



Course name	Network Architectures and Protocols / Computer networks
The topic of the document	Laboratory exercise book for university students
Laboratory exercise book no.	1.
The title and the topic of the laboratory exercise	Introduction to the practice of network systems

1. Preparation and implementation requirements:

- The student is obliged to read in advance the content of the present laboratory exercise book, to do the preparations for the laboratory and to observe the rules defined for the laboratory.
- The students should read the description of the special terms, mechanisms listed in the „Theoretical background information” chapter to accomplish the laboratory tasks successfully.
- The appearance happens at the beginning of the laboratory, delay can be allowed only in justified cases.
- The use of students’ own mobile phone and PC is forbidden in the laboratory, except the case when the laboratory leader permits their use for the students because of the type of the laboratory exercise to be done.
- Browsers can be used exclusively for the access to information which is necessary for the accomplishment of the laboratory exercise, in the case of the laboratory leader’s permission or instruction.
- By the end of the class the laboratory leader evaluates each participant’s activity based on the composed questions which are included in this present material and further possible questions.
- The laboratory will be successful, if the student provides a correct answer to each question on the basis of the laboratory exercises which are carried out on the premises.
- The replacement of the laboratory is possible at dates of time determined by the laboratory leader.

2. Theoretical background information:

The ppt slides of the lecture are available at the following link:

https://arato.inf.unideb.hu/gal.zoltan/nap_ZG_2018_05_09.pdf

During the laboratory the following special terms will be used in practice:

- **Operating system, Microsoft Windows, Linux, Mac OS, Android:** [Operating system – Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Operating_system)
- **Host and virtual machine:** [Virtual machine – Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Virtual_machine)
- **Computer network:** ppt slides of the lecture, slide no. 3., in details: [Computer network – Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Computer_network)



- **Transmission medium, channel:** pdf slides of the lecture, slide no. 15., 58-69
- **Network Interface Card (NIC) and its modes:** [Network Interface Controller – Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Network_Interface_Controller)
- **Physical address of the NIC:** [MAC address – Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/MAC_address)
- **NIC modes:** [Promiscuous mode – Wikipedia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Promiscuous_mode)
- **Cable types:** [An Educator's Guide to School Networks - Ch. 4.: Cabling](#)

3. The following tasks have to be performed on the site:

3.1.	<i>Finding the main features of the computer hardware</i>
	On a console or a graphical interface searching system properties (number of processor cores, RAM capacity, clock frequency, battery status, drive types and their capacity, number and type of interfaces): on PC, mobile phone.
3.2.	<i>Finding the main features of the operating system</i>
	On a console command line or a graphical interface searching system properties (<i>type, version number, number of running processes, etc.</i>): on PC, mobile phone.
3.3.	<i>Checking the Network Interface of the host and its signal transmission</i>
	Retrieving the status of the NIC-s using a command line. Checking the status of the physical channel using the NIC.
3.4.	<i>Determining the speed of data transfer within the PC</i>
	Within the PC one or several files can be copied or removed between different subdirectories with a certain speed: $n = 1, 2, 5, 10$ means the number of files, $L = 300 \text{ MB} \pm 10\%$ refers to file size. The measured data is presented in Excel and a trend curve is determined.
3.5.	<i>Determining the speed of data transfer between the PC and MS Teams storage</i>
	Connection to https://office.microsoft.com website with a browser from the PC. The upload or download speed of a file with a number $n = 1, 2, 5, 10$ and size $L = 1 \text{ MB} \pm 10\%$ are measured. The obtained data is presented in Excel and a trend curve is determined.



4. The following questions have to be answered by the end of the laboratory:

4.1.	A) The parameters of the PC. Justification: - number of processor cores: - clock frequency [kHz] - number and type of interfaces
	B) The parameters of the mobile phone. Justification: - number of processor cores - clock frequency [kHz] - number and type of interfaces
4.2.	A) The operating system properties of the PC. Justification: - type - version number - number of running processors - CPU load
	B) The operating system properties of the mobile phone. Justification: - type - version number - number of running processors - CPU load
4.3.	A) The arrangement of optical cable types used in practice in increasing order according to their size.
	B) The value of sensitivity of physical channel using the NIC of the host in Hz. Justification.
4.4.	A) Within the PC how will the file transfer speed of this file size $L = 300 \text{ MB} \pm 10\%$ depend on the number of files (n)? The equation of the bandwidth is $[\text{MB/s}] = f_1(n)$. Graphical justification of the data.
	B) How will the file size (L) influence the file transfer speed within the PC? - Bandwidth $[\text{MB/s}] = g_1(L)$ equation is increasing/decreasing/independent/random. Justification.
4.5.	A) How will the file transfer speed of this file size $L = 1 \text{ MB} \pm 10\%$ between the PC and the MS Teams storage depend on the number of files (n)? The equation of the bandwidth is $[\text{MB/s}] = f_2(n)$. Graphical justification of the data.
	B) How will the file size (L) influence the file transfer speed between the PC and the MS Teams storage? - Bandwidth $[\text{MB/s}] = g_2(L)$ equation is increasing/decreasing/independent/random. Justification.