

CS39006: Networks Laboratory

1. Source and Destination IP Addresses and Ports

Source & Destination

IP Address	
Server	127.0.0.1 (loopback address)
Client	
Port	
Server	5050 (set by user)
Client	56320 (allocated)

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	TCP	74	56320 → 5050 [SYN] Seq=0 Win=33280 Len=0 MSS=65495 SACK_PERM TSval=2751623612 TSecr=2751623612
2	0.000010480	127.0.0.1	127.0.0.1	TCP	74	5050 → 56320 [SYN, ACK] Seq=0 Ack=1 Win=33280 Len=0 MSS=65495 SACK_PERM TSval=2751623612 TSecr=2751623612
3	0.000020028	127.0.0.1	127.0.0.1	TCP	66	56320 → 5050 [ACK] Seq=1 Ack=1 Win=33280 Len=0 TSval=2751623612 TSecr=2751623612
4	3.327690248	127.0.0.1	127.0.0.1	TCP	86	56320 → 5050 [PSH, ACK] Seq=1 Ack=1 Win=33280 Len=20 TSval=2751626940 TSecr=2751626940
5	3.327707685	127.0.0.1	127.0.0.1	TCP	66	5050 → 56320 [ACK] Seq=1 Ack=21 Win=33280 Len=0 TSval=2751626940 TSecr=2751626940
6	3.327717137	127.0.0.1	127.0.0.1	TCP	73	56320 → 5050 [PSH, ACK] Seq=21 Ack=1 Win=33280 Len=7 TSval=2751626940 TSecr=2751626940
7	3.327719550	127.0.0.1	127.0.0.1	TCP	66	5050 → 56320 [ACK] Seq=1 Ack=28 Win=33280 Len=0 TSval=2751626940 TSecr=2751626940
8	3.327743405	127.0.0.1	127.0.0.1	TCP	86	56320 → 5050 [PSH, ACK] Seq=28 Ack=1 Win=33280 Len=20 TSval=2751626940 TSecr=2751626940
9	3.327750161	127.0.0.1	127.0.0.1	TCP	66	5050 → 56320 [ACK] Seq=1 Ack=48 Win=33280 Len=0 TSval=2751626940 TSecr=2751626940

Frame 4: 86 bytes on wire (688 bits), 86 bytes captured (688 bits)
 Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
 Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
 Transmission Control Protocol, Src Port: 56320, Dst Port: 5050, Seq: 1, Ack: 1, Len: 20
 Data (20 bytes)
 Data: 44454650525456574c4d5a41594748515349554a

2. Three-way handshake

SYN (client to server)

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	127.0.0.1	127.0.0.1	TCP	74	56320 → 5050 [SYN] Seq=0 W
2	0.000010480	127.0.0.1	127.0.0.1	TCP	74	5050 → 56320 [SYN, ACK] Se

Transmission Control Protocol, Src Port: 56320, Dst Port: 5050, Seq: 0, Len: 0

Source Port: 56320
Destination Port: 5050
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 2480130134
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 0
Acknowledgment number (raw): 0
1010 = Header Length: 40 bytes (10)

Flags: 0x002 (SYN)

000. = Reserved: Not set
...0 = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...0 = Acknowledgment: Not set
....0... = Push: Not set
....0.. = Reset: Not set
....1. = Syn: Set
[Expert Info (Chat/Sequence): Connection establish request (SYN): server port 5050]
....0 = Fin: Not set
[TCP Flags:S.]

SYN, ACK (server to client)

No.	Time	Source	Destination	Protocol	Length	Info
2	0.000010480	127.0.0.1	127.0.0.1	TCP	74	5050 → 56320 [SYN, ACK] Seq=
3	0.000020028	127.0.0.1	127.0.0.1	TCP	66	56320 → 5050 [ACK] Seq=1 Ack

Transmission Control Protocol, Src Port: 5050, Dst Port: 56320, Seq: 0, Ack: 1, Len: 0

Source Port: 5050
Destination Port: 56320
[Stream index: 0]
[Conversation completeness: Complete, WITH_DATA (31)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 1002129833
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 2480130135
1010 = Header Length: 40 bytes (10)

Flags: 0x012 (SYN, ACK)

000. = Reserved: Not set
...0 = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
....0... = Push: Not set
....0.. = Reset: Not set
....1. = Syn: Set
[Expert Info (Chat/Sequence): Connection establish acknowledge (SYN+ACK): server port 5050]
....0 = Fin: Not set
[TCP Flags:A..S.]

