



Nastavni predmet	RAČUNALNE MREŽE_3F Ela Nenadić i Ella Spivak
Naslov cjeline	Djelovanje u mrežnom sloju
Naslov jedinice	Vježba 1: Enkapsulacija podataka kroz slojeve OSI modela

CILJ VJEŽBE

Učenik će znati samostalno analizirati enkapsulaciju protokola kroz slojeve OSI modela.

PRIPREMA ZA VJEŽBU

U pisanoj formi odgovori na slijedeća pitanja:

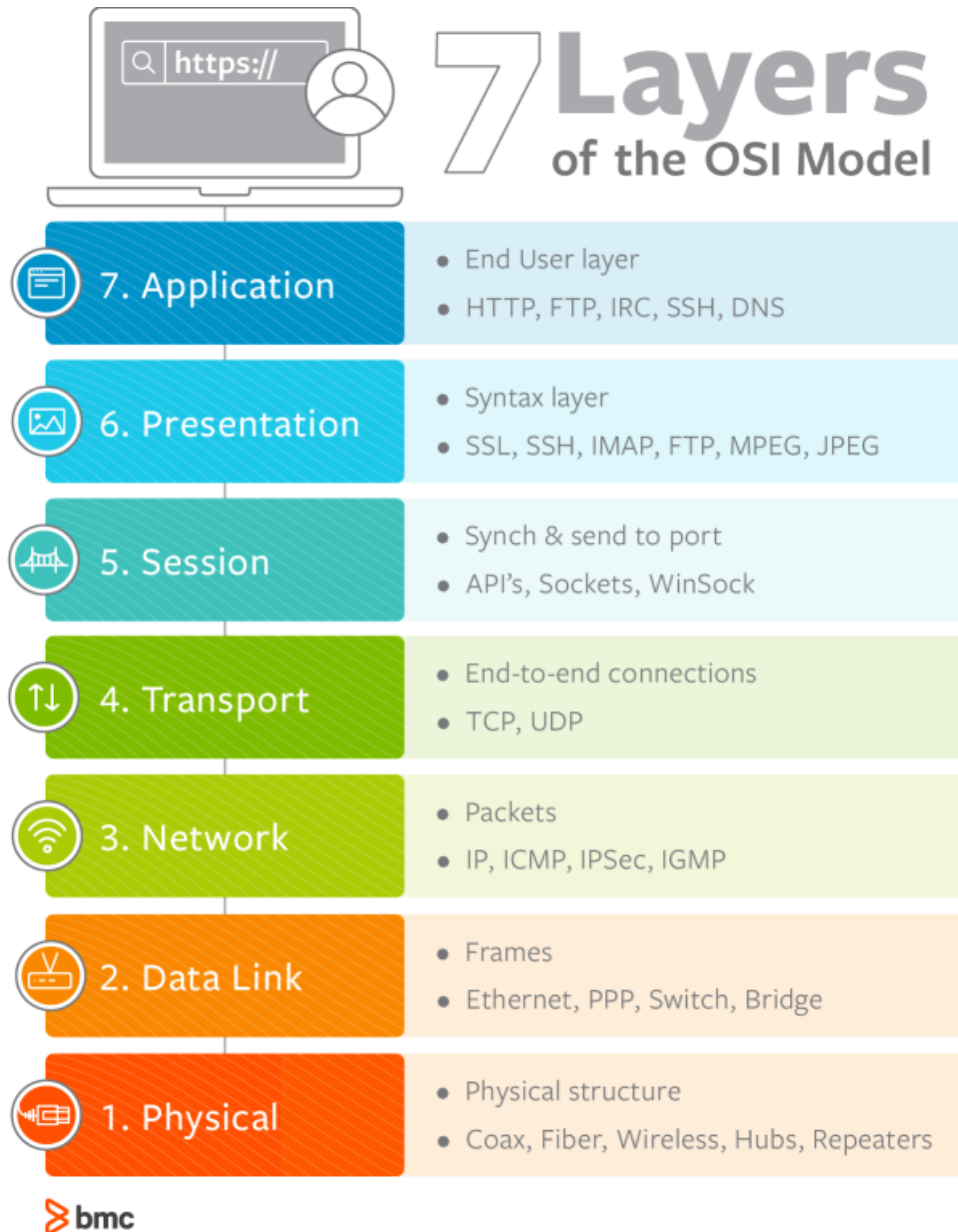
1. Nacrtaj OSI model

7	Application Layer	Human-computer interaction layer, where applications can access the network services
6	Presentation Layer	Ensures that data is in a usable format and is where data encryption occurs
5	Session Layer	Maintains connections and is responsible for controlling ports and sessions
4	Transport Layer	Transmits data using transmission protocols including TCP and UDP
3	Network Layer	Decides which physical path the data will take
2	Data Link Layer	Defines the format of data on the network
1	Physical Layer	Transmits raw bit stream over the physical medium

2. Definiraj enkapsulaciju.

To je postupak pakiranja podataka, od 7. sloja prema 1. sloju, u oblik pogodan za prijenos komunikacijskim vezama naziva se enkapsulacija. Odvija se na uređaju koji šalje podatke (izvor).

3. Za svaki od slojeva napiši najvažnije protokole



IZVOĐENJE VJEŽBE

- Pokrenuti program za praćenje protokola Wireshark
- Odabrati mrežnu karticu na kojoj će se pratiti promet podataka (Ethernet)
- Pokrenuti praćenje prometa na mrežnoj kartici
