

# Assignment M-4

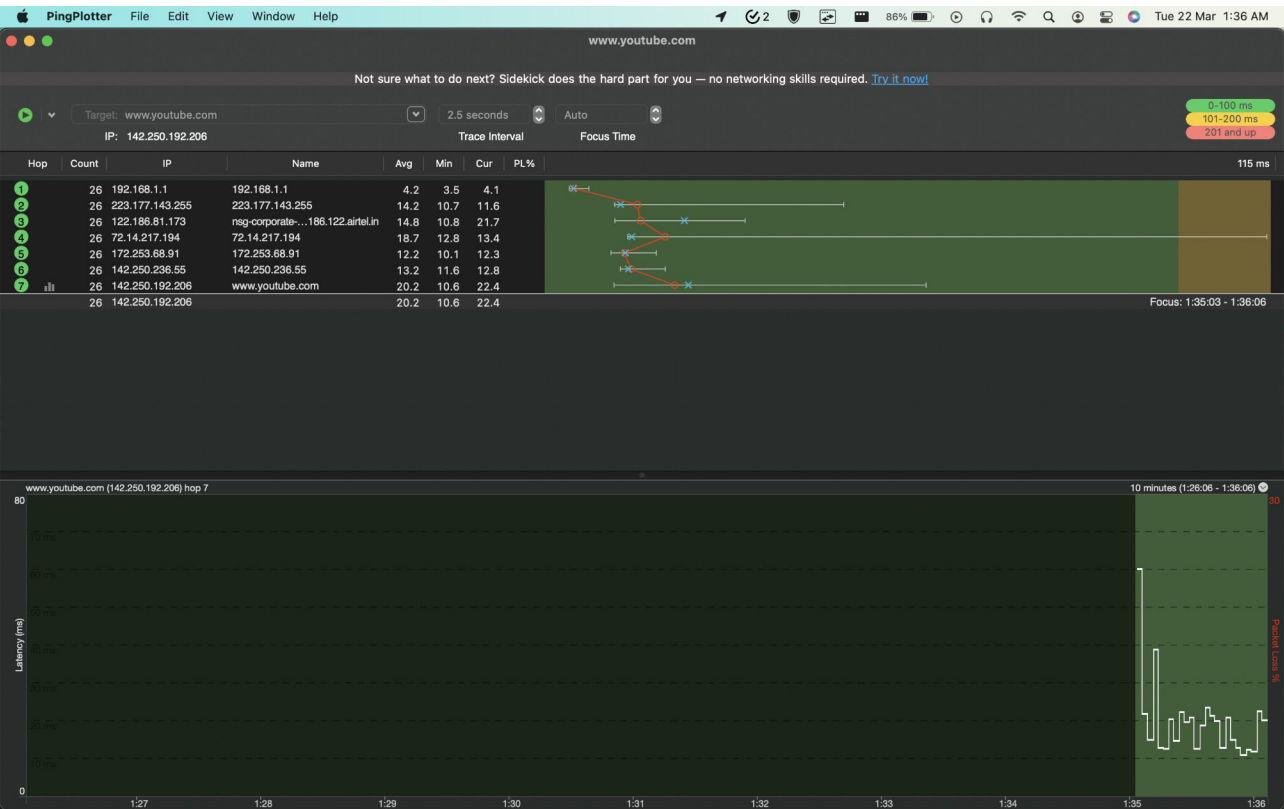
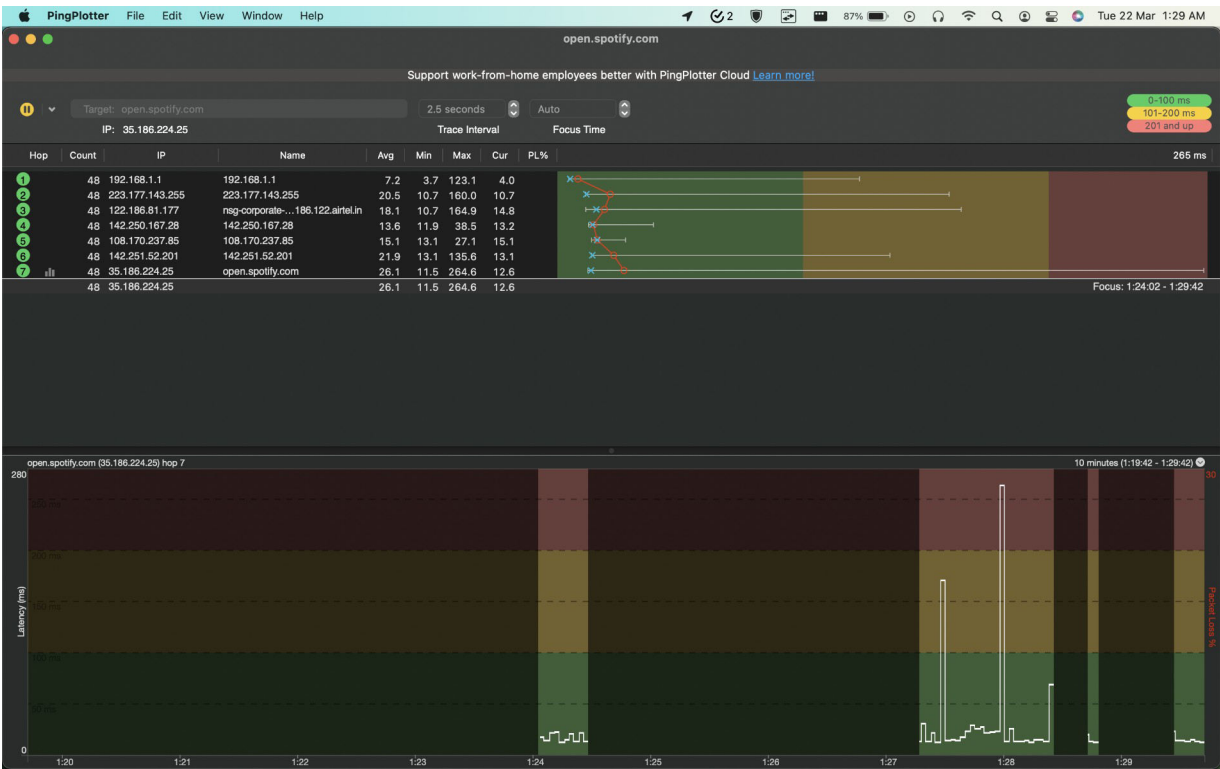
Anushthan Saxena