ACK (client to server)

No.	Time	Source	Destination	Protocol	Length	Info
3	0.000020028	127.0.0.1	127.0.0.1	TCP	66	56320 → 5050 [ACK] Seq=1
4	3.327690248	127.0.0.1	127.0.0.1	TCP	86	56320 → 5050 [PSH, ACK] Seq=1
Transmission Control Protocol, Src Port: 56320, Dst Port: 5050, Seq: 1, Ack: 1, Len: 0						
Source Port: 56320						
Destination Port: 5050						
[Stream index: 0]						
[Conversation completeness: Complete, WITH_DATA (31)]						
[TCP Segment Len: 0]						
Sequence Number: 1 (relative sequence number)						
Sequence Number (raw): 2480130135						
[Next Sequence Number: 1 (relative sequence number)]						
Acknowledgment Number: 1 (relative ack number)						
Acknowledgment number (raw): 1002129834						
1000 = Header Length: 32 bytes (8)						
Flags: 0x010 (ACK)						
000. = Reserved: Not set						
...0 = Accurate ECN: Not set						
.... 0... = Congestion Window Reduced: Not set						
.... .0.. = ECN-Echo: Not set						
.... ..0. = Urgent: Not set						
.... ...1 = Acknowledgment: Set						
.... 0... = Push: Not set						
....0.. = Reset: Not set						
....0. = Syn: Not set						
....0 = Fin: Not set						
[TCP Flags:A....]						

3. Connection Closure

FIN, ACK (client to server)

No.	Time	Source	Destination	Protocol	Length	Info
16	4.510324	127.0.0.1	127.0.0.1	TCP	67	56320 → 5050 [PSH, ACK] Seq=57 Ack=30
17	4.510342	127.0.0.1	127.0.0.1	TCP	66	56320 → 5050 [FIN, ACK] Seq=58 Ack=30
18	4.513789	127.0.0.1	127.0.0.1	TCP	66	[TCP Retransmission] 56320 → 5050 [FIN
19	4.513802	127.0.0.1	127.0.0.1	TCP	78	5050 → 56320 [ACK] Seq=30 Ack=59 Win=3

Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1

Transmission Control Protocol, Src Port: 56320, Dst Port: 5050, Seq: 58, Ack: 30, Len: 0

Source Port: 56320

Destination Port: 5050

[Stream index: 0]

[Conversation completeness: Complete, WITH_DATA (31)]

[TCP Segment Len: 0]

Sequence Number: 58 (relative sequence number)

Sequence Number (raw): 2480130192

[Next Sequence Number: 59 (relative sequence number)]

Acknowledgment Number: 30 (relative ack number)

Acknowledgment number (raw): 1002129863

1000 = Header Length: 32 bytes (8)

Flags: 0x011 (FIN, ACK)

000. = Reserved: Not set

...0 = Accurate ECN: Not set

... 0... = Congestion Window Reduced: Not set

.... 0... = ECN-Echo: Not set

.... ..0. = Urgent: Not set

.... ...1 = Acknowledgment: Set

.... 0... = Push: Not set

.... 0.. = Reset: Not set

....0. = Syn: Not set

....1 = Fin: Set

ACK (server to client)

No.	Time	Source	Destination	Protocol	Length	Info
19	4.513802	127.0.0.1	127.0.0.1	TCP	78	5050 → 56320 [ACK] Seq=30

Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1

Transmission Control Protocol, Src Port: 5050, Dst Port: 56320, Seq: 30, Ack: 59, Len: 0

Source Port: 5050

Destination Port: 56320

[Stream index: 0]

[Conversation completeness: Complete, WITH_DATA (31)]

[TCP Segment Len: 0]

Sequence Number: 30 (relative sequence number)

Sequence Number (raw): 1002129863

[Next Sequence Number: 30 (relative sequence number)]

Acknowledgment Number: 59 (relative ack number)

Acknowledgment number (raw): 2480130193

1011 = Header Length: 44 bytes (11)

Flags: 0x010 (ACK)

