

KOMUNIKASI DATA



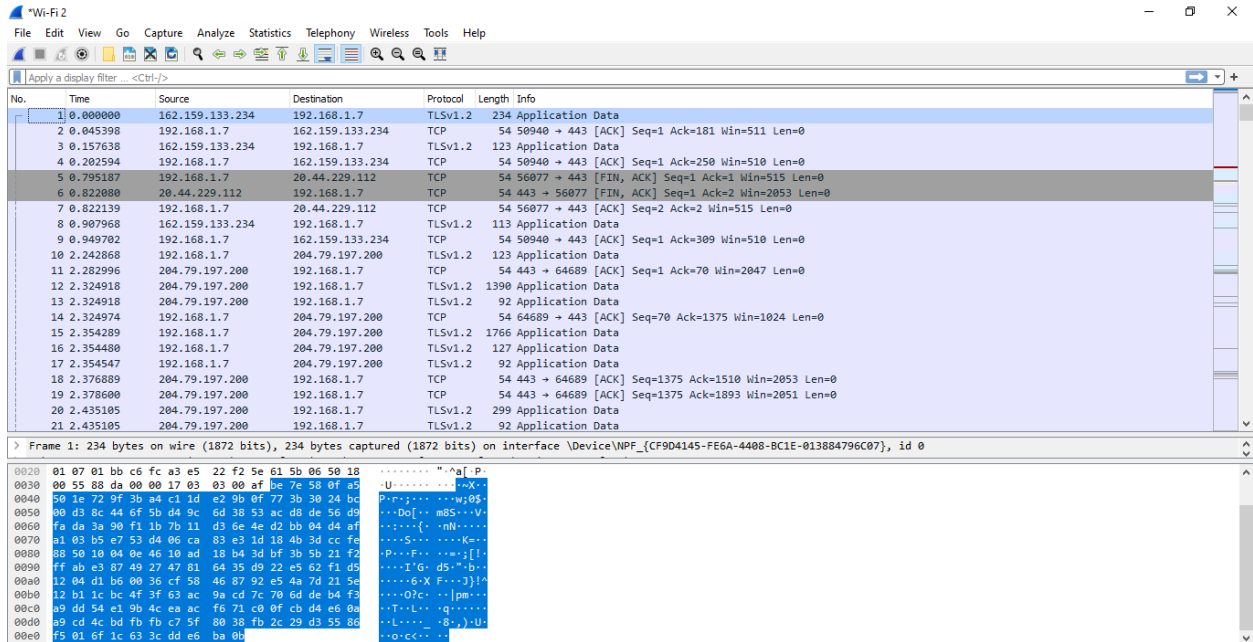
Dosen Pengampu
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JURUSAN SISTEM KOMPUTER
FAKULTAS ILMU KOMPUTER
UNIVERSITAS SRIWIJAYA

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1. Merekord jaringan pada wireshark sambil menjalan beberapa aplikasi



Pada proses ini saya menjalankan wireshark kurang lebih 10 menitn sambil membuka program seperti crome, Spotify dan epic games yang tersambung ker servernya sendiri dapat dilihat gambar di bawah ini wireshark mengrecord jaringan server yang tersambung

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.7	192.168.1.7	TLSv1.2	234	Application Data
2	0.045398	192.168.1.7	162.159.133.234	TCP	54	50940 → 443 [ACK] Seq=1 Ack=181 Win=511 Len=0
3	0.157638	162.159.133.234	192.168.1.7	TLSv1.2	123	Application Data
4	0.202594	192.168.1.7	162.159.133.234	TCP	54	50940 → 443 [ACK] Seq=1 Ack=250 Win=510 Len=0
5	0.795187	192.168.1.7	20.44.229.112	TCP	54	56077 → 443 [FIN, ACK] Seq=1 Ack=1 Win=515 Len=0
6	0.822880	20.44.229.112	192.168.1.7	TCP	54	443 → 56077 [FIN, ACK] Seq=1 Ack=2 Win=2053 Len=0
7	0.822139	192.168.1.7	20.44.229.112	TCP	54	56077 → 443 [ACK] Seq=2 Ack=2 Win=515 Len=0
8	0.907968	162.159.133.234	192.168.1.7	TLSv1.2	113	Application Data
9	0.949702	192.168.1.7	162.159.133.234	TCP	54	50940 → 443 [ACK] Seq=1 Ack=309 Win=510 Len=0
10	2.242868	192.168.1.7	204.79.197.200	TLSv1.2	123	Application Data
11	2.282996	204.79.197.200	192.168.1.7	TCP	54	443 → 64689 [ACK] Seq=1 Ack=70 Win=2047 Len=0
12	3.24918	204.79.197.200	192.168.1.7	TLSv1.2	1390	Application Data
13	3.24918	204.79.197.200	192.168.1.7	TLSv1.2	92	Application Data
14	3.24974	192.168.1.7	204.79.197.200	TCP	54	64689 → 443 [ACK] Seq=70 Ack=1375 Win=1024 Len=0
15	3.354289	192.168.1.7	204.79.197.200	TLSv1.2	1766	Application Data
16	3.354480	192.168.1.7	204.79.197.200	TLSv1.2	127	Application Data
17	3.354547	192.168.1.7	204.79.197.200	TLSv1.2	92	Application Data
18	3.376889	204.79.197.200	192.168.1.7	TCP	54	443 → 64689 [ACK] Seq=1375 Ack=1510 Win=2053 Len=0
19	3.378600	204.79.197.200	192.168.1.7	TCP	54	443 → 64689 [ACK] Seq=1375 Ack=1893 Win=2051 Len=0
20	2.435105	204.79.197.200	192.168.1.7	TLSv1.2	299	Application Data
21	2.435105	204.79.197.200	192.168.1.7	TLSv1.2	92	Application Data

