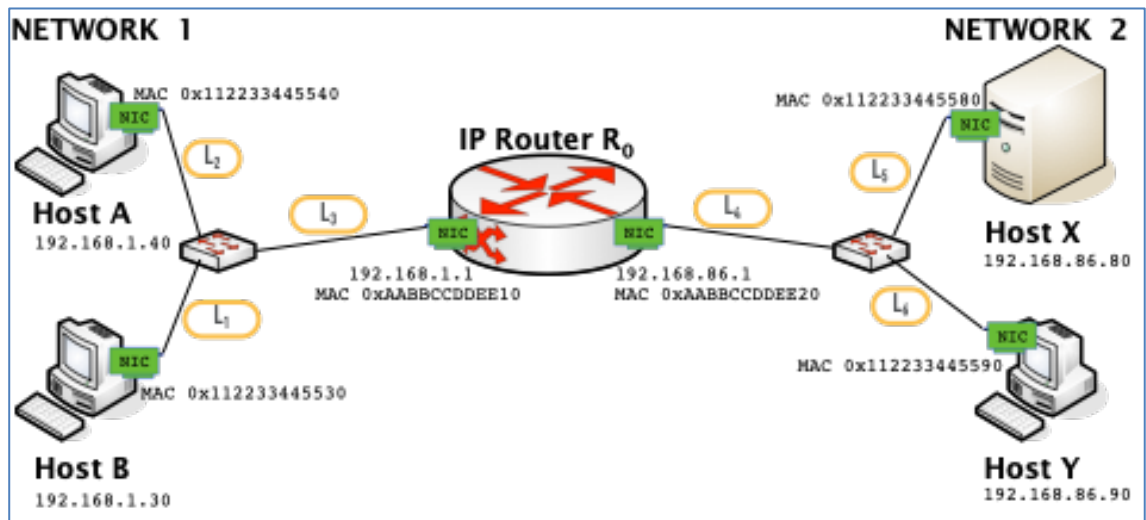**f. Describe the Ethernet frames involved in the communication from Host B to Host X.**



**Figure 3.** Internetwork for exercise 5.