Kristo Palić

0246074767 LAB 3

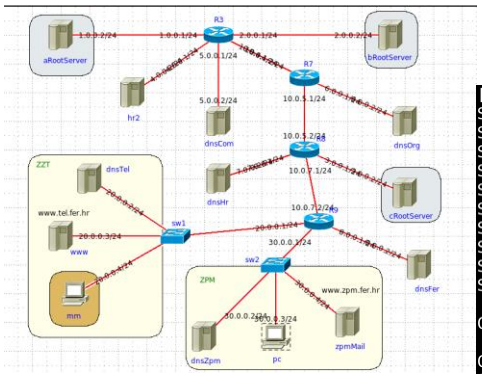
ZADATAK 34.

```
[root@IMUNES ~/imunes-examples/DHCP]# ./start_dhcp
Configuring server:

Configuring clients:
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 7
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 14
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.30 -- renewal in 300 seconds.
        inet 10.0.0.30 netmask 0xffffff00 broadcast 10.0.0.255
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 4
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.10 -- renewal in 300 seconds.
        inet 10.0.0.10 netmask 0xffffff00 broadcast 10.0.0.255
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 7
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.11 -- renewal in 300 seconds.
        inet 10.0.0.11 netmask 0xffffff00 broadcast 10.0.0.255
[root@IMUNES ~/imunes-examples/DHCP]#
```

```
root@PC3:/ # dhclient eth0
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 5
DHCPOFFER from 10.0.0.1
DHCPREQUEST on eth0 to 255.255.255.255 port 67
DHCPACK from 10.0.0.1
bound to 10.0.0.12 -- renewal in 300 seconds.
```

IZVOR IP	IZVOR MAC	ODREDISTE IP	ODREDISTE MAC	PORUKA
0.0.0.0	42:00:aa:00:00:02	255.255.255.255	ff:ff:ff:ff:ff:ff	DHCP Discover
10.0.0.1	42:00:aa:00:00:03	10.0.0.12	42:00:aa:00:00:02	DHCP Offer
0.0.0.0.	42:00:aa:00:00:02	255.255.255.255	ff:ff:ff:ff:ff:ff	DHCP Request
10.0.0.1	42:00:aa:00:00:03	10.0.0.12	42:00:aa:00:00:02	DHCP ACK

ZADATAK 35.




```
[root@IMUNES ~/imunes-examples/DNS+Mail+WEB]# ./start_dns
Starting named on aRootServer...
Starting named on bRootServer...
Starting named on cRootServer...
Starting named on dnsCom...
Starting named on dnsOrg...
Starting named on dnsHr...
Starting named on hr2...
Starting named on dnsFer...
Starting named on dnsTel...
Starting named on dnsZpm...

Copy/Create resolv.conf on clients:

Create empty resolv.conf on DNS servers:
```

```
[root@pc /]# host -t A dnsHr.hr
dnsHr.hr has address 7.0.0.2

[root@pc /]# host -t MX zpm.fer.hr
zpm.fer.hr mail is handled by 10 zpmMail.zpm.fer.hr.

[root@pc /]# host -t MX tel.fer.hr
tel.fer.hr mail is handled by 10 www.tel.fer.hr.

[root@pc /]# host -t NS hr
hr name server hr2.com.
hr name server dnsHr.hr.

[root@pc /]# host -t NS fer.hr
fer.hr name server dnsFer.fer.hr.

[root@pc /]# host -t NS tel.fer.hr
tel.fer.hr name server dnsTel.tel.fer.hr.

[root@pc /]# host -t NS .
 name server bRootServer.
 name server cRootServer.
 name server aRootServer.

[root@pc /]# host -t PTR 20.0.0.4
4.0.0.20.in-addr.arpa domain name pointer mm.tel.fer.hr.
```

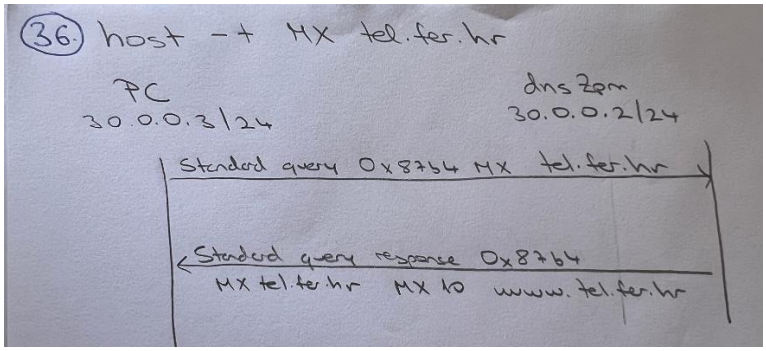
ZADATAK 36.

```
     2 0.839605456   30.0.0.3          30.0.0.2          DNS        70 Standard query 0x87b4 MX tel.fer.hr
     3 1.058116937   30.0.0.2          30.0.0.3          DNS        90 Standard query response 0x87b4 MX tel.fer.hr MX 10 www.tel.fer.hr
```

Pc (30.0.0.3) šalje DNS upit dnsZpm-u (30.0.0.2) s pitanjem tko je zadužen za tel.fer.

