

# **Computer Networks Lab**

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**Computer Networking Lab:**

**09**

# TASK # 01:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.000010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSe...
3	0.000000	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
4	0.000079	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP...
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP s...
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP ...
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP ...

Destination Address: 64.238.147.113

Transmission Control Protocol, Src Port: 60643, Dst Port: 80, Seq: 0, Len: 0

Source Port: 60643

Destination Port: 80

[Stream index: 0]

[Conversation completeness: Complete, WITH\_DATA (31)]

[TCP Segment Len: 0]

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 2682012317

[Next Sequence Number: 1 (relative sequence number)]

Acknowledgment Number: 0

Acknowledgment number (raw): 0

1011 ... = Header Length: 44 bytes (11)

Flags: 0x002 (SYN)

Window: 65535

[Calculated window size: 65535]

Checksum: 0x2212 [unverified]

[Checksum Status: Unverified]

0000	00 16 b6 e3 e9 8d 10 9a dd ac 6c 26 08 00 45 00	.....L&..E-
0010	00 40 9f 8a 40 00 40 06 04 ac c0 a8 01 7a 40 ee	.0..0. ....z0.
0020	93 71 ec e3 00 50 9f dc 42 9d 00 00 00 00 b0 02	.q...P.. B.....
0030	ff ff 22 12 00 00 02 04 05 b4 01 03 03 03 01 01	...".....
0040	08 0a 0f 4c 9f 71 00 00 00 00 04 02 00 00	...L-q.....

Transmission Control Protocol: Protocol

Packets: 1172 - Displayed: 1172 (100.0%)

Profile: Default

Source : 60643  
Destination: 80

# TASK # 02:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.008010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSe...
3	0.008080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524288 Len=0 TSval=256679881 TSecr=4016893437
4	0.008579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP...
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524288 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP s...
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP ...
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP ...

1010 .... = Header Length: 40 bytes (10)  
▼ Flags: 0x012 (SYN, ACK)  
000. .... = Reserved: Not set  
...0 .... = Nonce: Not set  
...0 .... = Congestion Window Reduced (CWR): 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  
...0 .... = Fin: Not set  
[TCP Flags: .....A..S.]  
Window: 5792  
[Calculated window size: 5792]  
Checksum: 0x67d7 [unverified]  
[Checksum Status: Unverified]  
Urgent pointer: 0

0000	10 9a dd ac 6c 26 00 16	b6 e3 e9 8d 08 00 45 20	...l&...E
0010	00 3c 00 00 40 00 2d 06	b7 1a 40 ee 93 71 c0 a8	<.@...@.q
0020	01 7a 00 50 ec e3 14 d4	c2 a0 9f dc 42 9e a0 12	.Z.P...B...
0030	16 a0 67 d7 00 00 02 04	05 64 04 02 08 0a ef 0c	.g...d...L
0040	ad fd 0f 4c 9f 71 01 03	03 02	.L.q...

ECN concealment protection (RFC 3540) (tcp.flags.ns), 1 byte

Packets: 1172 - Displayed: 1172 (100.0%)

Profile: Default

The sequence number of the TCP SYN segment is 0 since it is used to imitate the TCP connection between the client computer. In the Flags section, the Syn flag is set to 1 which indicates that this segment is a SYN segment.

# TASK # 03:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.088010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSe...

Frame 1: 78 bytes on wire (624 bits), 78 bytes captured (624 bits)

Ethernet II, Src: Apple\_ac:6c:26 (10:9a:dd:ac:6c:26), Dst: Cisco-Li\_e3:e9:8d (00:16:b6:e3:e9:8d)

Internet Protocol Version 4, Src: 192.168.1.122, Dst: 64.238.147.113

Transmission Control Protocol, Src Port: 60643, Dst Port: 80, Seq: 0, Len: 0

Source Port: 60643  
Destination Port: 80  
[Stream index: 0]  
[Conversation completeness: Complete, WITH\_DATA (31)]  
[TCP Segment Len: 0]  
Sequence Number: 0 (relative sequence number)  
Sequence Number (raw): 2682012317  
[Next Sequence Number: 1 (relative sequence number)]  
Acknowledgment Number: 0  
Acknowledgment number (raw): 0  
1011 .... = Header Length: 44 bytes (11)

Flags: 0x002 (SYN)

