

hw6

1. a) $130-105=25$ bytes

b) 105

2. a

a) From time 0 to 6 and 23 to at least 26 but cut off. We know because the increase is exponential. It then switches to linear so it is no longer slow start

b) From time 6 to 16 and 17 to 22. In these intervals the packets sent increase linearly

c) Triple ACK because the window gets halved. It is TCP Reno so halving is done when Triple ACK

d) timeout because the window is set to 1. In both Reno and Tahoe you set to 1 on timeout

e) Looks like 32 because that is when it switches from exponential to linear

f) Looks like 21ish because once again it is linear from here on out. Also the ssthresh is halved whenever a loss event occurs and in TCP Reno you half if you get a triple ACK so since the half was 21, that means the SStresh is too

g) Looks like 13 or so since the window was 26 when the event occurred so half would be 13.

h) 7. The first 6 are $1 + 2 + 4 + 8 + 16 + 32=63$. The 7th has size of 33 so that would bump this to 96 so the 70th packet is in the 7th round

i) 4 for both since loss at 8 packets sent, the ssthresh gets halved so 4.

3. a) This gets sent to 3 since it starts with 110 which doesn't match with any so goes to 3

b) This one goes to 2. The only one that fits is the prefix for 2. The prefix for 0 requires 0 for 8th bit so it won't work. Same with 1. 2 Works and 3 requires 1 for 9th bit which fails so 2

c) This one would be 3. There are two matches 2 and 3 but 3 is a longer match so it goes to 3

4. a) Forwarding and routing. Forwarding is taking the input and putting it on the right output port. This moves the packet in the same router. It is like getting in a lane to get out of the parking lot. Routing is figuring out how to get to the destination and where the packet will travel. This is like Google maps figuring out a route

b) In the header, there is a section called upper layer protocol which differentiates between TCP and UDP

c) If an application generates 40 bytes of data, there is 20 bytes for TCP and 20 for network layer header overhead so total of 80. 50% will be headers and 50% data

d) 4 fragments are generated. If you are trying to send 2400byte datagram then there is 2380 bytes of data. 700 is the max per so 4 segments are needed.

Packet 1: 680 bytes of data; Frag flag = 1; 0 offset flag

Packet 2: 680 bytes of data; Frag flag = 1; $680/8=85$ offset flag

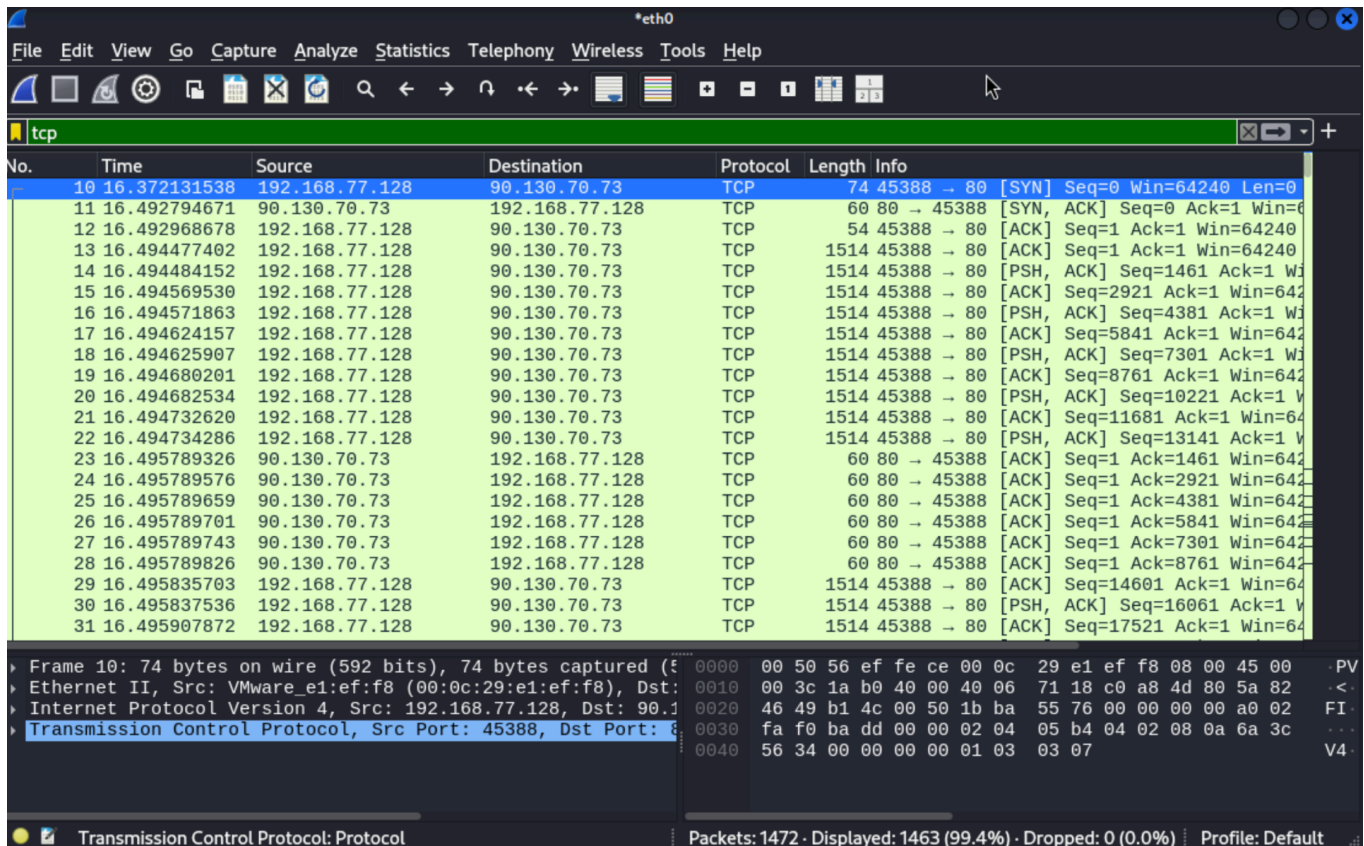
Packet 3: 680 bytes of data; Frag flag = 1; $680*2/8=170$ offset flag

