

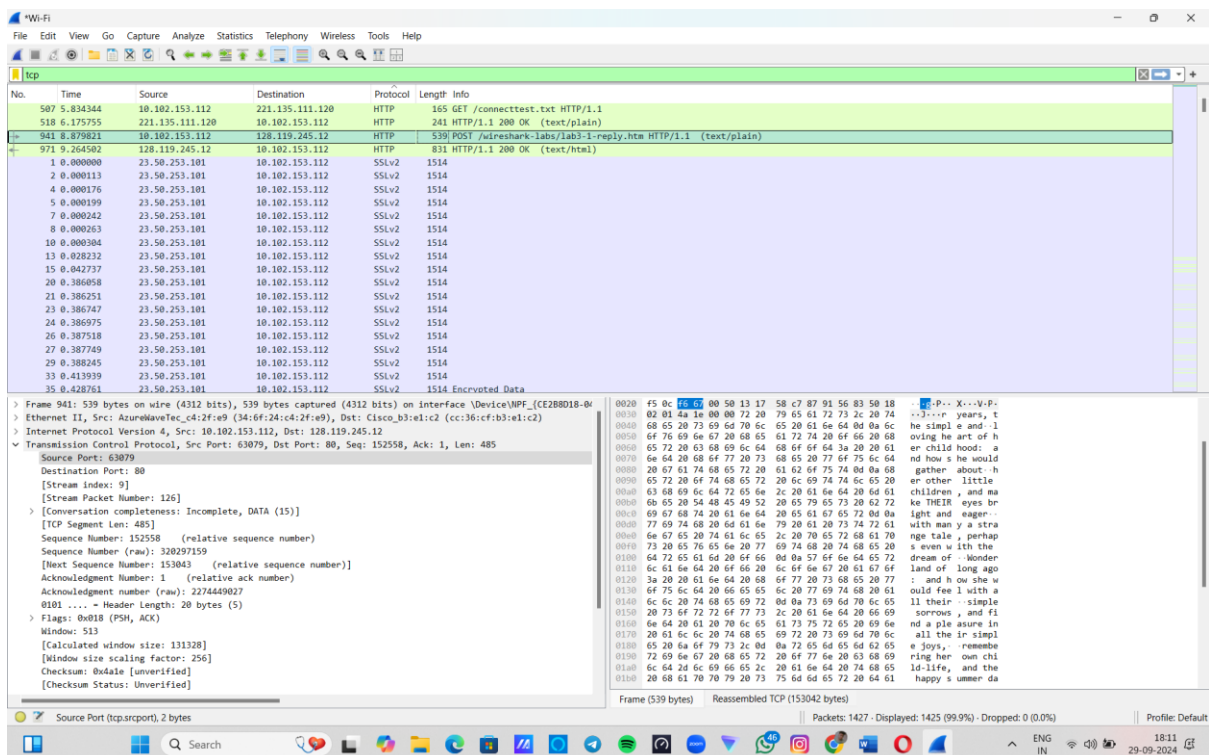
Computer Network: Wireshark TCP

Assignment 3

1. What is the IP address and TCP port number used by the client computer (source)

that is transferring the file to gaia.cs.umass.edu?

ANS-



IP address – 10.102.153.112

TCP port number used by the client computer (source) - 63079

2. What is the IP address of gaia.cs.umass.edu? On what port number is it sending

and receiving TCP segments for this connection?

ANS-

The image shows a Wireshark packet capture of a TCP connection. The packet list pane shows several packets, with packet 971 selected. The packet details pane shows the following information:

- Frame 971: 831 bytes on wire (6648 bits), 831 bytes captured (6648 bits) on interface \Device\NPF_{CE2B8018-04} Ethernet II, Src: Cisco_b3:e1:c2 (cc:36:cf:b3:e1:c2), Dst: AzureWaveTec_c4:2f:e9 (34:6f:24:c4:2f:e9)
- Internet Protocol Version 4, Src: 128.119.245.12, Dst: 10.102.153.112
- Transmission Control Protocol, Src Port: 80, Dst Port: 63079, Seq: 1, Ack: 153043, Len: 777
- Source Port: 80
- Destination Port: 63079
- [Stream Index: 9]
- [Stream Packet Number: 139]
- [Conversation completeness: Incomplete, DATA (15)]
- [TCP Segment Len: 777]
- Sequence Number: 1 (relative sequence number)
- Sequence Number (raw): 2274499027
- [Next Sequence Number: 778 (relative sequence number)]
- Acknowledgment Number: 153043 (relative ack number)
- Acknowledgment number (raw): 320297644
- 0101 - Header Length: 20 bytes (5)
- Flags: 0x018 (PSH, ACK)
- Window: 1893
- [Calculated window size: 242304]
- [Window size scaling factor: 128]
- Checksum: 0x98c2 [unverified]
- [Checksum Status: Unverified]

The packet bytes pane shows the raw data of the packet, including the Ethernet II header, Internet Protocol Version 4 header, and Transmission Control Protocol header.

