

Student:

3. domaća zadaća: prijenos videa putem Interneta

Za izradu zadaće je potrebno instalirati *Adobe Flash Player* i analizator *Wireshark*. Budući da je potrebno analizirati promet koji se generira preko mreže, preporučljivo je prije izrade zadaće zatvoriti sve aplikacije/programe koji generiraju mrežni promet (Skype i ostali IM-klijenti, Dropbox, programi za elektroničku poštu, itd.). Nadalje, prilikom snimanja prometa alatom *Wireshark*, preporučuje se isključivanje opcije *Capture packets in promiscuous mode*, kako bi alat snimao samo one pakete koji su namijenjeni Vašem računalu. Da biste lakše analizirali pakete koji pripadaju određenom toku, možete koristiti opcije *Follow TCP stream* odnosno *Follow UDP stream*, koje se dobiju kada se određeni paket u alatu *Wireshark* odabere desnom tipkom miša.

(1) Proučite uslugu televizije na zahtjev. Hrvatska radiotelevizija nudi HRT-emisije na zahtjev (<http://www.hrt.hr/enz/dnevnik/>) i HRT-uživo (<http://www.hrt.hr/uzivo/>). Slovenska televizija također nudi emisije na zahtjev (<http://4d.rtvsl.si/arhiv/>). Potrebno je proučiti sljedeća tri scenarija pomoću alata *Wireshark* i komentirati pomoću kojih se protokola pristupa televizijskom sadržaju (za svaki scenarij je potrebno priložiti i prikaz snimljenog prometa, npr. putem naredbe *print screen*):

(a) Snimite promet usluge HRT-na zahtjev (proizvoljno odaberite emisiju). Utvrdite koji se protokoli koriste (od transportnog sloja naviše) te koji je korišten format videa.

Koriste se protokoli TCP (većinski dio prometa), UDP, DNS, DHCP i HTTP. Korišteni format videa je mp4.

No.	Time	Source	Destination	Protocol	Length	Info
1389	5.25697000	10.4.253.236	213.5.58.14	TCP	54	56366→80 [ACK] Seq=699 Ack=335801 win=12032 Len=0
1390	5.25702400	10.4.251.105	10.4.255.255	NBNS	92	Name query NB WPAD<00>
1391	5.25718900	10.4.248.5	10.4.255.255	BROWSER	251	Browser Election Request
1392	5.25845700	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1393	5.26145700	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1394	5.26145800	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1395	5.26151500	10.4.253.236	213.5.58.14	TCP	54	56366→80 [ACK] Seq=699 Ack=340181 win=7680 Len=0
1396	5.26212600	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1397	5.26215800	10.4.253.236	213.5.58.14	TCP	54	56366→80 [ACK] Seq=699 Ack=341641 win=6144 Len=0
1398	5.26334400	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1399	5.26342100	10.4.0.93	10.4.255.255	NBNS	92	Name query NB MARS<1c>
1400	5.26642100	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1401	5.26648600	10.4.253.236	213.5.58.14	TCP	54	56366→80 [ACK] Seq=699 Ack=344561 win=3328 Len=0
1402	5.26942000	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1403	5.26942100	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1404	5.26942200	10.4.251.105	255.255.255.255	DHCP	342	DHCP Inform - Transaction ID 0x4b0f4d59
1405	5.26950900	10.4.253.236	213.5.58.14	TCP	54	56366→80 [ACK] Seq=699 Ack=347481 win=512 Len=0
1406	5.27046400	fe80::60e8:a61a:526fe80::d800:fc52:b58	SSDP	453	HTTP/1.1 200 OK	
1407	5.33482400	fe80::2488:115:b8aa:fe80::d800:fc52:b58	SSDP	453	HTTP/1.1 200 OK	
673	2.80237300	fe80::03eb:fcca:0001:fe80::d800:fc52:b58	SSDP	453	HTTP/1.1 200 OK	
677	2.89096300	10.4.253.236	213.5.58.14	HTTP	752	GET /1805/dnevnik18052015.mp4 HTTP/1.1
743	2.94367600	fe80::b08a:7c92:178fe80::d800:fc52:b58	SSDP	456	HTTP/1.1 200 OK	