Packet 4: 340 bytes of data; Frag flag = 0; $680 \times \frac{3}{8} = 255$ offset flag

The first 3 packets have total size 700 while the last has 360

All packets have ID of 422

Wireshark



- a. 192.168.77.128:45388
- b. 90.130.70.73:80
- c. The raw seq number is 465196406 with the relative being 0. The SYN flag in the TCP header is set to 1 in order to identify it as a SYN packet
- d. The relative ack is 1 with raw being 465196407. The relative syn is 0 and raw is 3758151152
- e. The relative seq is 1 with raw being 3758151153

No.	Time	Source	Destination	Protocol	Length	Info
10	16.372131538	192.168.77.128	90.130.70.73	TCP	74	45388 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM
11	16.492794671	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460
12	16.492968678	192.168.77.128	90.130.70.73	TCP	54	45388 → 80 [ACK] Seq=1 Ack=1 Win=64240 Len=0
13	16.494477402	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [ACK] Seq=1 Ack=1 Win=64240 Len=1460 [TCP PDU
14	16.494484152	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=1461 Ack=1 Win=64240 Len=1460
15	16.494569530	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [ACK] Seq=2921 Ack=1 Win=64240 Len=1460 [TCP P
16	16.494571863	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=4381 Ack=1 Win=64240 Len=1460
17	16.494624157	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [ACK] Seq=5841 Ack=1 Win=64240 Len=1460 [TCP P
18	16.494625907	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=7301 Ack=1 Win=64240 Len=1460
19	16.494680281	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [ACK] Seq=8761 Ack=1 Win=64240 Len=1460 [TCP P
20	16.494682534	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=10221 Ack=1 Win=64240 Len=1460
21	16.494732620	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [ACK] Seq=11681 Ack=1 Win=64240 Len=1460 [TCP
22	16.494734286	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=13141 Ack=1 Win=64240 Len=1460
23	16.495789326	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [ACK] Seq=1 Ack=1461 Win=64240 Len=0
24	16.495789576	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [ACK] Seq=1 Ack=2921 Win=64240 Len=0
25	16.495789659	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [ACK] Seq=1 Ack=4381 Win=64240 Len=0
26	16.495789701	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [ACK] Seq=1 Ack=5841 Win=64240 Len=0
27	16.495789743	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [ACK] Seq=1 Ack=7301 Win=64240 Len=0
28	16.495789826	90.130.70.73	192.168.77.128	TCP	60	80 → 45388 [ACK] Seq=1 Ack=8761 Win=64240 Len=0
29	16.495835703	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=14601 Ack=1 Win=64240 Len=1460 [TCP
30	16.495837536	192.168.77.128	90.130.70.73	TCP	1514	45388 → 80 [PSH, ACK] Seq=16061 Ack=1 Win=64240 Len=1460

0101 = Header Length: 20 bytes (5)	0000 00 50 56 ef fe ce 00 0c 29 e1 ef f8 08 00 45 00	PV.....).....E
Flags: 0x010 (ACK)	0010 05 dc 1a b2 40 00 40 06 6b 76 c0 a8 4d 80 5a 82	...@. kv. M. Z.
Window: 64240	0020 46 49 b1 4c 00 50 1b ba 55 77 e0 00 d5 f1 50 10	FI. L. P. Uw. . . . P.
[Calculated window size: 64240]	0030 fa f0 37 94 00 00 50 55 54 20 2f 75 70 6c 6f 61	..7.. PU T /uploa
[Window size scaling factor: -2 (no window scaling)]	0040 64 2e 70 68 70 20 48 54 54 50 2f 31 2e 31 0d 0a	d.php HT TP/1.1..
Checksum: 0x3794 [unverified]	0050 48 6f 73 74 3a 20 73 70 65 65 64 74 65 73 74 2e	Host: sp eedtest.
[Checksum Status: Unverified]	0060 74 65 6c 65 32 2e 6e 65 74 0d 0a 55 73 65 72 2d	tele2.ne t. User-
Urgent Pointer: 0	0070 41 67 65 6e 74 3a 20 63 75 72 6c 2f 38 2e 31 31	Agent: c url/8.11
[Timestamps]	0080 2e 30 0d 0a 41 63 63 65 70 74 3a 20 2a 2f 2a 0d	.0..Acce pt: /*.
[SEQ/ACK analysis]	0090 0a 43 6f 6e 74 65 6e 74 2d 4c 65 6e 67 74 68 3a	.Content -Length:
TCP payload (1460 bytes)	00a0 20 31 30 34 38 35 37 36 0d 0a 0d 0a 00 00 00 00	1048576
[Reassembled PDU in frame: 1433]	00b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
TCP segment data (1460 bytes)	00c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

f. The slow start is from the start till around .125. After that it seems like the max transmit peaks and there are no slopes that are larger. The vertical bars stay around that same height.