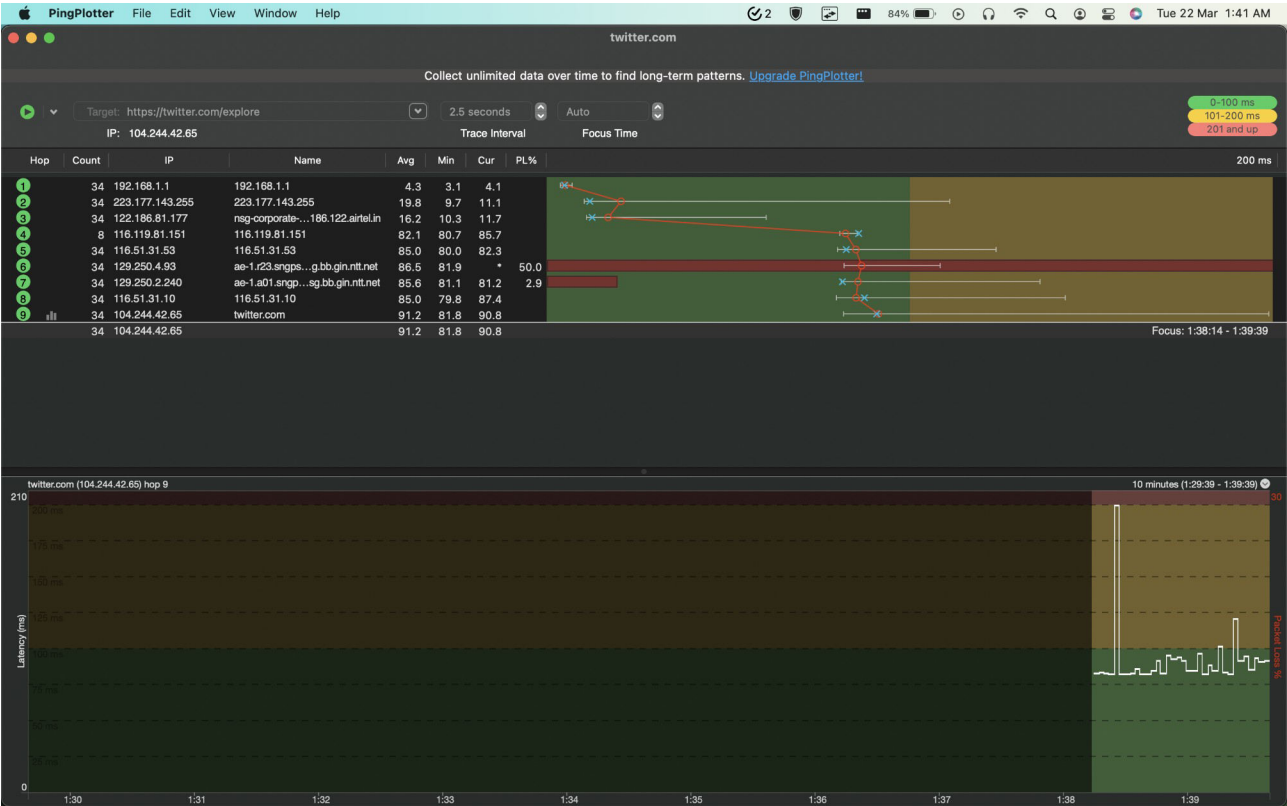
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