No.	Time	Source	Destination	Protocol	Length	Info
1454	5.65696900	10.4.253.236	213.5.58.14	TCP	54	56366-80 [ACK] Seq=699 Ack=367921 win=12032 Len=0
1455	5.65811600	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1456	5.65936700	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1457	5.65942000	10.4.253.236	213.5.58.14	TCP	54	56366-80 [ACK] Seq=699 Ack=370841 win=9216 Len=0
1458	5.66063200	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1459	5.66063400	IntelCor_2e:96:20	Broadcast	ARP	60	who has 10.4.255.252? Tell 10.4.0.1
1460	5.66191800	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1461	5.66195700	10.4.253.236	213.5.58.14	TCP	54	56366-80 [ACK] Seq=699 Ack=373761 win=6144 Len=0
1462	5.66311000	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1463	5.66570200	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1464	5.66576500	10.4.253.236	213.5.58.14	TCP	54	56366-80 [ACK] Seq=699 Ack=376681 win=3328 Len=0
1465	5.66770800	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1466	5.66970400	213.5.58.14	10.4.253.236	TCP	1514	[TCP segment of a reassembled PDU]
1467	5.66970800	fe80::cccb3:1502:c05fe80::d800:fc52:b58	SSDP	456	HTTP/1.1 200 OK	
1468	5.66976700	10.4.253.236	213.5.58.14	TCP	54	56366-80 [ACK] Seq=699 Ack=379601 win=512 Len=0
1469	5.67266500	10.4.3.145	255.255.255.255	UDP	60	Source port: 2008 Destination port: 2008
1470	5.67670600	10.4.255.131	10.4.255.255	NBNS	92	Name query NB BLOOD<1b>
1471	5.67776700	10.4.3.145	10.4.255.255	UDP	60	Source port: 2008 Destination port: 2008
1472	5.68872300	10.4.250.23	10.4.255.255	NBNS	92	Name query NB ISATAP<00>

(b) Snimite promet usluge HRT-uživo. Utvrdite koji se protokoli koriste (od transportnog sloja naviše) te koji je korišteni format videa.

Napomena: usluga HRT-uživo nedostupna je za vrijeme emitiranja emisija koje u TV-rasporedu imaju oznaku „kodirano za satelitski program“.

Koriste se protokoli TCP, UDP, DNS, DHCP i HTTP. Korišteni format videa je swf.

1430	3.73762500	208.92.53.74	10.4.253.236	TCP	66	80-56571 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
1431	3.73767800	10.4.253.236	208.92.53.74	TCP	54	56571-80 [ACK] Seq=1 Ack=1 win=16384 Len=0
1432	3.73886200	77.67.34.31	10.4.253.236	TCP	66	80-56584 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
1433	3.73895000	10.4.253.236	77.67.34.31	TCP	54	56584-80 [ACK] Seq=1 Ack=1 win=16384 Len=0
1434	3.73900100	77.67.34.31	10.4.253.236	TCP	66	80-56585 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
1435	3.73904400	10.4.253.236	77.67.34.31	TCP	54	56585-80 [ACK] Seq=1 Ack=1 win=16384 Len=0
1436	3.74055400	208.92.53.140	10.4.253.236	TCP	60	80-56578 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460
1437	3.74065200	10.4.253.236	208.92.53.140	TCP	54	56578-80 [ACK] Seq=1 Ack=1 win=16616 Len=0
1438	3.74083800	10.4.253.236	208.92.53.140	HTTP	733	GET /liveplayer.php?CALLSIGN=HTV1&width=640&height=450 HTTP/1.1
1439	3.74185600	208.92.53.140	10.4.253.236	TCP	60	80-56579 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460
1440	3.74192700	10.4.253.236	208.92.53.140	TCP	54	56579-80 [ACK] Seq=1 Ack=1 win=16616 Len=0
1441	3.74197600	208.92.53.140	10.4.253.236	TCP	60	80-56581 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460
1442	3.74200800	10.4.253.236	208.92.53.140	TCP	54	56581-80 [ACK] Seq=1 Ack=1 win=16616 Len=0
1443	3.74204100	208.92.53.140	10.4.253.236	TCP	60	80-56583 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460
1444	3.74208100	10.4.253.236	208.92.53.140	TCP	54	56583-80 [ACK] Seq=1 Ack=1 win=16616 Len=0
1445	3.74250000	208.92.53.140	10.4.253.236	TCP	60	80-56582 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460
1446	3.74254000	10.4.253.236	208.92.53.140	TCP	54	56582-80 [ACK] Seq=1 Ack=1 win=16616 Len=0
1447	3.74257700	208.92.53.140	10.4.253.236	TCP	60	80-56580 [SYN, ACK] Seq=0 Ack=1 win=5840 Len=0 MSS=1460