IP address of gaia.cs.umass.edu – 128.119.245.12

Source Port – 80

Destination Port - 63079

3. What is the IP address and TCP port number used by your client computer (source) to transfer the file to gaia.cs.umass.edu?

Ans we had not created our own trace

4. What is the sequence number of the TCP SYN segment that is used to initiate the

TCP connection between the client computer and gaia.cs.umass.edu? What is it in the segment that identifies the segment as a SYN segment?

ANS-

The image shows a Wireshark packet capture of a TCP connection. The packet list on the left shows a SYN segment (No. 490, Time 5.812646, Source 10.102.153.112, Destination 23.50.253.101, Protocol TCP, Length 60). The packet details on the right show the TCP segment structure, including the sequence number 109401163 and the SYN flag set. The packet bytes on the right show the raw data of the segment, including the sequence number field.

No.	Time	Source	Destination	Protocol	Length	Info
474	5.490233	10.102.153.112	23.50.253.101	TCP	54	53952 → 443 [ACK] Seq=1 Ack=208781 Win=513 Len=0
475	5.490233	10.102.153.112	23.64.59.25	TCP	54	62965 → 443 [ACK] Seq=59 Ack=207490 Win=4108 Len=0
477	5.789807	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=207490 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 489]
479	5.789914	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=208950 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 489]
481	5.790029	10.102.153.112	23.64.59.25	TCP	54	62965 → 443 [ACK] Seq=59 Ack=210410 Win=4108 Len=0
482	5.790071	10.102.153.112	23.50.253.101	TCP	54	53952 → 443 [ACK] Seq=1 Ack=211701 Win=513 Len=0
483	5.790096	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=210410 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 489]
485	5.790280	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=211870 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 489]
487	5.790352	10.102.153.112	23.64.59.25	TCP	54	62965 → 443 [ACK] Seq=59 Ack=213330 Win=4108 Len=0
488	5.790370	10.102.153.112	23.50.253.101	TCP	54	53952 → 443 [ACK] Seq=1 Ack=214621 Win=513 Len=0
491	5.790393	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=214790 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 536]
492	5.790491	10.102.153.112	23.64.59.25	TCP	54	62965 → 443 [ACK] Seq=59 Ack=216250 Win=4108 Len=0
494	5.790527	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=216250 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 536]
495	5.790527	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=217710 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 536]
496	5.790604	10.102.153.112	23.50.253.101	TCP	54	53952 → 443 [ACK] Seq=1 Ack=217541 Win=513 Len=0
497	5.790629	23.50.253.101	10.102.153.112	TCP	1514	443 → 53952 [PSH, ACK] Seq=217541 Ack=1 Win=501 Len=1460
498	5.793696	10.102.153.112	221.135.111.120	TCP	66	63077 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
499	5.812646	23.64.59.58	10.102.153.112	TCP	1514	80 → 63773 [ACK] Seq=21721 Ack=1 Win=501 Len=1448 TSval=1804495187 TSecr=803472847
501	5.815512	23.64.59.25	10.102.153.112	TCP	1514	443 → 62965 [ACK] Seq=219170 Ack=59 Win=501 Len=1460 [TCP PDU reassembled in 536]
502	5.815623	10.102.153.112	23.64.59.25	TCP	54	62965 → 443 [ACK] Seq=59 Ack=220630 Win=4108 Len=0
504	5.818017	10.102.153.112	23.50.253.101	TCP	54	53952 → 443 [ACK] Seq=1 Ack=220461 Win=513 Len=0
505	5.833516	221.135.111.120	10.102.153.112	TCP	66	80 → 63077 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460 SACK_PERM WS=128

Destination Port: 80
[Stream index: 5]
[Stream Packet Number: 1]
[Conversation completeness: Complete, WITH_DATA (63)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 109401163
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 0
Acknowledgment number (raw): 0
1000 = Header Length: 32 bytes (0)
Flags: 0x002 (SYN)
0000 = 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
...0... = Syn: Set
...0... = Fin: Not set

This shows the raw value of the sequence number (tcp.seq_raw), 4 bytes
Packets: 1427 - Displayed: 1425 (99.9%) - Dropped: 0 (0.0%)
Profile: Default

sequence number of the TCP SYN segment – 109401163

....1. = Syn: Set is the segment that identifies the segment as a SYN segment

5. What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value? What is it in the segment that identifies the segment as a SYNACK segment?