- Pokrenuti web preglednik i pozvati stranicu po želji (www.tsr.hr)
- Nakon što se web stranica učita, zaustaviti praćenje prometa

1. zadatak

- a. pronaći protokol na aplikacijskom sloju koji sudjeluje u prijenosu web stranice – **HTTP**

No.	Time	Source	Destination	Protocol	Length	Info
66	0.709729	192.168.50.24	142.250.180.132	HTTP	271	GET / HTTP/1.1
130	0.977309	142.250.180.132	192.168.50.24	HTTP	930	HTTP/1.1 200 OK (text/html)
790	4.186487	192.168.50.24	104.103.72.74	HTTP	299	GET /MFMwUTBPME0wSzAJBgUrDgMCGGUABBRi2smg%2ByvTLU%2Fw3mj59We3Nfmzx
793	4.239212	104.103.72.74	192.168.50.24	OCSF	1004	Response
1860	14.170006	192.168.50.24	104.103.72.97	HTTP	302	GET /assets/Owner/arm/ProcessMAU.txt HTTP/1.1
1864	14.192055	104.103.72.97	192.168.50.24	HTTP	411	HTTP/1.1 200 OK (text/plain)
5988	20.416488	192.168.50.10	192.168.50.24	HTTP	268	GET / HTTP/1.1
5990	20.420969	192.168.50.24	192.168.50.10	HTTP	108	HTTP/1.1 302 Moved Temporarily (text/html)
6005	20.422889	192.168.50.10	192.168.50.24	HTTP	277	GET /index.htm HTTP/1.1
6030	20.450975	192.168.50.24	192.168.50.10	HTTP	1489	HTTP/1.1 200 OK (text/html)
6670	24.007017	192.168.50.24	65.182.170.12	HTTP	396	GET /neosmart HTTP/1.1
6830	24.264423	65.182.170.12	192.168.50.24	HTTP	455	HTTP/1.1 302 Found (text/html)
6874	24.484387	192.168.50.24	142.250.184.83	HTTP	344	GET /neosmart HTTP/1.1
7033	24.916630	142.250.184.83	192.168.50.24	HTTP/XML	1132	HTTP/1.1 200 OK