DnsZpm vraća DNS odgovor na upit te informira pc da je zadužen www.tel.fer.hr.

Ne dolazi do izmjene poruka s vršnim DNS poslužiteljem zato što izvodimo naredbu po drugi put te lokalni server već ima spremljene podatke.



ZADATAK 37.

▸ User Datagram Protocol, Src Port: 26772, Dst Port: 53

▸ User Datagram Protocol, Src Port: 53, Dst Port: 26772

PC koristi vrata 26772.

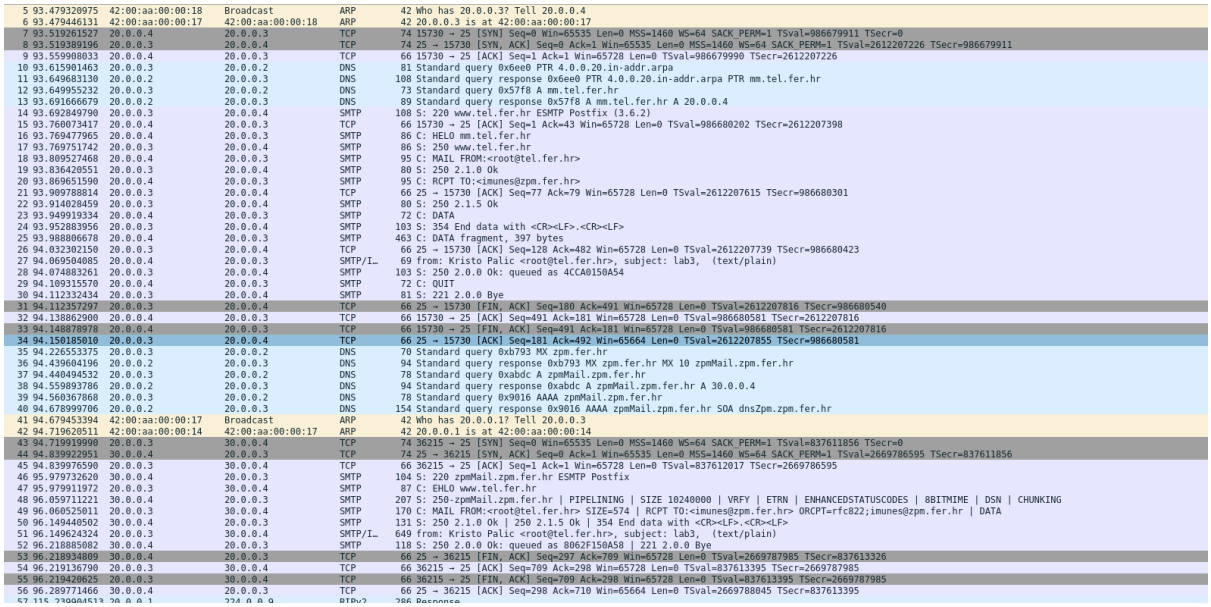
dnsZpm koristi default vrata 53 koja se inače koriste za uslugu DNS.

ZADATAK 38.