1716	4.13656100	10.4.253.236	208.117.229.187	HTTP	1066	GET /_utm.gif?utmwv=5.6.4&utms=2&utmh=516327578&utmhn=player.stream
1718	4.13752700	10.4.253.236	208.92.53.140	HTTP	774	GET /_players/stw/v2/GenericLiveVideo.swf?stamp=1354116642 HTTP/1.1
1722	4.13901100	208.117.229.187	10.4.253.236	HTTP	462	HTTP/1.1 200 OK (GIF89a)

(c) Snimite promet RTV SLO prilikom gledanja emisija na zahtjev. Proučite pakete protokola RTMP te utvrdite koji se kodeci koriste za audio, a koji za video tokove.

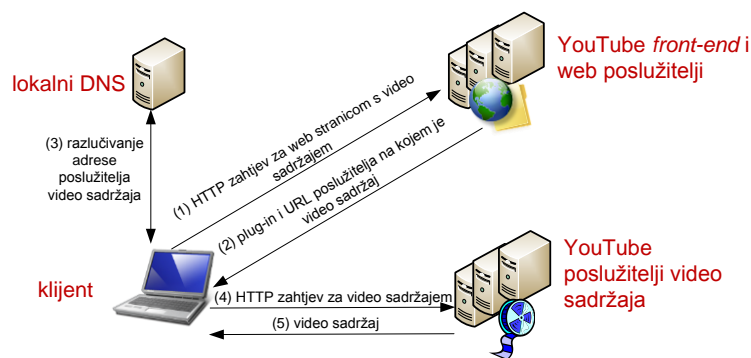
No.	Time	Source	Destination	Protocol	Length	Info
3066	9.77127900	10.4.4.155	239.255.255.250	SSDP	551	NOTIFY * HTTP/1.1
3067	9.77176500	fe80::7a:30a3:5a85:ff02::c		SSDP	580	NOTIFY * HTTP/1.1
3068	9.77310800	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=146155 Ack=3613 win=23360 Len=1460
3069	9.77425900	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=147615 Ack=3613 win=23360 Len=1460
3070	9.77431400	10.4.253.236	94.103.65.137	TCP	54	56826-1935 [ACK] Seq=3613 Ack=149075 win=16384 Len=0
3071	9.77550000	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=149075 Ack=3613 win=23360 Len=1460
3072	9.77672000	94.103.65.137	10.4.253.236	RTMP	1514	Video Data Audio Data
3073	9.77678100	10.4.253.236	94.103.65.137	TCP	54	56826-1935 [ACK] Seq=3613 Ack=151995 win=16384 Len=0
3074	9.77794800	94.103.65.137	10.4.253.236	RTMP	1514	Audio Data
3075	9.77929400	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=153455 Ack=3613 win=23360 Len=1460
3076	9.77935600	10.4.253.236	94.103.65.137	TCP	54	56826-1935 [ACK] Seq=3613 Ack=154915 win=16384 Len=0
3077	9.78042900	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=154915 Ack=3613 win=23360 Len=1460
3078	9.78188000	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=156375 Ack=3613 win=23360 Len=1460
3079	9.78194400	10.4.253.236	94.103.65.137	TCP	54	56826-1935 [ACK] Seq=3613 Ack=157835 win=16384 Len=0
3080	9.78287500	94.103.65.137	10.4.253.236	RTMP	1514	unknown (0x0)
3081	9.78411000	94.103.65.137	10.4.253.236	RTMP	1514	[Malformed Packet]
3082	9.78419400	10.4.253.236	94.103.65.137	TCP	54	56826-1935 [ACK] Seq=3613 Ack=160755 win=16384 Len=0
3083	9.78455000	10.4.253.236	54.86.179.3	TCP	54	56824-80 [ACK] Seq=724 Ack=245 win=16372 Len=0
3084	9.78531800	94.103.65.137	10.4.253.236	TCP	1514	1935-56826 [ACK] Seq=160755 Ack=3613 win=23360 Len=1460