b. pronaći protokol koji na transportnom sloju enkapsulira web stranicu - TCP

No.	Time	Source	Destination	Protocol	Length	Info
2598	8.163099	193.198.184.158	192.168.50.24	HTTP	649	HTTP/1.1 200 OK (JPEG JFIF image)
2599	8.163127	192.168.50.24	193.198.184.158	TCP	54	51382 → 80 [ACK] Seq=1791 Ack=38652 Win=262656 Len=0
2600	8.163333	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=4532 Ack=1726 Win=18176 Len=1460 [TCP seq
2601	8.163333	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=5992 Ack=1726 Win=18176 Len=1460 [TCP seq
2602	8.163365	192.168.50.24	193.198.184.158	TCP	54	51384 → 80 [ACK] Seq=1726 Ack=7452 Win=262656 Len=0
2603	8.163562	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=7452 Ack=1726 Win=18176 Len=1460 [TCP seq
2604	8.163562	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=8912 Ack=1726 Win=18176 Len=1460 [TCP seq
2605	8.163584	192.168.50.24	193.198.184.158	TCP	54	51384 → 80 [ACK] Seq=1726 Ack=10372 Win=262656 Len=0
2606	8.163782	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=10372 Ack=1726 Win=18176 Len=1460 [TCP si
2607	8.163782	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=11832 Ack=1726 Win=18176 Len=1460 [TCP si
2608	8.163807	192.168.50.24	193.198.184.158	TCP	54	51384 → 80 [ACK] Seq=1726 Ack=13292 Win=262656 Len=0
2609	8.164006	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=13292 Ack=1726 Win=18176 Len=1460 [TCP si
2610	8.164006	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=14752 Ack=1726 Win=18176 Len=1460 [TCP si
2611	8.164029	192.168.50.24	193.198.184.158	TCP	54	51384 → 80 [ACK] Seq=1726 Ack=16212 Win=262656 Len=0
2612	8.164225	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=16212 Ack=1726 Win=18176 Len=1460 [TCP si
2613	8.164225	193.198.184.158	192.168.50.24	TCP	1514	80 → 51384 [ACK] Seq=17672 Ack=1726 Win=18176 Len=1460 [TCP si
2614	8.164225	193.198.184.158	192.168.50.24	HTTP	381	HTTP/1.1 200 OK (JPEG JFIF image)
2615	8.164250	192.168.50.24	193.198.184.158	TCP	54	51384 → 80 [ACK] Seq=1726 Ack=19132 Win=262656 Len=0
2616	8.164445	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=4648 Ack=1746 Win=18176 Len=1460 [TCP seq
2617	8.164661	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=6108 Ack=1746 Win=18176 Len=1460 [TCP seq
2618	8.164661	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=7568 Ack=1746 Win=18176 Len=1460 [TCP seq
2619	8.164691	192.168.50.24	193.198.184.158	TCP	54	51385 → 80 [ACK] Seq=1746 Ack=9028 Win=262656 Len=0
2620	8.164886	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=9028 Ack=1746 Win=18176 Len=1460 [TCP seq
2621	8.164886	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=10488 Ack=1746 Win=18176 Len=1460 [TCP si
2622	8.164909	192.168.50.24	193.198.184.158	TCP	54	51385 → 80 [ACK] Seq=1746 Ack=11948 Win=262656 Len=0
2623	8.165109	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=11948 Ack=1746 Win=18176 Len=1460 [TCP si
2624	8.165109	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=13408 Ack=1746 Win=18176 Len=1460 [TCP si
2625	8.165131	192.168.50.24	193.198.184.158	TCP	54	51385 → 80 [ACK] Seq=1746 Ack=14868 Win=262656 Len=0
2626	8.165326	193.198.184.158	192.168.50.24	TCP	1514	80 → 51385 [ACK] Seq=14868 Ack=1746 Win=18176 Len=1460 [TCP si
2627	8.165342	192.168.50.24	193.198.184.158	TCP	54	51385 → 80 [ACK] Seq=1746 Ack=16328 Win=262656 Len=0

c. kako se zove PDU na transportnom sloju?
SEGMENT

2. zadatak

- koji protokol na mrežnom sloju enkapsulira segmente s transportnog sloja? - **IP**
- Kako se zove PDU na mrežnom sloju? - **PAKET**
- Napiši ishodišnu i odredišnu IP adresu paketa koji nosi web stranicu
> **Internet Protocol Version 4, Src: 193.198.184.158, Dst: 192.168.50.24**
- Pročitati i komentirati ostala polja zaglavlja jednog od paketa

```

> Internet Protocol Version 4, Src: 193.198.184.158, Dst: 192.168.50.24
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 635
    Identification: 0x42da (17114)
  > Flags: 0x4000, Don't fragment
    Time to live: 55
    Protocol: TCP (6)
    Header checksum: 0x917d [validation disabled]
    [Header checksum status: Unverified]
    Source: 193.198.184.158
    Destination: 192.168.50.24