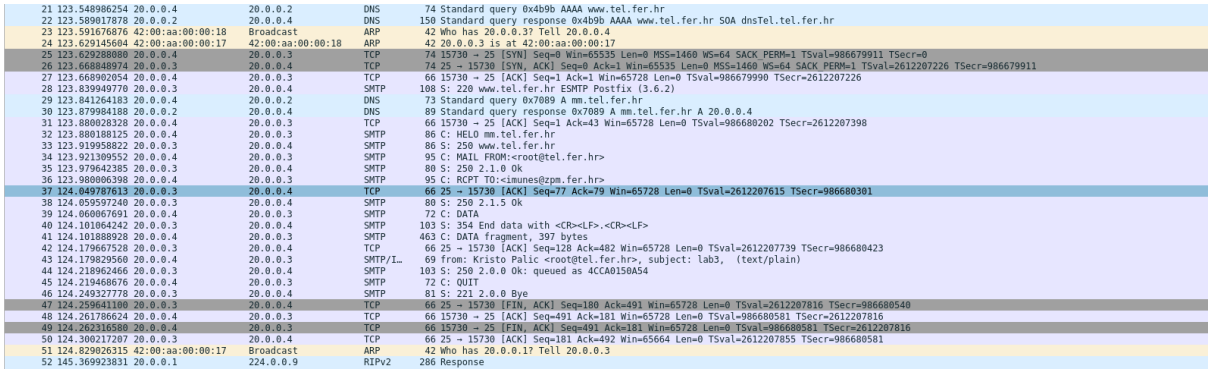
```
[root@IMUNES ~/imunes-examples/DNS+Mail+WEB]# ./start_mail
postfix: Postfix is running with backwards-compatible default settings
postfix: See http://www.postfix.org/COMPATIBILITY_README.html for details
postfix: To disable backwards compatibility use "postconf compatibility_level=2"
 and "postfix reload"
postfix/postfix-script: starting the Postfix mail system
postfix: Postfix is running with backwards-compatible default settings
postfix: See http://www.postfix.org/COMPATIBILITY_README.html for details
postfix: To disable backwards compatibility use "postconf compatibility_level=2"
 and "postfix reload"
postfix/postfix-script: starting the Postfix mail system
```

Display name:	Kristo Palić
E-mail address:	root@tel.fer.hr
User ID:	root
POP3 server:	www.tel.fer.hr:110
SMTP server:	www.tel.fer.hr:25

www



Mm



a)

PROTOKOL	ULOGA	SLOJ TCP/IP
ARP	Iz IP adrese saznaje MAC adresu.	Sloj podatkovne poveznice
TCP	Prijenos podataka.	Transportni sloj
DNS	Iz simboličke adrese saznaje IP adresu.	Aplikacijski sloj
SMTP	Protokol za slanje elektroničkih poruka.	Aplikacijski sloj
SMTP/IMF	SMTP-ov protokol s informacijom o pošiljatelju, subjektu i tijelu poruke.	

b) Prvo mm preko ARP-a saznaje MAC adresu dnsTel DNS poslužitelja. Zatim DNS traži IP adresu za www.tel.fer.hr. Nakon toga usppstavlja se TCP veza između mm i www. Prenosi se poruka protokolom SMTP I SMTP/IMF. Te se nakon toga prekida TCP veza.

c) Protokol DNS se koristi da bi mm preko simboličke adrese saznao IP adresu od www.tel.fer.hr i obratno.

Nadležni poslužitelj za tel.fer.hr – dnsTel.tel.fer.hr

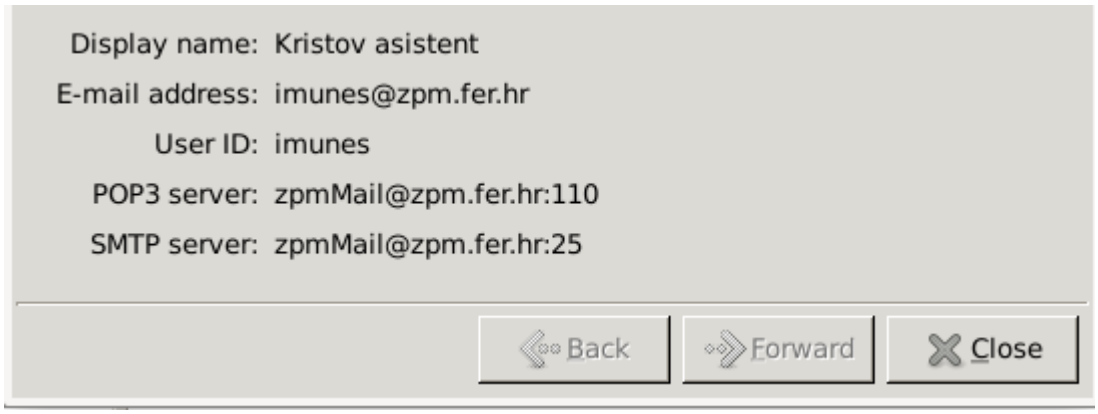
Nadležni poslužitelj za zpm.fer.hr – dnsZpm.zpm.fer.hr