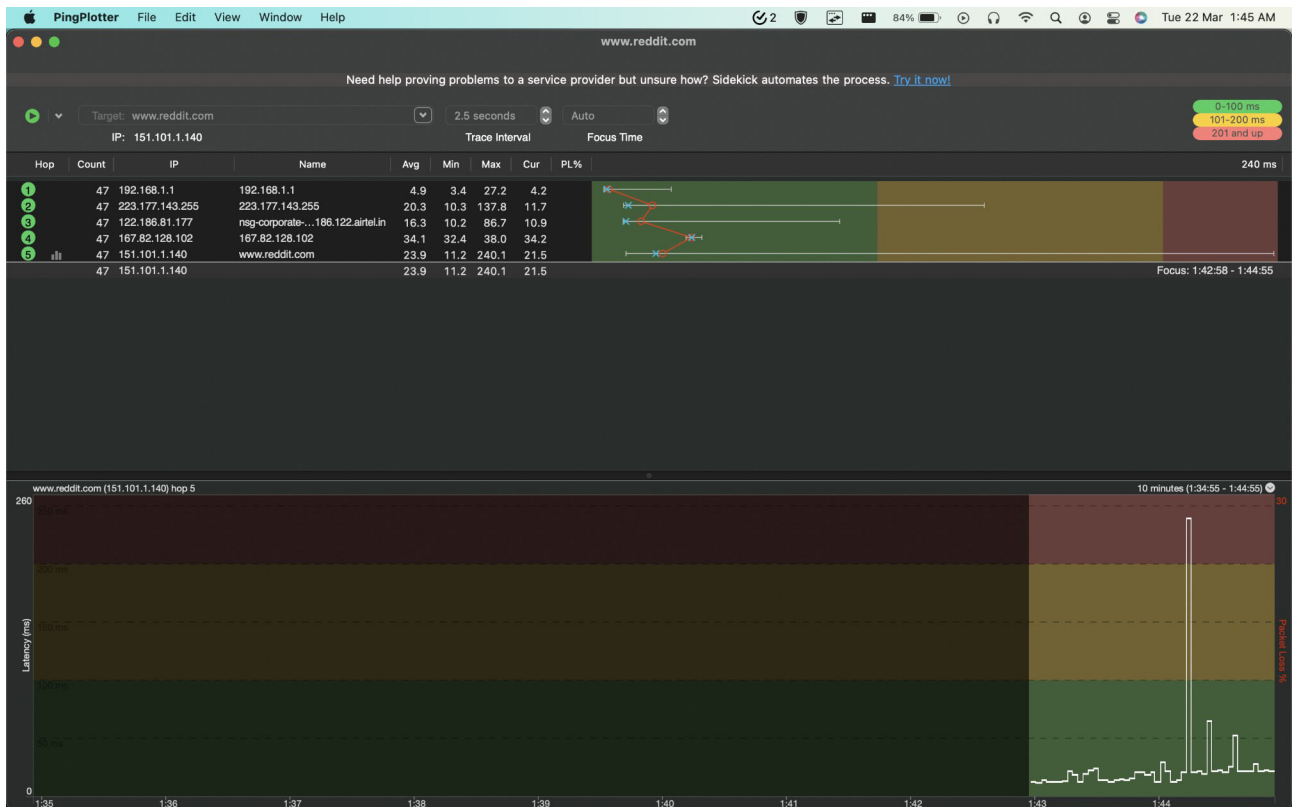
OCW B2