ANS –

The image shows a Wireshark packet capture of a TCP connection. The packet list on the left shows a SYNACK segment (No. 509) from 10.102.153.112 to 23.64.59.25. The packet details on the right show the following information:

- Source Port: 80
- Destination Port: 63077
- [Stream index: 5]
- [Stream Packet Number: 2]
- [Conversation completeness: Complete, WITH_DATA (63)]
- [TCP Segment Len: 0]
- Sequence Number: 0 (relative sequence number)
- Sequence Number (raw): 15142108
- [Next Sequence Number: 1 (relative sequence number)]
- Acknowledgment Number: 1 (relative ack number)
- Acknowledgment number (raw): 109401164
- 1000 = Header Length: 32 bytes (8)
- 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

Sequence number of the SYNACK segment – 15142108

Value of the Acknowledgement field in the SYNACK segment – 109401164

The acknowledgement and Syn is set as 1 that identifies the segment as a SYNACK segment

6. What is the sequence number of the TCP segment containing the HTTP POST command?

ANS –

The image shows a Wireshark packet capture of a TCP connection. The packet list on the left shows a series of TCP segments. The selected packet is packet 792, which is a TCP segment with sequence number 320160662. The packet details pane on the right shows the sequence number (raw) as 320160662. The packet bytes pane on the right shows the raw data of the segment, which is a POST request.

Stream Packet Number: 16
[Conversation completeness: Incomplete, DATA (15)]
[TCP Segment Len: 1460]
Sequence Number: 320160662 (relative sequence number)
[Next Sequence Number: 13521 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
0101 = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
0000 = 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: Set
...0 = Reset: Not set
...0 = SYN: Not set
...0 = FIN: Not set
[TCP Flags:AP...]
Window: 513

0020 f5 0c f6 67 00 50 13 15 43 98 87 91 56 83 58 18 ...g-P...-V-P-
0030 02 01 87 b6 00 00 20 6e 6f 74 20 74 68 65 20 73 n ot the s
0040 61 6d 65 2c 20 74 68 65 20 6e 65 78 74 20 71 75 ame, the next qu
0050 65 73 74 69 6f 6e 20 69 73 2c 20 57 68 6f 20 69 .. estion i s, who i
0060 6e 0d 0a 74 68 65 20 77 6f 72 6c 64 20 61 6d 20 .. n- the world am
0070 49 3f 20 20 41 68 2c 20 54 48 41 54 27 53 20 74 .. I? Ah, THAT'S t
0080 68 65 20 67 72 65 61 74 20 70 75 74 7a 6c 65 21 .. he great puzzle!
0090 27 20 20 41 6e 64 20 73 68 65 20 62 65 67 61 6e .. And s he began
00a0 0d 0a 74 68 69 6e 68 69 6e 67 20 6f 70 65 72 20 .. -thinki ng over
00b0 61 6c 6c 20 74 68 65 20 63 68 69 6c 64 72 65 6e .. all the children
00c0 20 73 68 65 20 6b 6e 65 77 20 74 68 61 74 20 77 .. she kn e w that w
00d0 65 72 65 20 6f 66 20 74 68 65 20 73 61 6d 65 20 .. ere of t he same
00e0 61 67 65 0d 0a 61 73 20 68 65 72 73 65 6c 66 2c .. age- as herself,
00f0 20 74 6f 20 73 65 65 20 69 66 20 73 68 65 20 63 .. to see if she c
0100 6f 75 6c 64 20 68 61 76 65 20 62 65 65 6e 20 63 .. ould hav e been c
0110 68 61 6e 67 65 64 20 66 6f 72 20 61 6e 79 20 6f .. hanged f or any o
0120 66 0d 0a 74 68 65 6d 2e 0d 0a 0d 0a 20 20 60 49 .. f- then, I
0130 27 6d 20 73 75 72 65 20 49 27 6d 20 6e 6f 74 20 .. 'm sure I'm not
0140 41 64 61 2c 27 20 73 68 65 20 73 61 69 64 2c 20 .. Ada,' she said,
0150 60 66 6f 72 20 68 65 72 20 68 61 69 72 20 67 6f .. "for her hair go
0160 65 73 20 69 6e 20 73 75 63 68 0d 0a 6c 6f 6e 67 .. es in su ch- long
0170 20 72 69 6e 67 6c 65 74 73 2c 20 61 6e 64 20 6d .. ringlet s, and m
0180 69 6e 65 20 64 6f 65 73 6e 27 74 20 67 6f 20 69 .. line does n't go i
0190 6e 20 72 69 6e 67 6c 65 74 73 20 61 74 20 61 6c .. n ringle ts at al
01a0 6c 3b 20 61 6e 64 20 49 27 6d 0d 0a 73 75 72 65 .. i; and I 'm- sure
01b0 20 49 20 63 61 6e 27 74 20 62 65 20 4d 61 62 65 .. I can't be Habb
01c0 6c 2c 20 66 6f 72 20 49 20 6b 6e 6f 77 20 61 6c .. I, for I know al
01d0 6c 20 73 6f 72 74 73 20 6f 66 20 74 68 69 6e 67 .. I sorts of thing