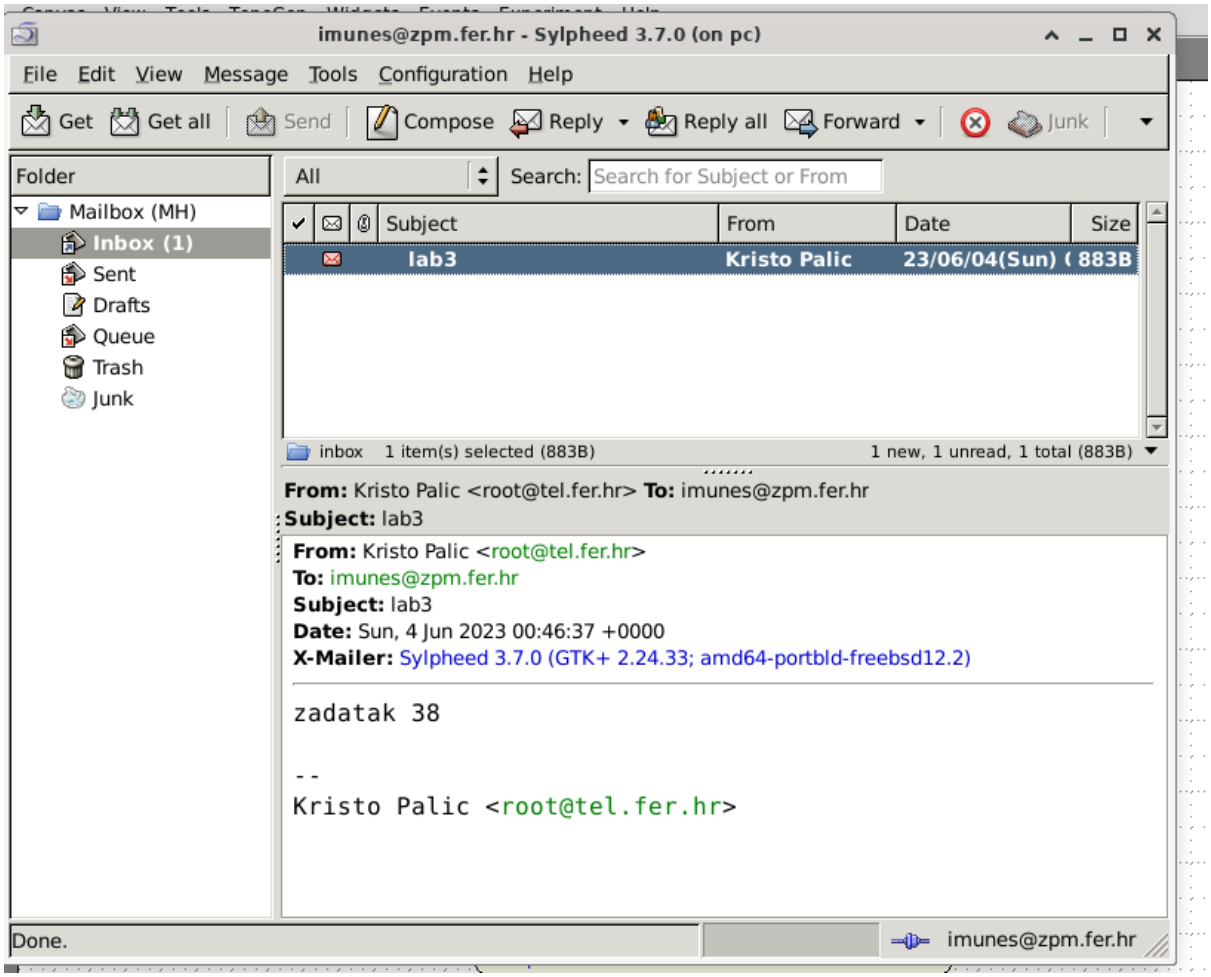
Sve saznaju DNS upitom.

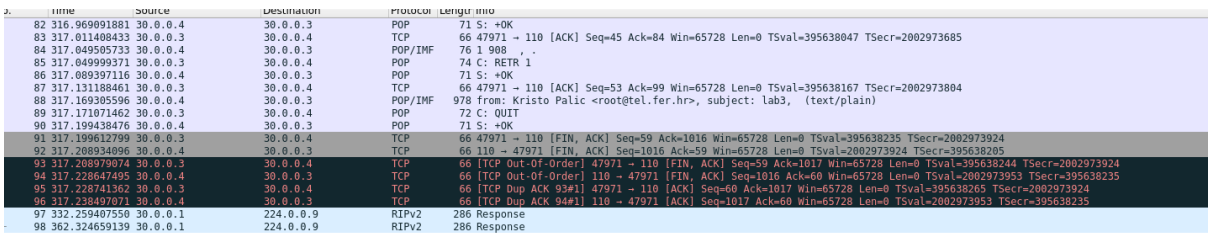
e)

```
220 www.tel.fer.hr ESMTP Postfix (3.6.2)
HELO mm.tel.fer.hr
250 www.tel.fer.hr
MAIL FROM:<root@tel.fer.hr>
250 2.1.0 Ok
RCPT TO:<imunes@zpm.fer.hr>
250 2.1.5 Ok
DATA
354 End data with <CR><LF>.<CR><LF>
Date: Sun, 4 Jun 2023 00:46:37 +0000
From: Kristo Palic <root@tel.fer.hr>
To: imunes@zpm.fer.hr
Subject: lab3
Message-Id: <20230604004637.d607fbf70515a59b393e16af@tel.fer.hr>
X-Mailer: Sylpheed 3.7.0 (GTK+ 2.24.33; amd64-portbld-freebsd12.2)
Mime-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

zadatak 38

--
Kristo Palic <root@tel.fer.hr>
.
250 2.0.0 Ok: queued as 4CCA0150A54
QUIT
221 2.0.0 Bye
```