No.	Time	Source	Destination	Protocol	Length	Info
101	5.805010	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	103	Standard query 0x5724 A spclient.wg.spotify.com
116	5.870355	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	571	Standard query response 0x5724 A spclient.wg.spotify.com CNAME edge-web.dual-gslb.spotify.com A 35.186.224...
117	5.883241	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	101	Standard query 0x423d A apresolve.spotify.com
128	5.944573	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	564	Standard query response 0x423d A apresolve.spotify.com A 34.98.74.57 NS ns-cloud-a1.googledomains.com NS ns...
136	5.972414	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	97	Standard query 0x0580 A t-ring.msedge.net
185	6.064367	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	232	Standard query response 0x0580 A t-ring.msedge.net CNAME t-ring-t-9999.t-msedge.net CNAME t-9999.t-msedge.n...
193	6.090080	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	99	Standard query 0x6c42 A ap-gae2.spotify.com
196	6.096700	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	562	Standard query response 0x6c42 A ap-gae2.spotify.com A 104.199.240.237 NS dns3.p07.nsone.net NS dns1.p07.ns...
198	6.102579	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	99	Standard query 0x0f8c A fp-vs.azureedge.net
199	6.109718	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	98	Standard query 0xcba2 A dealer.spotify.com
201	6.114258	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	414	Standard query response 0x0f8c A fp-vs.azureedge.net CNAME fp-vs.ec.azureedge.net CNAME cs9.wpc.vcdn.net A...
217	6.168781	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	565	Standard query response 0xcba2 A dealer.spotify.com CNAME global-dealer-ssl.spotify.com A 35.186.224.47 NS ...
235	6.182676	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	98	Standard query 0xca7e A login5.spotify.com
308	6.347192	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	566	Standard query response 0xca7e A login5.spotify.com CNAME edge-web.dual-gslb.spotify.com A 35.186.224.25 NS...
310	6.349594	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	103	Standard query 0xb414 A spclient.wg.spotify.com
720	8.222612	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	119	Standard query response 0xb414 A spclient.wg.spotify.com A 35.186.224.25
723	8.241036	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	105	Standard query 0x390d A gae2-spclient.spotify.com
735	8.296100	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	550	Standard query response 0x390d A gae2-spclient.spotify.com CNAME edge-web-gae2.dual-gslb.spotify.com A 35.1...
736	8.311436	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	103	Standard query 0xea2b A gae2-dealer.spotify.com
768	8.492822	fe80::e43e:34fc:dbf::fe80::1	fe80::e43e:34fc:dbf::fe80::1	DNS	568	Standard query response 0xea2b A gae2-dealer.spotify.com CNAME gae2-dealer-ssl.spotify.com A 35.186.224.39 ...

Selain itu saya juga melakukan perhitungan throughput, packet loss, jitter, dan delay. Untuk hasil dan gambar unuk pencarian throughput, packet loss dan jitter dapat dilihat pada halaman selanjutnya.

Mencari Throughput, Packet Loss, Jitter dan Delay

Buka hasil statistic dari record pada wireshark tadi

Statistics

Measurement	Captured	Displayed	Marked
Packets	82353	102 (0.1%)	—
Time span, s	367.995	308.663	—
Average pps	223.8	0.3	—
Average packet size, B	768	272	—
Bytes	63286203	27701 (0.0%)	0
Average bytes/s	171 k	89	—
Average bits/s	1375 k	717	—

Ini adalah hasil statistic dari record wireshark yang saya lakukan, terdapat 82535 paket yang diproses dengan jarak waktu 367995 detik atau bisa dibilang 6 menit. Untuk mencari thouhtput dilakukan dengan jumlah bytes data yang dibagi dengan time span kemudian hasilnya dikalikan dengan 8 bit.