Audio kodek: HE-AAC, video kodek: H.264

```
RTMP Body
  Control: 0x27 (inter-frame H.264)
    0010 .... = Type: inter-frame (2)
    .... 0111 = Format: H.264 (7)
    video data: 0100002800007b4c419a0c3860236dffe44110788dbb27f6...

RTMP Body
  Control: 0xaf (HE-AAC 44 kHz 16 bit stereo)
    1010 .... = Format: HE-AAC (10)
    .... 11.. = Sample rate: 44 kHz (3)
    .... ..1. = Sample size: 16 bit (1)
    .... ...1 = Channels: stereo (1)
    audio data: 01211a14addd8342b330682c351805d2e92e974f18f6b555...
```

- (2) Preuzmite datoteku sa snimljenim prometom nastalim prilikom pristupa usluzi YouTube i otvorite je u alatu Wireshark. Prisjetite se slike s predavanja gdje je prikazana pojednostavljena slika pristupa:



Odgovorite na sljedeća pitanja:

- (a) Pronađite *YouTube ID* video sadržaja koji je zatražen (*YouTube ID* je oznaka videa koja se sastoji od velikih i malih slova te znamenaka, a može se pročitati iz URI-a videa kao vrijednost parametra *v* koja slijedi nakon <http://www.youtube.com/watch?v=>)

YcZ5w6e9t5s

141	8.012377	fe80::2104:1011:e20ff02::c	SSDP	208	M-SEARCH * HTTP/1.1
144	9.611502	192.168.1.65	173.194.70.93	HTTP	108 GET /watch?v=YcZ5w6e9t5s&feature=g-logo HTTP/1.1
180	10.022644	173.194.70.93	192.168.1.65	HTTP	271 HTTP/1.1 200 OK (text/html)

- (b) Koja je IP-adresa *front-end* web poslužitelja na kojem se korisnik inicijalno spojio? Priložite prikaz snimljenog prometa iz alata *Wireshark* gdje se vidi slanje inicijalnog zahtjeva.

173.194.70.93

10	5.481687	192.168.1.65	173.194.70.93	TCP	54 64042-80 [ACK] Seq=...
11	5.481816	192.168.1.65	173.194.70.93	HTTP	1440 GET / HTTP/1.1
12	5.523996	173.194.70.93	192.168.1.65	TCP	54 80-64042 [ACK] Seq=...

- (c) Koja je IP-adresa poslužitelja na kojem se nalazi sam video sadržaj (faza gledanja prije promjene kvalitete)? Priložite prikaz snimljenog prometa gdje se vidi postupno preuzimanje sadržaja s navedenog poslužitelja.

208.117.229.178

195	10.087000	192.168.1.65	208.117.229.178	HTTP	95	GET	/crossdomain.xml	HTTP/1.1
199	10.088019	192.168.1.65	208.117.229.178	HTTP	545	GET	/generate_204?upn=qh4_sDI-_w	
212	10.114953	192.168.1.65	173.194.70.91	HTTP	435	GET	/gen_204?attributionpartner=	