Q1. Use the Ping plotter tool and make ping requests to any 4 known websites. Make a table, ranking them in a ascending order as per their ping response time.

SNo	Website Name	IP address	Number of hops	Average Round Trip time	Packet loss	Max delay	Min delay	Rank
1.	Spotify	35.186.224.25	7	16.5	28%	264.6	11.5	4
2.	Youtube	142.250.192.206	7	20.2	14%	60.3	10.6	1
3.	Twitter	104.244.42.65	9	91.2	46%	199.8	81.8	2
4.	Reddit	151.101.1.140	5	23.9	12%	240.1	11.2	3







Q2. Use Wireshark packet sniffer and capture your Wi-Fi and Bluetooth interfaces. Open a web browser in your laptop and open three tabs of different websites ( Ex: IIITS website, Youtube and online banking). Pair one Bluetooth device to your Laptop.

- Apply filters to capture Bluetooth and make a screenshot of the transactions.
- Apply filters to capture the three applications running on the browser.

a)

Wireshark interface showing a packet capture from Loopback: lo0. The capture is filtered by 'Apply a display filter ... <filter>'. The packet list shows 11 packets, including DNS queries and SSDP M-SEARCH messages. The packet details pane shows the structure of the first packet (Frame 1: 364 bytes on wire (2912 bits), 364 bytes captured (2912 bits) on interface lo0, id 0). The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	224.0.0.251	MDNS	364	Standard query 0x0000 PTR lb._dns-sd._udp.local, "QM" question PTR _airport._tcp.local, "QM" question ...
2	0.000185	fe80::1	ff02::fb	MDNS	384	Standard query 0x0000 PTR lb._dns-sd._udp.local, "QM" question PTR _airport._tcp.local, "QM" question ...
3	0.000186	fe80::a400:55ff:fe...	ff02::fb	MDNS	407	Standard query 0x0000 PTR lb._dns-sd._udp.local, "QM" question PTR _airport._tcp.local, "QM" question ...
4	0.000263	fe80::a400:55ff:fe...	ff02::fb	MDNS	413	Standard query 0x0000 PTR lb._dns-sd._udp.local, "QM" question PTR _airport._tcp.local, "QM" question ...
5	0.000319	192.168.1.5	224.0.0.251	MDNS	393	Standard query 0x0000 PTR lb._dns-sd._udp.local, "QM" question PTR _airport._tcp.local, "QM" question ...
6	0.000408	fe80::10e9:c219:10...	ff02::fb	MDNS	413	Standard query 0x0000 PTR lb._dns-sd._udp.local, "QM" question PTR _airport._tcp.local, "QM" question ...
7	3.885237	192.168.1.5	192.168.1.255	UDP	76	57621 → 57621 Len=44
8	4.619569	192.168.1.5	239.255.255.250	SSDP	202	M-SEARCH * HTTP/1.1
9	5.619208	192.168.1.5	239.255.255.250	SSDP	202	M-SEARCH * HTTP/1.1
10	6.620378	192.168.1.5	239.255.255.250	SSDP	202	M-SEARCH * HTTP/1.1
11	7.621475	192.168.1.5	239.255.255.250	SSDP	202	M-SEARCH * HTTP/1.1

> Frame 1: 364 bytes on wire (2912 bits), 364 bytes captured (2912 bits) on interface lo0, id 0  
> Null/Loopback  
> Internet Protocol Version 4, Src: 127.0.0.1, Dst: 224.0.0.251  
> User Datagram Protocol, Src Port: 5353, Dst Port: 5353  
> Multicast Domain Name System (query)

0000 02 00 00 00 45 00 01 68 68 f9 00 00 ff 11 f1 8e ....E..h.....  
0010 7f 00 00 01 e0 00 00 fb 14 e9 14 e9 01 54 61 62 .....Tab.....  
0020 00 00 00 00 12 00 00 00 00 00 00 00 02 6c 62 07 .....lb.....  
0030 5f 64 6e 73 2d 73 64 04 5f 75 64 70 05 6c 6f 63 \_dns-sd.\_udp.loc  
0040 61 6c 00 00 0c 00 01 08 5f 61 69 72 70 6f 72 74 al.....airport  
0050 04 5f 74 63 70 c0 1c 00 0c 00 01 07 5f 72 64 6c \_tcp.....rdl  
0060 69 6e 6b c0 30 00 0c 00 01 08 5f 68 6f 6d 65 6b lnk.0....honek  
0070 69 74 c0 30 00 0c 00 01 06 5f 75 73 63 61 6e c0 it.0....uscan  
0080 30 00 0c 00 01 04 5f 69 70 70 c0 30 00 0c 00 01 0.....i pp.0....  
0090 07 5f 69 70 70 75 73 62 c0 30 00 0c 00 01 08 5f \_ippusb.0.....  
00a0 73 63 61 6e 6e 65 72 c0 30 00 0c 00 01 04 5f 70 scanner.0.....p  
00b0 74 70 c0 30 00 0c 00 01 0f 5f 70 64 6c 2d 64 61 tp.0....\_pdl-da  
00c0 74 61 73 74 72 65 61 6d c0 30 00 0c 00 01 07 5f testream.0.....  
00d0 75 73 63 61 6e 73 c0 30 00 0c 00 01 08 5f 70 72 uscans.0.....pr  
00e0 69 6e 74 65 72 c0 30 00 0c 00 01 05 5f 69 70 70 inter.0....\_ipp  
00f0 73 c0 30 00 0c 00 01 0d 5f 61 70 70 6c 65 2d 6d s.0.....apple-m

b)