Yang artinya 717 Kb/s

No.	Time	Source	Destination	Protocol	Length	Info
743	8.348420	35.186.224.39	192.168.1.7	TCP	635	[TCP Previous segment not captured] 443 → 64713 [PSH, ACK] Seq=2861 Ack=518 Win=66816 Len=581 [TCP segment of a reassembled P...
747	8.370558	35.186.224.25	192.168.1.7	TLSv1.3	161	[TCP Previous segment not captured], Continuation Data
790	8.572101	35.186.224.25	192.168.1.7	TCP	644	[TCP Previous segment not captured] 443 → 64714 [PSH, ACK] Seq=2861 Ack=518 Win=66816 Len=590 [TCP segment of a reassembled P...
865	8.798649	35.186.224.25	192.168.1.7	TLSv1.3	93	[TCP Previous segment not captured], Application Data
919	8.901330	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
958	8.951049	74.125.130.132	192.168.1.7	TCP	298	[TCP Previous segment not captured] 443 → 64716 [PSH, ACK] Seq=4291 Ack=518 Win=66816 Len=244 [TCP segment of a reassembled P...
1036	9.094458	74.125.130.132	192.168.1.7	TLSv1.3	85	[TCP Previous segment not captured], Application Data
1128	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Application Data
1129	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	393	[TCP Previous segment not captured], Application Data, Application Data
1132	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
1135	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
1152	9.290303	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
1842	35.712455	35.186.224.25	192.168.1.7	TLSv1.3	93	[TCP Previous segment not captured], Application Data
9690	268.849212	204.79.197.222	192.168.1.7	TLSv1.2	504	[TCP Previous segment not captured], Ignored Unknown Record
9710	269.284355	204.79.197.222	192.168.1.7	TLSv1.2	123	[TCP Previous segment not captured], Application Data
9729	269.642040	18.214.44.229	192.168.1.7	TCP	1506	[TCP Previous segment not captured] 443 → 65334 [ACK] Seq=2905 Ack=518 Win=28160 Len=1452
9818	272.018860	204.246.164.66	192.168.1.7	TLSv1.3	177	[TCP Previous segment not captured], Continuation Data
9934	272.260376	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation
9935	272.260376	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation
9940	272.261745	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation
9944	272.263228	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation

Pada gambar diatas ada 102 paket loss dari 82535 paket sehingg untuk mencari persentesnya adalah $(102 \times 100\%) / 82535$ yang hasilnya adalah 0,012%.

Untuk jitter dan delay cara mencarinya dengan mengeksporst hasil record wireshark menjadi file CSV
Seperti pada gambar dibawah ini

No.	Time	Source	Destination	Protocol	Length	Info
743	8.348420	35.186.224.39	192.168.1.7	TCP	635	[TCP Previous segment not captured] 443 → 64713 [PSH, ACK] Seq=2861 Ack=518 Win=66816 Len=581 [TCP segment of a reassembled P...
747	8.370558	35.186.224.25	192.168.1.7	TLSv1.3	161	[TCP Previous segment not captured], Continuation Data
790	8.572101	35.186.224.25	192.168.1.7	TCP	644	[TCP Previous segment not captured] 443 → 64714 [PSH, ACK] Seq=2861 Ack=518 Win=66816 Len=590 [TCP segment of a reassembled P...
865	8.798649	35.186.224.25	192.168.1.7	TLSv1.3	93	[TCP Previous segment not captured], Application Data
919	8.901330	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
958	8.951049	74.125.130.132	192.168.1.7	TCP	298	[TCP Previous segment not captured] 443 → 64716 [PSH, ACK] Seq=4291 Ack=518 Win=66816 Len=244 [TCP segment of a reassembled P...
1036	9.094458	74.125.130.132	192.168.1.7	TLSv1.3	85	[TCP Previous segment not captured], Application Data
1128	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Application Data
1129	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	393	[TCP Previous segment not captured], Application Data, Application Data
1132	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
1135	9.286612	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
1152	9.290303	35.186.224.25	192.168.1.7	TLSv1.3	1484	[TCP Previous segment not captured], Continuation Data
1842	35.712455	35.186.224.25	192.168.1.7	TLSv1.3	93	[TCP Previous segment not captured], Application Data
9690	268.849212	204.79.197.222	192.168.1.7	TLSv1.2	504	[TCP Previous segment not captured], Ignored Unknown Record
9710	269.284355	204.79.197.222	192.168.1.7	TLSv1.2	123	[TCP Previous segment not captured], Application Data
9729	269.642040	18.214.44.229	192.168.1.7	TCP	1506	[TCP Previous segment not captured] 443 → 65334 [ACK] Seq=2905 Ack=518 Win=28160 Len=1452
9818	272.018860	204.246.164.66	192.168.1.7	TLSv1.3	177	[TCP Previous segment not captured], Continuation Data
9934	272.260376	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation
9935	272.260376	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation
9940	272.261745	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation
9944	272.263228	210.210.145.75	192.168.1.7	HTTP	1506	[TCP Previous segment not captured] Continuation