340	12.169822	208.117.229.178	192.168.1.65	HTTP	605	HTTP/1.1	200 OK (text/x-cross-domain-policy)	
342	12.173989	192.168.1.65	208.117.229.178	HTTP	545	GET	/videoplayback?upn=qh4_sDI-_ws&burst=40&sparams=algorithm%2Cburst%2Ccp%2Cfactor%2Cid%2Cip%	
346	12.190610	192.168.1.65	173.194.70.118	HTTP	75	GET	/crossdomain.xml	HTTP/1.1
349	12.207361	173.194.70.93	192.168.1.65	HTTP	200	HTTP/1.1	304 Not Modified	
352	12.212458	192.168.1.65	173.194.70.93	HTTP	308	GET	/player_204?mt=0&ad_event=1&el=detailpage&sid=0&cid=12114&l_ns=2&event=ad&scoville=1&feat	
353	12.212633	173.194.70.138	192.168.1.65	HTTP	189	HTTP/1.1	304 Not Modified	
355	12.218472	192.168.1.65	173.194.70.138	HTTP	360	GET	/vi/qkGroxCs-Ns/2.jpg	HTTP/1.1
358	12.248176	173.194.70.118	192.168.1.65	HTTP	188	HTTP/1.1	304 Not Modified	
390	12.278008	192.168.1.65	173.194.70.118	HTTP	1494	GET	/feeds/api/videos/qkGroxCs-Ns?v=2	HTTP/1.1
401	12.284149	192.168.1.65	173.194.70.93	HTTP	132	GET	/tracking?ptk=Macbarbie07%2Buser&video_id=Ycz5w6e9t5s&pltype=content&plid=AAS_oudic20f_VM	
413	12.292131	173.194.70.138	192.168.1.65	HTTP	602	HTTP/1.1	200 OK (JPEG JFIF image)	
427	12.306554	173.194.70.93	192.168.1.65	HTTP	299	HTTP/1.1	204 No Content	
446	12.332650	173.194.64.120	192.168.1.65	HTTP	269	HTTP/1.1	204 No Content	
500	12.382927	173.194.70.93	192.168.1.65	HTTP	286	HTTP/1.1	204 No Content	
510	12.394210	173.194.70.157	192.168.1.65	HTTP	1130	HTTP/1.1	200 OK (text/html)	
610	12.481821	192.168.1.65	173.194.70.154	HTTP	351	GET	/simgad/3746832447989220686	HTTP/1.1
614	12.486715	173.194.70.118	192.168.1.65	HTTP/XM	284	HTTP/1.1	200 OK	
930	12.775845	173.194.70.154	192.168.1.65	HTTP	512	HTTP/1.1	200 OK (JPEG JFIF image)	
967	12.790126	192.168.1.65	173.194.70.101	HTTP	150	GET	/s?vid=okvx5G-1Zr0Y---pg8xHmFs8ii63hVbC&asv=3&fmt=34&ns=vt&el=detailpage&yttk=1&et=0.018&	