Wireshark interface showing a packet capture on interface en0. The packet list displays several TCP and TLSv1.2 packets. The selected packet (No. 642) is a TCP Reset (RST) packet from 192.168.1.5 to 172.217.166.206, Seq=1, Win=0, Len=0. The packet details pane shows the Ethernet II, Internet Protocol Version 4, and Transmission Control Protocol (RST) fields. The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
637	11.128966	142.250.193.4	192.168.1.5	TLSv1.2	674	Application Data, Application Data
638	11.129015	192.168.1.5	142.250.193.4	TCP	66	51937 → 443 [ACK] Seq=1007 Ack=4899 Win=130432 Len=0 TSval=207344129 TSecr=1740200775
639	11.129317	192.168.1.5	142.250.193.4	TLSv1.2	97	Application Data
640	11.129369	142.250.193.4	192.168.1.5	TLSv1.2	97	Application Data
641	11.129411	192.168.1.5	142.250.193.4	TCP	66	51937 → 443 [ACK] Seq=1038 Ack=4930 Win=131008 Len=0 TSval=207344129 TSecr=1740200776
642	11.140717	142.250.193.4	192.168.1.5	TCP	78	[TCP Dup ACK 635#1] 443 → 51937 [ACK] Seq=4930 Ack=1007 Win=68864 Len=0 TSval=1740200787 TSecr=207344129
643	11.141976	142.250.193.4	192.168.1.5	TCP	66	443 → 51937 [ACK] Seq=4930 Ack=1038 Win=68864 Len=0 TSval=1740200788 TSecr=207344129
644	11.143814	192.168.1.5	142.250.193.4	TLSv1.2	101	Application Data
645	11.158138	142.250.193.4	192.168.1.5	TCP	66	443 → 51937 [ACK] Seq=4930 Ack=1073 Win=68864 Len=0 TSval=1740200803 TSecr=207344144
646	11.334609	192.168.1.5	172.217.166.206	TCP	78	51939 → 443 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 TSval=2013234961 TSecr=0 SACK_PERM=1
647	11.350730	192.168.1.5	1.1.1.1	DNS	78	Standard query 0xb9bf A auth.grammarly.com
648	11.367442	172.217.166.206	192.168.1.5	TCP	74	443 → 51939 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1430 SACK_PERM=1 TSval=3503582382 TSecr=2013234961
649	11.367556	192.168.1.5	172.217.166.206	TCP	66	51939 → 443 [ACK] Seq=1 Ack=1 Win=131840 Len=0 TSval=2013234994 TSecr=3503582382

> Frame 650: 583 bytes on wire (4664 bits), 583 bytes captured (4664 bits) on interface en0, id 0  
> Ethernet II, Src: Apple\_46:31:dd (50:ed:3c:46:31:dd), Dst: Serverco\_00:e7:88 (8c:a3:99:00:e7:88)  
> Internet Protocol Version 4, Src: 192.168.1.5, Dst: 172.217.166.206  
> Transmission Control Protocol, Src Port: 51939, Dst Port: 443, Seq: 1, Ack: 1, Len: 517  
> Transport Layer Security

0000 8c a3 99 00 e7 88 50 ed 3c 46 31 dd 08 00 45 00 .....P. <F1...E-  
0010 02 39 00 00 40 00 40 06 23 6a c0 a8 01 05 ac d9 .9..@.@.#j.....  
0020 a6 ce ca e3 01 bb 53 85 90 ed 23 29 ff 62 80 18 .....S...#).b.....  
0030 08 0c 84 94 00 00 01 01 08 0a 77 ff 87 32 d0 d4 .....w..2.....  
0040 6c ac 16 03 01 02 00 01 00 01 fc 03 03 be c9 ef l.....E.L.....  
0050 27 19 1b 60 cf 2e 45 0c 4c a6 df 25 1a f0 c4 c1 .....E.L.....  
0060 3d 2a 3c 18 d2 3a 60 36 46 b7 ba 06 ce 20 18 e1 ==<.: '6 F.....  
0070 d0 f7 10 2b 8b 5a 88 cd d9 25 cb aa cf e9 d9 9d ...+Z.....  
0080 5e 9b c5 01 19 eb 25 85 bb 01 b8 72 78 46 00 22 ^.....:pxF.."  
0090 13 01 13 03 13 02 c0 2b c0 2f cc a9 cc a8 c0 2c .....+./.....  
00a0 c0 30 c0 0a c0 09 c0 13 c0 14 00 9c 00 9d 00 2f .0.....+.....  
00b0 00 35 01 00 01 91 00 00 00 14 00 12 00 00 0f 77 .5.....w.....  
00c0 77 77 2e 79 6f 75 74 75 62 65 2e 63 6f 6d 00 17 ww.youtu.be.com...  
00d0 00 00 ff 01 00 01 00 00 0a 00 0e 00 0c 0d 00 .....  
00e0 17 00 18 00 19 01 00 01 01 00 0b 00 02 01 00 00 .....  
00f0 23 00 00 10 00 0e 00 0c 02 68 32 08 68 74 74 #.....h2 htt

