Komunikacijski protokoli in omrežna varnost 2013/14
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: The first protocol we mentioned this year was bootp. During the lectures, we mentioned that it works on the application (ISO/OSI 7.) layer.

VPRAŠANJA:

1. If bootp/DHCP works on the application layer, what is the destination IP of a packet containing the bootp frame? Explain separately both for IPv4 and for IPv6

2. Our friend Peter Zmeda was trying to set up a DHCP server on his private network. He set the IP of the server to 192.168.2.3. He also added the following entry to his configuration file:

   ```
   subnet 192.168.2.3 netmask 255.255.255.224 {
     range 192.168.2.4 192.168.2.30;
     option broadcast-address 192.168.2.31;
     option routers 192.168.2.2;
   }
   ```

   Did he set the default gateway correctly? Explain your answer.

3. As Peter's server is working so flawlessly his friend Paul would like to use it as well on his home local 10.0.1.128/25. What does he have to do to make this solution work? Explain your answer.

4. During the lectures, we talked about packet routing. Suppose a network is transmitting *broadcast* packets using flooding. Can we still say that the packets are being routed? Explain your answer.

2. naloga:

VPRAŠANJA: One of the central protocols or services on the Internet, which is used to map IP addresses to well defined names (*fully qualified name - FQN*) and vice-versa, is called DNS.

VPRAŠANJA:

1. When we were describing DNS, we also mentioned IPv4. Similarly to IGMP, is there a replacement protocol for DNS when using IPv6? Explain your answer.

2. Peter Zmeda has made a bet with his friend Špela - he claims that it is impossible to have more than 2^{32} different domain names on the Internet if we only use IPv4. Who is right, Špela or Peter? Explain your answer.

3. Peter would like to connect his computer to the Internet. He has run the command ping www.arnes.si, but has received the following answer:

```
ping:  unknown host www.arnes.si
```

(i.) What has gone wrong? (ii.) How else could he check whether he has access to the Internet? Write the appropriate command.

4. When we were talking about multicast, we mentioned the PIM protocol (i.) What exactly is the PIM protocol used for (for example does it route the packets or does it do something else)? (ii.) We mentioned that the PIM protocol has two modes of operation - dense and sparse. Explain - what could go wrong if we used sparse mode when we were supposed to use dense mode?

   HINT: Perhaps present a specific example network and describe how the protocol would work within that network.

3. naloga: PBC (*Peter Broadcasting Corporation*) is the abbreviation of a new television station which only broadcasts using Internet technologies. Obviously, the owner of this new TV station is our old friend Zmeda. Because Peter is a huge movie fan, he believes that PBC will be especially successful at streaming movies.

VPRAŠANJA:

1. Peter uses SNMP to manage his Internet program transmitter. He has to send the string „Ana Karenina" so an agent. How is this string encoded in the TLV format?

2. Peter has set up a user database containing all his customers. His friend Lučka, who attended the KPOV class last year, has told him that there exist several protocols and services which can be used to manage a user database, but Peter is stubborn and has designed his system a bit differently. He has therefore set up a web application which allows him to add, update and delete users and their properties. The application then uses the SNMP protocol to actually alter the data in a user database on one if his servers. Comment on this solution, especially regarding *security*.

3. Which protocol does NTP use at the transport layer? Could it use any other protocol? Which property would this protocol be required to have?

   HINT: To answer the second part of the question, consider the way NTP works and the functionality that the transport protocol must provide.

4. Peter has learned from a friend, that apart from the commands which Peter was taught in networking classes, there also exists a command called ip. He has started to use it, as is shown on figure Figure 1. What is the IP address

```
peter@redoljub:> ip route show
default via 192.168.1.1 dev wlan0  proto static
192.168.1.0/24 dev wlan0  proto kernel  scope link  src 192.168.1.124

peter@redoljub:> ip neigh show
192.168.1.1 dev wlan0 lladdr 00:22:75:24:67:d8 REACHABLE
192.168.1.4 dev wlan0 lladdr 50:46:5d:57:d5:b7 STALE
```

Figure 1: An example of using ip.

of Peter's computer? Did he acquire it using SNMP or DHCP? Explain your answer.

5. OPTIONAL. The film *Anna Karenina* by Joe Wright won an Oscar last year. There also exists a British adaptation from 1948, which was directed by Julien Duvivier. The original story, however, is much older. Who is the author of this literary work and when approximately was it written?

4. naloga:

VPRAŠANJA:

1. PBC streams movies by separately transmitting five audio channels and one video channel. Describe the fields within an RTP packet which is used to bring programming to clients.

2. PBC would like to introduce a new service - movie subtitling. First, a user chooses the language in which to receive the subtitles. These are then displayed while they watch a movie. Suggest a technical solution for the transmission and display of the subtitles.

   HINT: The less data and space your solution uses while still being sufficiently robust, the more points you will get.

3. Can a device with the IP address 192.168.2.10 send a packet to a device with the IP address 192.168.3.15? If yes, explain when? If not, explain why?

4. Peter has decided to set up a local network. He knows that he will connect at least 3 computers, a router and a network printer to this network. (i.) What are the smallest and the largest netmasks he can use?

Peter would like to set his network up in a way that will allow him to later connect it to the network of his friend Pavel. To do this, he has decided to use the network range 172.30.12.0/22, since he is almost certain that Pavel is not using a network containing addresses which would overlap with this range. (ii.) Is Peter even allowed to use addresses in this range? What will the address of the default gateway *have* to be like for Peter's devices to be able to access the Internet? Explain your answer.