ZADATAK 39.


Display name: Kristov asistent
E-mail address: imunes@zpm.fer.hr
User ID: imunes
POP3 server: zpmMail@zpm.fer.hr:110
SMTP server: zpmMail@zpm.fer.hr:25
Back
Forward
Close

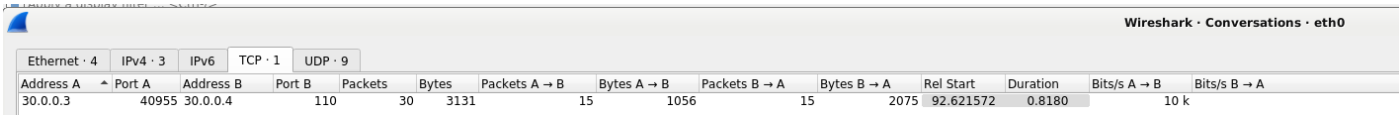

imunes@zpm.fer.hr - Sylpheed 3.7.0 (on pc)
File Edit View Message Tools Configuration Help
Get Get all Send Compose Reply Reply all Forward Junk
Folder
All
Search: Search for Subject or From
Mailbox (MH)
Inbox (1)
Sent
Drafts
Queue
Trash
Junk
Subject From Date Size
lab3 Kristo Palic 23/06/04(Sun) (883B
inbox 1 item(s) selected (883B)
1 new, 1 unread, 1 total (883B)
From: Kristo Palic <root@tel.fer.hr> To: imunes@zpm.fer.hr
Subject: lab3
From: Kristo Palic <root@tel.fer.hr>
To: imunes@zpm.fer.hr
Subject: lab3
Date: Sun, 4 Jun 2023 00:46:37 +0000
X-Mailer: Sylpheed 3.7.0 (GTK+ 2.24.33; amd64-portbld-freebsd12.2)
zadatak 38
--
Kristo Palic <root@tel.fer.hr>
Done.
imunes@zpm.fer.hr


82 316.969091881 30.0.0.4 30.0.0.3 POP 71 S: +OK
83 317.011408433 30.0.0.3 30.0.0.4 TCP 66 47971 → 110 [ACK] Seq=45 Ack=84 Win=65728 Len=0 TSval=395638047 TSecr=2002973685
84 317.049505733 30.0.0.4 30.0.0.3 POP/IMF 76 1 908 , .
85 317.049999371 30.0.0.3 30.0.0.4 POP 74 C: RETR 1
86 317.089397116 30.0.0.4 30.0.0.3 POP 71 S: +OK
87 317.131188461 30.0.0.3 30.0.0.4 TCP 66 47971 → 110 [ACK] Seq=53 Ack=99 Win=65728 Len=0 TSval=395638167 TSecr=2002973804
88 317.169305596 30.0.0.4 30.0.0.3 POP/IMF 978 from: Kristo Palic <root@tel.fer.hr>, subject: lab3, (text/plain)
89 317.171071462 30.0.0.3 30.0.0.4 POP 72 C: QUIT
90 317.199438476 30.0.0.4 30.0.0.3 POP 71 S: +OK
91 317.199612799 30.0.0.3 30.0.0.4 TCP 66 47971 → 110 [FIN, ACK] Seq=59 Ack=1016 Win=65728 Len=0 TSval=395638235 TSecr=2002973924
92 317.208934096 30.0.0.4 30.0.0.3 TCP 66 110 → 47971 [FIN, ACK] Seq=1016 Ack=59 Win=65728 Len=0 TSval=2002973924 TSecr=395638205
93 317.208979074 30.0.0.3 30.0.0.4 TCP 66 [TCP Out-Of-Order] 47971 → 110 [FIN, ACK] Seq=59 Ack=1017 Win=65728 Len=0 TSval=395638244 TSecr=2002973924
94 317.228647495 30.0.0.4 30.0.0.3 TCP 66 [TCP Out-Of-Order] 110 → 47971 [FIN, ACK] Seq=1016 Ack=60 Win=65728 Len=0 TSval=2002973953 TSecr=395638235
95 317.228741362 30.0.0.3 30.0.0.4 TCP 66 [TCP Dup ACK 93#1] 47971 → 110 [ACK] Seq=60 Ack=1017 Win=65728 Len=0 TSval=395638265 TSecr=2002973924
96 317.238497071 30.0.0.4 30.0.0.3 TCP 66 [TCP Dup ACK 94#1] 110 → 47971 [ACK] Seq=1017 Ack=60 Win=65728 Len=0 TSval=2002973953 TSecr=395638235
97 332.259407550 30.0.0.1 224.0.0.9 RIPv2 286 Response
98 362.324659139 30.0.0.1 224.0.0.9 RIPv2 286 Response