Wireshark interface showing a packet capture on interface en0. The packet list displays a single packet (No. 650) which is a TLSv1.2 Client Hello packet from 192.168.1.5 to 172.217.166.206. The packet details pane shows the Ethernet II, Internet Protocol Version 4, and Transport Layer Security (Client Hello) fields. The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
650	11.368498	192.168.1.5	172.217.166.206	TLSv1.2	583	Client Hello

> Frame 650: 583 bytes on wire (4664 bits), 583 bytes captured (4664 bits) on interface en0, id 0  
> Ethernet II, Src: Apple\_46:31:dd (50:ed:3c:46:31:dd), Dst: Serverco\_00:e7:88 (8c:a3:99:00:e7:88)  
> Internet Protocol Version 4, Src: 192.168.1.5, Dst: 172.217.166.206  
> Transmission Control Protocol, Src Port: 51939, Dst Port: 443, Seq: 1, Ack: 1, Len: 517  
> Transport Layer Security

0000 8c a3 99 00 e7 88 50 ed 3c 46 31 dd 08 00 45 00 .....P. <F1...E-  
0010 02 39 00 00 40 00 40 06 23 6a c0 a8 01 05 ac d9 .9..@.@.#j.....  
0020 a6 ce ca e3 01 bb 53 85 90 ed 23 29 ff 62 80 18 .....S...#).b.....  
0030 08 0c 84 94 00 00 01 01 08 0a 77 ff 87 32 d0 d4 .....w..2.....  
0040 6c ac 16 03 01 02 00 01 00 01 fc 03 03 be c9 ef l.....E.L.....  
0050 27 19 1b 60 cf 2e 45 0c 4c a6 df 25 1a f0 c4 c1 .....E.L.....  
0060 3d 2a 3c 18 d2 3a 60 36 46 b7 ba 06 ce 20 18 e1 ==<.: '6 F.....  
0070 d0 f7 10 2b 8b 5a 88 cd d9 25 cb aa cf e9 d9 9d ...+Z.....  
0080 5e 9b c5 01 19 eb 25 85 bb 01 b8 72 78 46 00 22 ^.....:pxF.."  
0090 13 01 13 03 13 02 c0 2b c0 2f cc a9 cc a8 c0 2c .....+./.....  
00a0 c0 30 c0 0a c0 09 c0 13 c0 14 00 9c 00 9d 00 2f .0.....+.....  
00b0 00 35 01 00 01 91 00 00 00 14 00 12 00 00 0f 77 .5.....w.....  
00c0 77 77 2e 79 6f 75 74 75 62 65 2e 63 6f 6d 00 17 ww.youtu.be.com...  
00d0 00 00 ff 01 00 01 00 00 0a 00 0e 00 0c 0d 00 .....  
00e0 17 00 18 00 19 01 00 01 01 00 0b 00 02 01 00 00 .....  
00f0 23 00 00 10 00 0e 00 0c 02 68 32 08 68 74 74 #.....h2 htt



Wireshark interface showing a packet capture on Wi-Fi: en0. The filter is set to "tcp contains spotify". The packet list shows a series of TLS client hello messages from 192.168.1.5 to 35.186.224.25. The packet details pane shows the structure of a TLS client hello message, including the handshake\_extensions field. The packet bytes pane shows the raw data of the packet, with the handshake\_extensions field highlighted in blue.

No.	Time	Source	Destination	Protocol	Length	Info
3076	19.885818	192.168.1.5	35.186.224.25	TLSv1	583	Client Hello
3328	20.522218	192.168.1.5	34.98.74.57	TLSv1	583	Client Hello
3434	20.686617	192.168.1.5	35.186.224.39	TLSv1	583	Client Hello
3504	20.867561	192.168.1.5	35.186.224.25	TLSv1	583	Client Hello
4147	21.255826	192.168.1.5	35.186.224.13	TLSv1	583	Client Hello
4149	21.256910	192.168.1.5	35.186.224.13	TLSv1	583	Client Hello
4153	21.263136	192.168.1.5	35.186.224.25	TLSv1	583	Client Hello
4488	22.188850	192.168.1.5	35.186.224.25	TLSv1	583	Client Hello
5439	24.687545	192.168.1.5	199.232.22.249	TLSv1	583	Client Hello
5440	24.689436	192.168.1.5	199.232.22.249	TLSv1	583	Client Hello
5441	24.611308	192.168.1.5	199.232.22.249	TLSv1	583	Client Hello
5445	24.622320	199.232.22.249	192.168.1.5	TLSv1	1470	Server Hello
5451	24.623873	199.232.22.249	192.168.1.5	TLSv1	1470	Server Hello
5456	24.626336	199.232.22.249	192.168.1.5	TLSv1	1470	Server Hello