967	12.790126	192.168.1.65	173.194.70.101	HTTP	150	GET	/s?vid=okvx5G-1Zr0Y---pg8xHmFs8ii63hVbC&asv=3&fmt=34&ns=vt&el=detailpage&yttk=1&et=0.018&st=	
1005	12.841181	192.168.1.65	173.194.70.100	HTTP	891	GET	/s?screenh=768&playerw=768&sdetail=f%3Ag-Logo%2Cp%3A%2F&vq=auto&pd=1.980&playerh=468&mos=0&sc	
1035	12.866048	173.194.70.101	192.168.1.65	HTTP	466	HTTP/1.1	204 No Content	
1089	12.937617	173.194.70.100	192.168.1.65	HTTP	466	HTTP/1.1	204 No Content	
2169	14.012766	fe80::2104:1011:e20ff02::c		SSDP	208	M-SEARCH	* HTTP/1.1	
2360	14.182854	208.117.229.178	192.168.1.65	HTTP	714	HTTP/1.1	200 OK (video/x-flv)	
2363	14.284896	192.168.1.65	208.117.229.178	HTTP	550	GET	/videoplayback?itag=34&burst=40&expire=1336631128&key=ytI&ipbits=8&source=youtube&keepalive=y	
4237	16.176669	208.117.229.178	192.168.1.65	HTTP	210	HTTP/1.1	200 OK (video/x-flv)	
4239	16.202396	192.168.1.65	208.117.229.178	HTTP	550	GET	/videoplayback?algorithm=throttle-factor&cp=u0hss1Z0T19HUKNOM190SFNCOK16S9mU21NSEN&sparams=i	
6039	18.012674	fe80::2104:1011:e20ff02::c		SSDP	208	M-SEARCH	* HTTP/1.1	
6115	18.090794	208.117.229.178	192.168.1.65	HTTP	1234	HTTP/1.1	200 OK (video/x-flv)	
6117	18.116900	192.168.1.65	208.117.229.178	HTTP	550	GET	/videoplayback?algorithm=throttle-factor&cp=u0hss1Z0T19HUKNOM190SFNCOK16S9mU21NSEN&sparams=i	
7967	19.994408	208.117.229.178	192.168.1.65	HTTP	210	HTTP/1.1	200 OK (video/x-flv)	
7969	21.012628	fe80::2104:1011:e20ff02::c		SSDP	208	M-SEARCH	* HTTP/1.1	
7976	21.104474	192.168.1.65	208.117.229.172	HTTP	518	GET	/videoplayback?upn=qh4_sDI-_ws&sparams=cp%2Cid%2Cip%2Cipbits%2Citag%2Cratebypass%2Csource%2Cu	
8626	22.054544	199.47.218.151	192.168.1.65	HTTP	233	HTTP/1.1	200 OK (text/plain)	
8627	22.056039	192.168.1.65	199.47.218.151	HTTP	405	GET	/subscribe?host_int=77210816&ns_map=108915554_5914278882146_54004291_85953350211_54004708_1711	
9302	22.750870	192.168.1.65	173.194.70.100	HTTP	853	GET	/s?screenh=768&playerw=768&nsivbb1max=1097339.000&playerh=468&nsiabblc=72&vq=hd720&pd=-1.980&	
9411	22.849691	173.194.70.100	192.168.1.65	HTTP	466	HTTP/1.1	204 No Content	

(3) Pokrenite snimanje prometa u alatu Wireshark i u web-pregledniku otvorite poveznicu <http://www.iis.net/media/experiencesmoothstreaming> (po potrebi instalirajte i omogućite *Microsoft Silverlight*) te pokrenite demo koji se nalazi pri dnu stranice.

(a) U HTML-u navedene stranice pronađite dio koda kojim se u stranicu uključuje video preko tehnologije *Silverlight*. Navedite korištene tagove i ukratko ih opišite.

```
<nav id="breadcrumb"><p><a href="/home">Home</a><a href="/media">Media</a><span>Experience IIS Smooth Streaming</span></p></nav>
<div class="page">
<section class="col-article">
<article>
<header>
<h1>Experience IIS Smooth Streaming</h1></header>
<p>The Silverlight browser plug-in allows you to see the IIS Smooth Streaming player on this page. (If Silverlight is not installed, please install it when prompted.)
<p class="page-tip"><span><span class="icon icon-light">Light</span></span> <strong>Tip:</strong> Try the demo below, which helps demonstrate how <a href="http://www.iis.net/media/experiencesmoothstreaming">smooth streaming</a> works.
<h2>User Interface Key</h2>
<div class="col-equal">
<p><strong>Bit Rate Bar</strong> The Now Downloading Bitrate bar (top-right) displays the network connection's current throughput.</p>
<p><strong>Limit Bit Rate Slider</strong> The Limit Max Bitrate slider bar (top-right) allows you to emulate lower bandwidths, so that you can see how Smooth Streaming works at lower bandwidths.</p>
<p><strong>Frames Per Second</strong> The top-left graph displays the frames per second are being rendered, which is a reflection of both network throughput and video playback rate.</p>
<p><strong>Bit Rate Graph</strong> The lower left graph displays the available video bit rates, with the red line indicating the currently playing bit rate.</p>
</div>
<h2>Smooth Streaming Demo</h2>
<object id="SilverlightMediaPlayer" style="width:1138px;height:628px;" width="1138" height="628" type="application/x-silverlight-2">
<param name="MinRuntimeVersion" value="2.0.31005.0" />
<param name="Source" value="/ClientBin/mediaplayer/SmoothStreamingSamplePlayer.xap?msccore=cdnRequestId()" />
<param name="windowless" value="false" />
<param name="InitParams" value='fakemode=, background=#FF000000, autoload=False, autoplay=False, muted=False, stretchmode=0, playlist=<playlist></playlist>' />
</object>
</article>
</section>
</div>
```

<nav> – definira navigacijske veze u dokumentu

<div> – grupira blok elemente za formatiranje CSS-om

<section> – definira odjeljke u dokumentu (poglavlja, zaglavlja, podnožja..)

