# Komunikacijski protokoli in omrežna varnost
# 2012/13
# Prvi kolokvij

This test must be taken individually. Any and all literature may be used while taking this test. Answer diligently *all* questions.

Bonus points might be awarded if you at least partially correctly answer each question.

Duration of the test: 60 minutes.

Successfully – veliko uspeha!

| TASK | POINTS | MAX. POINTS | TASK | POINTS | MAX. POINTS |
|---|---|---|---|---|---|
| 1 | | | 3 | | |
| 2 | | | 4 | | |

IME IN PRIIMEK: _____

ŠTUDENTSKA ŠTEVILKA: _____

DATUM: _____

PODPIS: _____

**1. naloga:** In lectures we introduced ISO/OSI layered model on top of which are applications. We also introduced TCP/IP model which also has applications on top. The implementation of the later model is part of every operating system.

VPRAŠANJA:

1. When network interface card (NIC) receives data from the network, it notifies the operating system through interrupt request. On which layer does the OS receive this data. Explain your answer, perhaps by drawing or a diagram.

2. Operating system then processes the received data up to the transport layer (usually TCP or UDP) and then hands it to the application. How does the OS know which application to deliver data to? Explain your answer, perhaps by drawing.

3. If an application wishes to send data to the network it also uses the operating system, but in an opposite direction with respect to the previous question. Usually, it uses the transport layer for this. Can an application send the data directly through network layer? Explain your answer.

4. Peter Zmeda would like to ensure the integrity of sent messages. How can he achieve this? Describe.

**2. naloga:**

VPRAŠANJA:

1. When packet arrives through the network it contains information whether it is a `bootp` protocol packet. Where is this information? In the IP header? In the TCP header? In the UDP header? Justify your answer.

2. Our friend, Peter Zmeda, uses `bootp` protocol for loading the operating system on all computers in the company. However, he heard that this protocol is not very safe, since Cefizelj, the villain, can easily make the computers load his own modified version of the operating system instead of Peter's. This is why Peter decided to upgrade the booting process and designed his solution based on fact that every user in the company already has her or his own username and password for accessing company's financial applications.

   His solution uses `bootp` protocol not to boot the OS directly, but only a small program which asks the user for her or his username and password. Only after these are verified, the program starts loading the operating system.

Comment on Peter's solution.

3. Can we intercept DHCPv6 client request on the network, where the source and destination IPv6 address and port numbers are:

   source: `[fe80::0011:33de:fe17:55aa]:547`
   destination: `[ff02::1:4]:546`

   Explain your answer.

**3. naloga:** Peter introduced in his company a new application that permits tracking the amount of paper available in a storage. Application also has a management interface, that returns the quantity of paper still available in the storage when issuing the command `paper-in-warehouse` in a command line.

VPRAŠANJA:

1. Peter otherwise uses a friendly GUI application for monitoring devices and services in the company. Can he extend this application (*just!*) to track the quantity of paper available in the storage? Explain your answer.

2. Assume there is `122 kg` of paper in the warehouse. How do we encode this information using TLV and ASN.1 standards? Give *two different* encodings!

3. Our friend Peter Zmeda has finally put things in the right order and managed to implement complete network management using a SNMP protocol. He got a new application that needs access to the data from the management network. What kind of approach is the most extendable and in accordance with the standard:

   - Application should query for data using SNMP message 6.
   - Application should be directly included as a network manager and use message of type 0.
   - He can always reprogram the agents, so they can communicate with his custom protocol.
   - The system does not permit this.

   Explain your answer.

**4. naloga:** Peter Zmeda is a big music lover. The other day, he found out, that his three friends founded a piano trio – in this trio, everyone plays his own instrument, which we mark by A, B and C. Peter attended their first concert with great joy and was already looking forward to attended the second one.

Unfortunately, Peter's boss called a meeting, that should begin half an hour after the start of the concert. Peter is therefore left with no other choice but to install three microphones in the room where concert is to take place – one for each of the three instruments. He connected the microphones to the computer and the later to the network. Now, he wishes to transfer the concert to his home computer using the RTP protocol.

VPRAŠANJA:

1. Obviously, we have three sources of data. Write the RTP header and mark within it data about and data of each source separately. Explain your answer.

2. Peter told his friend Špela about the concert. He offered her that she can also listen the concert over the Internet. While listening, Špela would like to find out which instrument does a specific source correspond to. Which protocol (and how) should she use in order to get a string with the name of every individual source? Explain your answer.

3. What do NTP protocol and tree structure have in common? Explain your answer.

4. EXTRA. Which instruments make a piano trio?