> Frame 3328: 583 bytes on wire (4664 bits), 583 bytes captured (4664 bits) on interface en0, id 0  
> Ethernet II, Src: Apple\_46:31:dd (50:ed:3c:46:31:dd), Dst: Serverco\_00:e7:88 (8c:a3:99:00:e7:88)  
> Internet Protocol Version 4, Src: 192.168.1.5, Dst: 34.98.74.57  
> Transmission Control Protocol, Src Port: 51995, Dst Port: 443, Seq: 1, Ack: 1, Len: 517  
> Transport Layer Security

0000 8c a3 99 00 e7 88 50 ed 3c 46 31 dd 08 00 45 00 .....P<F1...E.  
0010 02 39 00 00 40 00 40 06 0a 77 c0 a8 01 05 22 62 .9..@.@.w....b  
0020 4a 39 cb 1b 01 bb de 14 db 71 d6 79 ac 86 80 18 J9.....:q.y....  
0030 08 0e a7 bc 00 00 01 01 08 0a 93 f7 71 66 ec 56 .....:..qf.V  
0040 37 27 16 03 01 02 00 01 00 01 fc 03 21 b1 81 7.....:.....  
0050 4a 68 8d 5b b6 35 c1 71 1b 29 7d a8 16 3f 19 01 Jh[.5.q.)}..?..  
0060 04 f2 ea 5f 87 2d 04 20 e7 ad 35 4f 5f 20 7b 2c .....-..50\_{,  
0070 ad f7 5f ec 47 fd 32 f3 64 7f a8 25 cd e3 22 3b ...G.2.d.%\*.;  
0080 3c 40 32 1c 7b 02 2f 33 53 3a e7 1c 6b ca 00 22 <@2{f/3 S:~k...  
0090 13 01 13 03 13 02 c0 2b c0 2f cc a9 cc a8 c0 2c .....+./.....  
00a0 c0 30 c0 0a c0 09 c0 13 c0 14 00 9c 00 9d 00 2f .0.....:/.....  
00b0 00 35 01 00 01 91 00 00 00 1a 00 18 00 00 15 61 .5.....:.....  
00c0 70 72 65 73 6f 6c 76 65 2e 73 70 6f 74 69 66 79 presolve..spotify  
00d0 2e 63 6f 6d 00 17 00 00 ff 01 00 01 00 00 0a 00 .com.....  
00e0 0e 00 0c 0d 00 17 00 18 00 19 01 00 01 01 00 .....#.....  
00f0 0b 00 02 01 00 23 00 00 00 10 00 0e 00 0c 02 .....#.....

Bytes 191-211: Server Name (tls.handshake.extensions\_server\_name) Packets: 11044 - Displayed: 14 (0.1%) - Dropped: 0 (0.0%) Profile: Default

Wireshark interface showing a packet capture on Wi-Fi: en0. The filter is set to "tcp contains twitter". The packet list shows a single TLS client hello message from 192.168.1.5 to 104.244.42.193. The packet details pane shows the structure of a TLS client hello message, including the handshake\_extensions field. The packet bytes pane shows the raw data of the packet, with the handshake\_extensions field highlighted in blue.

No.	Time	Source	Destination	Protocol	Length	Info
1425	14.493342	192.168.1.5	104.244.42.193	TLSv1	583	Client Hello

> Frame 1425: 583 bytes on wire (4664 bits), 583 bytes captured (4664 bits) on interface en0, id 0  
> Ethernet II, Src: Apple\_46:31:dd (50:ed:3c:46:31:dd), Dst: Serverco\_00:e7:88 (8c:a3:99:00:e7:88)  
> Internet Protocol Version 4, Src: 192.168.1.5, Dst: 104.244.42.193  
> Transmission Control Protocol, Src Port: 51946, Dst Port: 443, Seq: 1, Ack: 1, Len: 517  
> Transport Layer Security