Clipboard		Font		Alignment		Number		Styles		Cells		Editing						
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	A	B	C	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
82338	82337	366,8061	366,8061				366,8061	366,806087	-0,33182814		4,54E-06	-0,33183721	-0,33184					
82339	82338	366,8061	366,8061				366,8061	366,806087	-0,33183267		4,54E-06	-0,331841746	-0,33185					
82340	82339	366,8061	366,8061				366,8061	366,806163	-0,33183721		4,54E-06	-0,331846281	-0,33185					
82341	82340	366,8062	366,8062				366,8062	366,806266	-0,33184175		4,54E-06	-0,331850817	-0,33186					
82342	82341	366,8063	366,8063				366,8063	366,806315	-0,33184628		4,54E-06	-0,331855353	-0,33186					
82343	82342	366,8063	366,8063				366,8063	366,845478	-0,33185082		4,54E-06	-0,331859889	-0,33186					
82344	82343	366,8455	366,8455				366,8455	366,845538	-0,33185535		4,54E-06	-0,331864424	-0,33187					
82345	82344	366,8455	366,8455				366,8455	366,932268	-0,33185989		4,54E-06	-0,33186896	-0,33187					
82346	82345	366,9323	366,9323				366,9323	366,9445	-0,33186442		4,54E-06	-0,331873496	-0,33188					
82347	82346	366,9445	366,9445				366,9445	366,989598	-0,33186896		4,54E-06	-0,331878031	-0,33188					
82348	82347	366,9896	366,9896				366,9896	367,014594	-0,3318735		4,54E-06	-0,331882567	-0,33189					
82349	82348	367,0146	367,0146				367,0146	367,056308	-0,33187803		4,54E-06	-0,331887103	-0,33189					
82350	82349	367,0563	367,0563				367,0563	367,444805	-0,33188257		4,54E-06	-0,331891638	-0,3319					
82351	82350	367,4448	367,4448				367,4448	367,964247	-0,3318871		4,54E-06	-0,331896174	-0,3319					
82352	82351	367,9642	367,9642				367,9642	367,994731	-0,33189164									
82353	82352	367,9947	367,9947				367,9947	367,994797	-0,33189617									
82354	82353	367,9948	367,9948															
82355																		
82356								Total Delay	-11952,2711			Total Jitter	-11952,8					
82357								Rata - rata Delay	-0,14513638			Rata - rata Jitter	-0,14514					
82358																		
82359																		
82360																		

Activate Windows

Mencar Delay sendiri adalah dengan pengurangan, yaitu waktu pertama dibagi waktu kedua kemudian ditotalkan, untuk rata ratanya dibagi 82532. Untuk jitter sendiri juga sama namun yang dikurangi adalah delay kedua dikurang delay pertama kemudian ditotalkan, untuk rata rata jitter dibagi dengan 82352 karena pada jitter total data berkurang 1.

Dan pada gambar dibawah ini adalah proses komunikasi datanya

```

✓ Transmission Control Protocol, Src Port: 443, Dst Port: 50940, Seq: 1, Ack: 1, Len: 180
  Source Port: 443
  Destination Port: 50940
  [Stream index: 0]
  [Conversation completeness: Incomplete (12)]
  [TCP Segment Len: 180]
  Sequence Number: 1 (relative sequence number)
  Sequence Number (raw): 2749702898
  [Next Sequence Number: 181 (relative sequence number)]
  Acknowledgment Number: 1 (relative ack number)
  Acknowledgment number (raw): 1583438598
  0101 .... = Header Length: 20 bytes (5)
  > Flags: 0x018 (PSH, ACK)
  Window: 85

```

Yang dimana port menjadi pembeda dalam proses transportasi data.

Link Rpository Github : https://github.com/bayuakbarpebrian/Komunikasi_Data