000. = Reserved: Not set

...0 = Accurate ECN: Not set

... 0... = Congestion Window Reduced: Not set

.... 0... = ECN-Echo: Not set

.... ..0. = Urgent: Not set

.... ...1 = Acknowledgment: Set

.... 0... = Push: Not set

.... 0.. = Reset: Not set

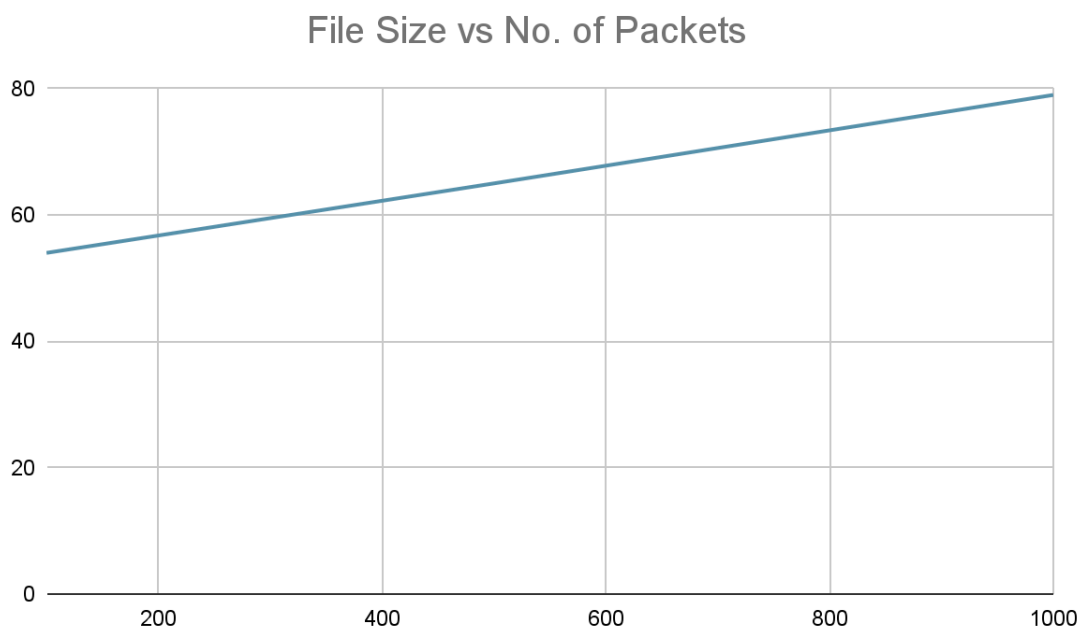
....0. = Syn: Not set

....0 = Fin: Not set

[TCP Flags:A.....]

4. Number of packets

File Size (in bytes)	No. of Packets
100	54
500	65
1000	79

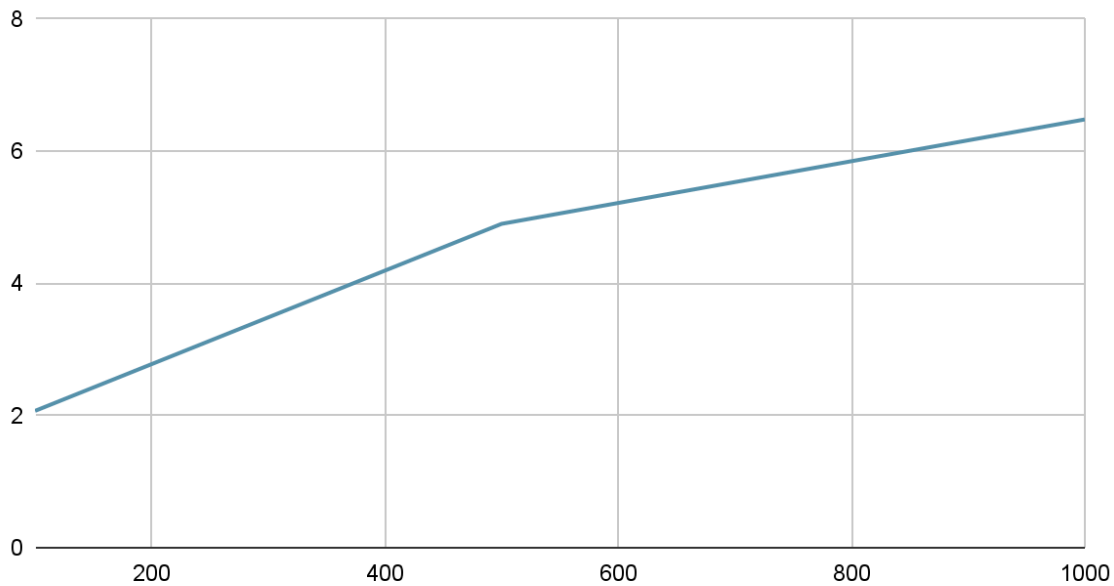


The number of packets appear to be increasing linearly with the file size

5. Total time taken

File Size (in bytes)	Time Taken (in ms)
100	2.07
500	4.9
1000	6.48

File Size vs Time Taken



6. Average Packet Size

File Size (in B)	No. of packets	Avg Packet Size (in B)
100	37	73.03
500	83	78.94
1000	85	90.33

Overall Avg = 82.6 bytes