0000 8c a3 99 00 e7 88 50 ed 3c 46 31 dd 08 00 45 00 .....P<F1...E.  
0010 02 39 00 00 40 00 40 06 0a 77 c0 a8 01 05 22 62 .9..@.@.w....b  
0020 2a c1 ca ea 01 bb c4 d8 8f b2 28 fa e3 5c 80 18 \*.@.@.\.....h  
0030 08 10 c5 1c 00 00 01 01 08 0a b3 5c 63 68 38 92 .....:..\c'8..  
0040 be b9 16 03 01 02 00 01 00 01 fc 03 28 c7 08 .....:.....  
0050 87 26 7c da 15 ea 68 34 01 06 7b cb a4 32 05 7d .&|...h4...{.2..  
0060 71 59 09 de b2 be 0f 1d e8 e0 e6 f5 47 20 82 49 qY.....G..I  
0070 51 08 fe 7a 54 69 53 bb ef 10 f6 71 3c e0 12 17 Q..zTIS...qe...  
0080 94 05 5e 37 15 c7 85 94 b1 09 79 5f 54 9b 00 22 ..^7.....y.T...  
0090 13 01 13 03 13 02 c0 2b c0 2f cc a9 cc a8 c0 2c .....+./.....  
00a0 c0 30 c0 0a c0 09 c0 13 c0 14 00 9c 00 9d 00 2f .0.....:/.....  
00b0 00 35 01 00 01 91 00 00 00 10 00 0e 00 00 0b 74 .5.....:.....  
00c0 77 69 74 74 65 72 2e 63 6f 6d 00 17 00 00 ff 01 witter.com.....  
00d0 00 01 00 00 0a 00 0e 00 9c 00 1d 00 17 00 18 00 .....#.....  
00e0 19 01 00 01 01 00 0b 00 02 01 00 00 23 00 00 00 .....#.....  
00f0 10 00 0e 00 0c 02 68 32 08 68 74 74 70 2f 31 2e .....h2..http/1.

Bytes 191-201: Server Name (tls.handshake.extensions\_server\_name) Packets: 11044 - Displayed: 1 (0.0%) - Dropped: 0 (0.0%) Profile: Default

Wireshark File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Wi-Fi: en0

tcp contains livechart

No.	Time	Source	Destination	Protocol	Length	Info
6042	26.632790	192.168.1.5	104.26.14.112	TLSv1...	571	Client Hello
109...	33.515906	192.168.1.5	104.26.15.112	TLSv1...	571	Client Hello
109...	33.518735	192.168.1.5	104.26.15.112	TLSv1...	571	Client Hello
109...	33.521272	192.168.1.5	104.26.15.112	TLSv1...	571	Client Hello

> Frame 6042: 571 bytes on wire (4568 bits), 571 bytes captured (4568 bits) on interface en0, id 0  
> Ethernet II, Src: Apple\_46:31:dd (50:ed:3c:46:31:dd), Dst: Serverco\_00:e7:88 (8c:a3:99:00:e7:88)  
> Internet Protocol Version 4, Src: 192.168.1.5, Dst: 104.26.14.112  
> Transmission Control Protocol, Src Port: 52016, Dst Port: 443, Seq: 1, Ack: 1, Len: 517  
> Transport Layer Security

0000 8c a3 99 00 e7 88 50 ed 3c 46 31 dd 08 00 45 00 .....P<F1...E  
0010 02 2d 00 00 40 00 06 00 94 c0 a8 01 05 68 1a ...@.@.....h  
0020 0e 70 cb 30 01 bb 2c f6 0f 4e e9 a6 3d 50 50 18 p.0.,.N.-=PP  
0030 10 00 98 8a 00 00 16 03 01 02 00 01 00 01 fc 03 .....  
0040 03 4f af 3b 4d ad 6e 40 8c 59 03 b4 81 60 3d a0 .0.M.n0.Y...e  
0050 c9 63 a6 24 d7 e1 2c 73 26 31 34 6e 01 3a 2b c6 c.\$.,s 614n:+  
0060 7d 20 a9 58 03 e0 8d fb 3b c7 20 a3 57 d8 38 75 }X...:;W-8u  
0070 15 de 41 e7 0b e2 c3 ef 62 88 b9 ed 5b ec 26 51 ..A.....b...[6Q  
0080 17 94 00 22 13 01 13 03 13 02 c0 2b c0 2f cc a9 ...".....+./..  
0090 cc a8 c0 2c c0 30 c0 0a c0 09 c0 13 c0 14 00 9c ...0.....  
00a0 00 d0 00 2f 00 35 01 00 01 01 00 00 00 15 00 13 .../5.....  
00b0 00 00 10 77 77 77 2e 6c 69 76 65 63 68 61 72 74 ...www.l ivechart  
00c0 2e 6d 65 00 17 00 00 ff 01 00 01 00 00 0a 00 0e .me.....  
00d0 00 0c 00 1d 00 17 00 18 00 19 01 00 01 01 00 0b .....  
00e0 00 02 01 00 00 23 00 00 00 10 00 0e 00 0c 02 68 .....#.....h  
00f0 32 08 68 74 74 70 2f 31 2e 31 00 05 00 05 01 00 2.http/1 .1.....

Bytes 179-194: Server Name (tls.handshake.extensions\_server\_name)

Packets: 11044 · Displayed: 4 (0.0%) · Dropped: 0 (0.0%) Profile: Default