a)

PROTOKOL	ULOGA	SLOJ TCP/IP
ARP	Iz IP adrese saznaje MAC adresu.	Sloj podatkovne poveznice
TCP	Prijenos podataka.	Transportni sloj
DNS	Iz simboličke adrese saznaje IP adresu.	Aplikacijski sloj
POP	Preuzima elektroničku poštu s udaljenog računala.	Aplikacijski sloj
POP/IMF	Format poruke.	Aplikacijski sloj

b)

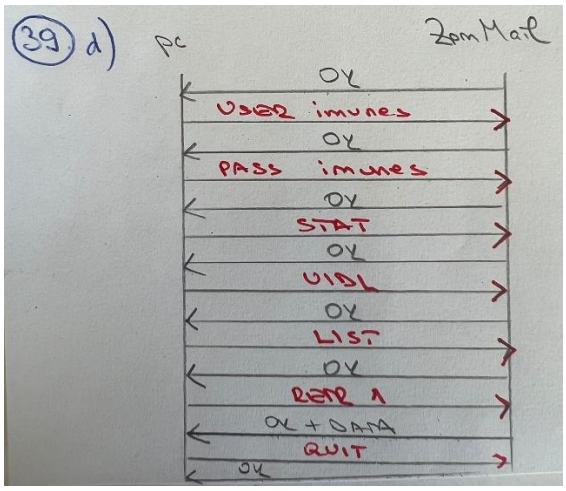


1 TCP konekcija s vratima 40955(pc) i 110 (standard za POP3 protokol).

c)

DNS protokol služi kako bi se doznala IP adresa računala zpmMail.zpm.fer.hr.

d)



LIST - koliko ima mailova na poslužitelju te njihove duljine (u bajtovima) u ovom slučaju jedan mail duljine 978

RETR n - vraća n-ti od navedenih m mailova (1 od 1)

e)

Poruka je stigla na zpmMail od računala mm.tel.fer.hr preko poslužitelja www.tel.fer.hr.

f)

Komunikacija između računala NIJE šifrirana jer se u poruci vidljivo šalje password u izvornom obliku.