```

Source - Izvorišna IP adresa

Destination - IP adresa koja prima podatke

TTL - Time To Live – „životni vijek“ paketa tj.broj skokova koji ogranicava zivotni vijek podataka

Total Length – Veličina tog podatka u bitovima

Protocol – TCP – Vrsta protokola koja je korištena na transportnom sloju

3. zadatak

a. zapiši naziv okvira u koji je enkapsuliran paket na drugom sloju OSI modela

- **ETHERNET FRAME**

b. napiši ishodišnu i odredišnu MAC adresu mrežnih kartica

```
Ethernet II, Src: Routerbo_a6:8c:7f (74:4d:28:a6:8c:7f), Dst: AsrockIn_ce:9b:a8 (70:85:c2:ce:9b:a8)
  > Destination: AsrockIn_ce:9b:a8 (70:85:c2:ce:9b:a8)
  > Source: Routerbo_a6:8c:7f (74:4d:28:a6:8c:7f)
  Type: IPv4 (0x0800)
```

4. zadatak

a. pronaći protokol na aplikacijskom sloju koji je sudjelovao u traženju odredišne IP adrese za zadano ime web stranice

DNS

No.	Time	Source	Destination	Protocol	Length	Info
613	6.447432	192.168.50.24	193.198.184.140	DNS	83	Standard query 0xc0a1 Unknown (65) ss-tehnicka-zg.skole.hr
614	6.448716	193.198.184.140	192.168.50.24	DNS	167	Standard query response 0x7241 A ss-tehnicka-zg.skole.hr A 19
615	6.449366	193.198.184.140	192.168.50.24	DNS	128	Standard query response 0xc0a1 Unknown (65) ss-tehnicka-zg.sk
832	6.792282	192.168.50.24	193.198.184.140	DNS	80	Standard query 0xa1f9 A beacons.gcp.gvt2.com
833	6.792375	192.168.50.24	193.198.184.140	DNS	80	Standard query 0x0ed9 Unknown (65) beacons.gcp.gvt2.com
834	6.792727	192.168.50.24	193.198.184.140	DNS	80	Standard query 0x0bf0 A beacons.gcp.gvt2.com
835	6.792813	192.168.50.24	193.198.184.140	DNS	80	Standard query 0xaa7c Unknown (65) beacons.gcp.gvt2.com
838	6.793636	193.198.184.140	192.168.50.24	DNS	126	Standard query response 0xa1f9 A beacons.gcp.gvt2.com CNAME b
839	6.793854	193.198.184.140	192.168.50.24	DNS	167	Standard query response 0x0ed9 Unknown (65) beacons.gcp.gvt2

b. pronaći protokol koji vraća odredišnu fizičku adresu (MAC adresu) za odredišnu IP adresu mrežne kartice (veza fizičke i logičke adrese)

ARP

No.	Time	Source	Destination	Protocol	Length	Info
507	5.819997	AsrockIn_ce:9a:e0	AsrockIn_ce:9b:a8	ARP	60	Who has 192.168.50.24? Tell 192.168.50.17
508	5.820012	AsrockIn_ce:9b:a8	AsrockIn_ce:9a:e0	ARP	42	192.168.50.24 is at 70:85:c2:ce:9b:a8
2030	7.625600	AsrockIn_ce:9a:f0	AsrockIn_ce:9b:a8	ARP	60	Who has 192.168.50.24? Tell 192.168.50.25
2031	7.625617	AsrockIn ce:9b:a8	AsrockIn ce:9a:f0	ARP	42	192.168.50.24 is at 70:85:c2:ce:9b:a8