<article> – određuje nezavisan, samo-sadržan sadržaj

<header> – zaglavlje, predstavlja spremnik za uvodni sadržaj ili skup navigacijskih linkova

 – definira važan tekst

<object> – definira ugrađeni objekt unutar HTML dokumenta. Koristi se za ugradnju audia, videa, Java apleta, ActiveX, PDF i Flash-a.

<param> - koristi se za definiranje parametara za dodatke ugrađene s <object> oznakom

(b) U dijelu koda koji uključuje *Silverlight* u stranicu pronađite poveznicu na *metafile* (napomena: *metafile* je u formatu XML). Analizirajte *metafile* i odgovorite na pitanja

i. Koje su podržane rezolucije i brzine (*bitrate*) videa te od koliko se dijelova (*Chunks*) sastoji?

Podržane su rezolucije **1280x720, 1056x592, 848x480, 704x400, 576x320, 448x256, 368x208 i 320x176**. Podržane brzine su **2,75 Mbit/s, 2,04 Mbit/s, 1,52 Mbit/s, 1,13 Mbit/s, 845 kbit/s, 630 kbit/s, 470 kbit/s i 350 kbit/s**. Sastoji se od 299 dijelova.

ii. Koje su podržane brzine (*bitrate*) audia te od koliko se dijelova (*Chunks*) sastoji?

Podržana je samo brzina **64 kbit/s** i sastoji se od 299 dijelova.

(c) Graf u donjem lijevom dijelu videa pokazuje promjene brzine. Priložite graf koji ćete dobiti reprodukcijom videa (*screenshot*) ili skicirajte vlastiti graf s promjenama brzine u vremenu (min. 3 promjene). Za svaku promjenu priložite prvi redak zahtjeva (iz snimljenog prometa) iz kojih se vide tražena kvaliteta videa i audia.



1376	7.25749200	10.4.253.236	193.170.140.78	HTTP	713	GET /mediadl/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/QualityLevels(350000)/Fragments(video)
1401	7.28572000	10.4.253.236	193.170.140.78	HTTP	712	GET /mediadl/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/QualityLevels(64000)/Fragments(audio)
1693	7.60011600	10.4.253.236	193.170.140.78	HTTP	720	GET /mediadl/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/QualityLevels(845000)/Fragments(video)
1694	7.60130700	10.4.253.236	193.170.140.78	HTTP	719	GET /mediadl/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/QualityLevels(64000)/Fragments(audio)
2268	8.10809700	10.4.253.236	193.170.140.78	HTTP	720	GET /mediadl/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/QualityLevels(64000)/Fragments(audio)
2285	8.13039900	10.4.253.236	193.170.140.78	HTTP	721	GET /mediadl/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/QualityLevels(2040000)/Fragments(video)



10.4.253.236	193.170.140.78	HTTP	721 GET /mediad1/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/qualityLevels(64000)/Fragments(audio
10.4.253.236	193.170.140.78	HTTP	723 GET /mediad1/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/qualityLevels(2750000)/Fragments(vid



10.4.253.236	193.170.140.78	HTTP	721 GET /mediad1/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/qualityLevels(64000)/Fragments(audio
10.4.253.236	193.170.140.78	HTTP	723 GET /mediad1/iisnet/smoothmedia/Experience/BigBuckBunny_720p.ism/qualityLevels(2040000)/Fragments(vid

Rješenje domaće zadaće **pretvorite u format PDF** te predajte najkasnije do 25. svibnja 2015. (ponedjeljak) u 15.00 sati. Rješenje zadaće predaje se putem sustava *Moodle*.