ZADATAK 40.

```
720 42.329862852  30.0.0.2          30.0.0.3          DNS      172 Standard query response 0x2517 AAAA www.zpm.fer.hr CNAME zpmMail.zpm.fer.hr SOA dnsZpm.zpm.fer.hr
721 42.331483294  42:00:aa:00:00:1c Broadcast         ARP       42 Who has 30.0.0.4? Tell 30.0.0.3
722 42.367597391  42:00:aa:00:00:1d 42:00:aa:00:00:1c ARP       42 30.0.0.4 is at 42:00:aa:00:00:1d
723 42.367628605  30.0.0.3          30.0.0.4          TCP       74 10001 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=367166367 TSecr=0
724 42.408493139  30.0.0.4          30.0.0.3          TCP       74 80 → 10001 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=3747830768 TSecr=367166367
725 42.408545669  30.0.0.3          30.0.0.4          TCP       66 10001 → 80 [ACK] Seq=1 Ack=1 Win=65664 Len=0 TSval=367166446 TSecr=3747830768
726 42.410814534  30.0.0.3          30.0.0.4          HTTP     380 GET / HTTP/1.1
727 42.454425986  30.0.0.4          30.0.0.3          TCP      281 80 → 10001 [PSH, ACK] Seq=1 Ack=315 Win=65664 Len=215 TSval=3747830811 TSecr=367166446 [TCP segment of a reassembled PDU]
728 42.475848783  30.0.0.4          30.0.0.3          HTTP     375 HTTP/1.1 200 OK  (text/html)
729 42.476122445  30.0.0.3          30.0.0.4          TCP       66 10001 → 80 [ACK] Seq=315 Ack=525 Win=65344 Len=0 TSval=367166513 TSecr=3747830811
730 42.613140632  30.0.0.3          30.0.0.4          TCP       74 10002 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=3144301408 TSecr=0
731 42.658580827  30.0.0.4          30.0.0.3          TCP       74 80 → 10002 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM=1 TSval=246165284 TSecr=3144301408
732 42.658608590  30.0.0.3          30.0.0.4          TCP       66 10002 → 80 [ACK] Seq=1 Ack=1 Win=65664 Len=0 TSval=3144301459 TSecr=246165284
733 42.667537312  30.0.0.3          30.0.0.4          HTTP     347 GET /powerlogo.gif HTTP/1.1
734 42.688459945  30.0.0.4          30.0.0.3          TCP      281 80 → 10002 [PSH, ACK] Seq=1 Ack=282 Win=65664 Len=215 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
735 42.698309530  30.0.0.4          30.0.0.3          TCP     1514 80 → 10002 [ACK] Seq=216 Ack=282 Win=65664 Len=1448 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
736 42.698394102  30.0.0.3          30.0.0.4          TCP       66 10002 → 80 [ACK] Seq=282 Ack=1664 Win=64192 Len=0 TSval=3144301499 TSecr=246165334
737 42.698399019  30.0.0.4          30.0.0.3          TCP     1514 80 → 10002 [ACK] Seq=1664 Ack=282 Win=65664 Len=1448 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
738 42.698405674  30.0.0.4          30.0.0.3          TCP     1514 80 → 10002 [ACK] Seq=3112 Ack=282 Win=65664 Len=1448 TSval=246165334 TSecr=3144301459 [TCP segment of a reassembled PDU]
739 42.698413909  30.0.0.4          30.0.0.3          HTTP    1001 HTTP/1.1 200 OK  (GIF89a)
740 42.698416074  30.0.0.3          30.0.0.4          TCP       66 10002 → 80 [ACK] Seq=282 Ack=4560 Win=61312 Len=0 TSval=3144301499 TSecr=246165334
741 42.711875491  30.0.0.3          30.0.0.2          DNS       74 Standard query 0x5b28 A www.tel.fer.hr
742 42.714567792  30.0.0.3          30.0.0.4          HTTP     312 GET /favicon.ico HTTP/1.1
743 42.751235340  30.0.0.4          30.0.0.3          HTTP/X…  541 HTTP/1.1 404 Not Found
744 42.851870874  30.0.0.3          30.0.0.4          TCP       66 10002 → 80 [ACK] Seq=528 Ack=5970 Win=65664 Len=0 TSval=3144301652 TSecr=246165382
745 43.038298483  30.0.0.2          30.0.0.3          DNS       90 Standard query response 0x5b28 A www.tel.fer.hr A 20.0.0.3
746 43.038502142  30.0.0.3          30.0.0.2          DNS       74 Standard query 0xc397 AAAA www.tel.fer.hr
```

Ethernet · 4 | IPv4 · 3 | IPv6 | TCP · 3 | UDP · 574

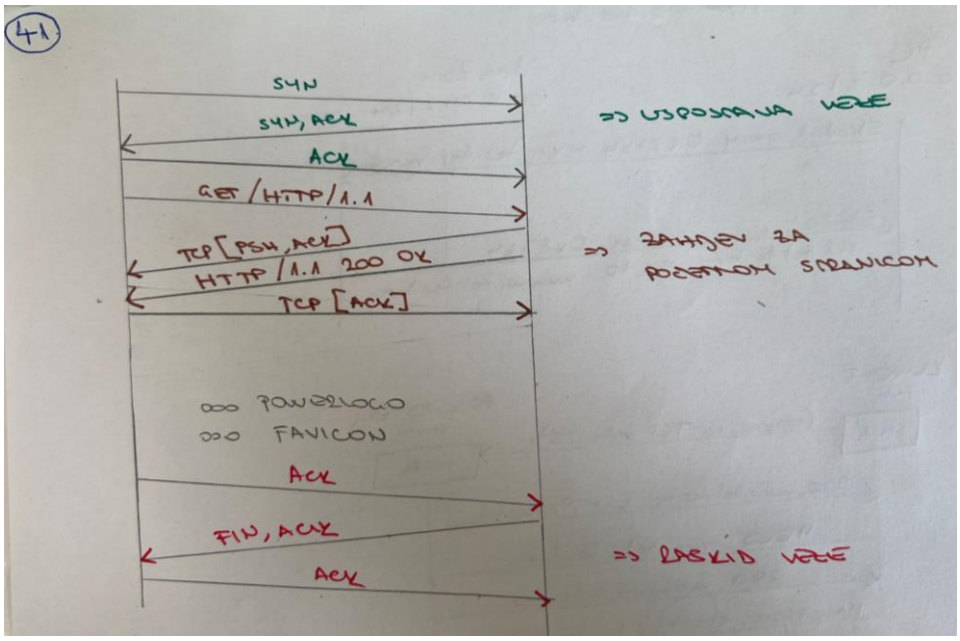
Address A	Port A	Address B	Port B	Packets	Bytes	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits/s A → B	Bits/s B → A
30.0.0.3	10001	30.0.0.4	80	11	1580	6	718	5	862	42.367629	6.1836	928	
30.0.0.3	10002	30.0.0.4	80	18	7700	9	1129	9	6571	42.613141	5.9848	1509	
30.0.0.3	10000	30.0.0.4	80	7	478	4	272	3	206	45.328845	5.1602	421	