000. .... = Reserved: Not set  
...0 .... = Nonce: Not set  
...0 .... = Congestion Window Reduced (CWR): 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  
...0 .... = Fin: Not set  
TCP Flags: .....S.1

0000 00 16 b6 e3 e9 8d 10 9a dd ac 6c 26 00 00 45 00 .....l&..E  
0010 00 40 9f 8a 40 00 40 00 04 ac c9 a8 01 7a 40 ee .....@.0...z@  
0020 93 71 ec e3 00 50 9f dc 42 9d 00 00 00 00 b0 02 .....q..P..B.....  
0030 ff ff 22 12 00 00 02 04 05 b4 01 03 03 03 01 01 .....-.....  
0040 08 0a 0f 4c 9f 71 00 00 00 00 04 02 00 00 .....L.q.....

The sequence number of the SYNACK segment sent to the client computer in reply to the SYN is 0. The value of the acknowledgement field in the SYNACK segment is 1. The value of the acknowledgement field in the SYNACK segment is determined by the server . The server adds 1 to the initial sequence number of SYN segment form the client computer. For this case, the initial sequence number of SYN segment from the client computer is 0, thus the value of the acknowledgement field in the SYNACK segment is 1. A segment will be identified as a SYNACK segment if both SYN flag and Acknowledgement in the segment are set to 1.

# TASK # 04:

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
tcp						
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.122	64.238.147.113	TCP	78	60643 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=8 TSval=256679793 TSecr=0 SACK_PERM=1
2	0.000010	64.238.147.113	192.168.1.122	TCP	74	80 → 60643 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1380 SACK_PERM=1 TSval=4016893437 TSe...
3	0.000080	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=1 Ack=1 Win=524280 Len=0 TSval=256679881 TSecr=4016893437
4	0.000579	192.168.1.122	64.238.147.113	HTTP	257	GET /sigcomm/2011/papers/sigcomm/p2.pdf HTTP/1.1
5	0.177819	64.238.147.113	192.168.1.122	TCP	66	80 → 60643 [ACK] Seq=1 Ack=192 Win=6864 Len=0 TSval=4016893527 TSecr=256679881
6	0.178321	64.238.147.113	192.168.1.122	TCP	311	80 → 60643 [PSH, ACK] Seq=1 Ack=192 Win=6864 Len=245 TSval=4016893528 TSecr=256679881 [TCP...
7	0.178388	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=246 Win=524280 Len=0 TSval=256679970 TSecr=4016893528
8	0.189114	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=246 Ack=192 Win=6864 Len=1368 TSval=4016893538 TSecr=256679881 [TCP s...
9	0.266705	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=1614 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP ...
10	0.266787	192.168.1.122	64.238.147.113	TCP	66	60643 → 80 [ACK] Seq=192 Ack=2982 Win=523944 Len=0 TSval=256680057 TSecr=4016893538
11	0.267657	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=2982 Ack=192 Win=6864 Len=1368 TSval=4016893615 TSecr=256679970 [TCP ...
12	0.354612	64.238.147.113	192.168.1.122	TCP	1434	80 → 60643 [ACK] Seq=4350 Ack=192 Win=6864 Len=1368 TSval=4016893703 TSecr=256680057 [TCP ...
Transmission Control Protocol, Src Port: 80, Dst Port: 60643, Seq: 1, Ack: 192, Len: 245						
Source Port: 80						
Destination Port: 60643						
[Stream index: 0]						
[Conversation completeness: Complete, WITH_DATA (31)]						
[TCP Segment Len: 245]						
Sequence Number: 1 (relative sequence number)						
Sequence Number (raw): 349487777						
[Next Sequence Number: 246 (relative sequence number)]						
Acknowledgment Number: 192 (relative ack number)						
Acknowledgment number (raw): 2682012509						
1000 .... = Header Length: 32 bytes (8)						
Flags: 0x018 (PSH, ACK)						
Window: 1716						
[Calculated window size: 6864]						
[Window size scaling factor: 4]						
Checksum: 0xf3d (unverified)						

Length :     1 → 0  
              2 → 0  
              3 → 0  
              5 → 0  
              6 → 245

## **TASK # 05:**

There is no retransmitted segments in the trace file since in the time sequence graph by applying Graph Filter, all sequence numbers are monotonically increasing.