Uspostave se 3 HTTP konekcije koje služe da dohvaćanje resursa (pc zahtijeva, zpmMail poslužuje)

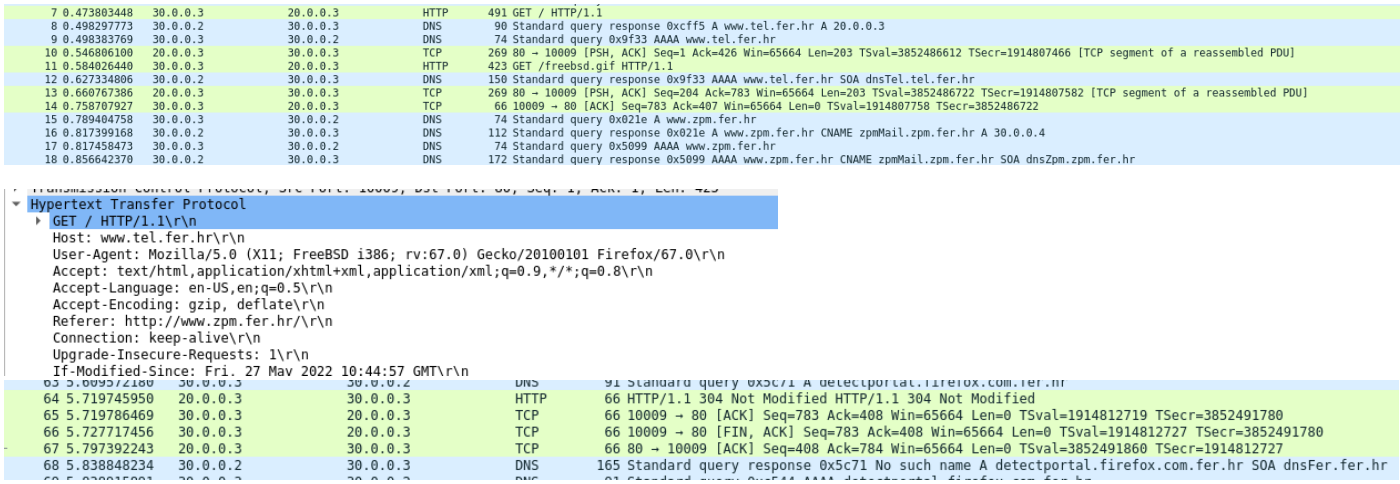
ZAHTJEV	**ODGOVOR**	
GET/HTTP/1.1	HTTP/1.1 200 OK (text/html)	Zahtjev za početnom stranicom. Resurs dostavljena.
GET/powerlogo.gif HTTP/1.1	HTTP/1.1 200 OK (GIF89a)	Zahtijevana slika. Resurs dostavljen.
GET/favicon.ico HTTP/1.1	HTTP/1.1 404 Not Found	Zahtijevana slika. Resurs nije pronađen.

Sve konekcije su između pc (30.0.0.3, port 10000/10001/10002) i zpmMail – www.zpm.fer.hr (30.0.0.4, port 80)

ZADATAK 41.



ZADATAK 42.



Nakon odabira poveznice „Link on ZZT“ ne dolazi do DNS protokola jer dnsZpm već zna traženu IP adresu.

If-Modified-Since zahtjev HTTP headera označava da će server poslati natrag tražene podatke sa statusom 200 (OK) ako i samo ako su modificirani nakon danog datuma. U slučaju da resurs nije bio modificiran od danog datuma, odgovor će biti 304 (Not Modified) bez tijela.