sequence number of the TCP segment containing the HTTP POST command-320160662

7. Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST)?

At what time was each segment sent? When was the ACK for each segment received? Given the difference between when each TCP segment was sent, and when its acknowledgement was received, what is the RTT value for each of the six segments? What is the EstimatedRTT value (see Section 3.5.3, page 242 in text) after the receipt of each ACK?ANS-

The image shows a Wireshark packet capture of a TCP connection. The packet list on the left shows segments 783 to 808. The packet details for packet 793 (Seq=17521) are expanded, showing the TCP header and data. The packet bytes show the raw data of the segment.

No.	Time	Source	Destination	Protocol	Length	Info
783	8.106625	10.102.153.112	23.64.59.25	TCP	54	62965 → 443 [ACK] Seq=152 Ack=339612 Win=4188 Len=0
787	8.106694	128.119.245.12	10.102.153.112	TCP	54	80 → 63079 [ACK] Seq=1 Ack=14601 Win=58496 Len=0
788	8.106694	128.119.245.12	10.102.153.112	TCP	66	80 → 63080 [SYN, ACK] Seq=0 Ack=1 Win=20200 Len=0 MSS=1460 SACK_PERM WS=128
790	8.106894	10.102.153.112	23.64.59.25	TCP	54	53952 → 443 [ACK] Seq=1 Ack=30601 Win=513 Len=0
791	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=14601 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
792	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [PSH, ACK] Seq=16061 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
793	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=17521 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
794	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=18981 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
795	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=20441 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
796	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=21901 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
797	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=23361 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
798	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=24821 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
799	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=26281 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
800	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=27741 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
801	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=29201 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
802	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=30661 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
803	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=32121 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
804	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=33581 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
805	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=35041 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
806	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=36501 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
807	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=37961 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]
808	8.106952	10.102.153.112	128.119.245.12	TCP	1514	63079 → 80 [ACK] Seq=39421 Ack=1 Win=131328 Len=1460 [TCP PDU reassembled in 941]

[Stream Packet Number: 17]
 > [Conversation completeness: Incomplete, DATA (15)]
 [TCP Segment Len: 1460]
 Sequence Number: 17521 (relative sequence number)
 Sequence Number (raw): 320162122
 [Next Sequence Number: 18981 (relative sequence number)]
 Acknowledgment Number: 1 (relative ack number)
 Acknowledgment Number (raw): 227449027
 0101 = Header Length: 20 bytes (5)
 Flags: 0x010 (ACK)
 0000 = 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.....]
 Window: 513

0020 f5 0c f6 67 00 50 13 15 49 42 87 91 56 83 50 10 ...g-P: 1...V-P:
 0030 02 01 7a 6c 00 00 61 64 20 68 69 73 20 63 6c 61 ...:ll..ad his cla
 0040 77 73 2c 04 0a 20 20 20 20 20 20 20 20 20 20 20 ...ws,..
 0050 20 41 6a 64 20 77 65 6c 63 6f 6d 65 20 6c 69 7a ...And wel come lit
 0060 74 6c 65 20 66 69 73 68 65 73 20 69 6e 04 0a 20 ...tle fish es in..
 0070 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 ...Wit
 0080 68 20 67 65 6e 74 6c 79 20 73 6d 69 6c 69 6e 67 ...h gently smiling
 0090 20 6a 61 77 73 21 27 04 0a 04 0a 20 20 60 45 27 ...'aws!''I'
 00a0 6d 20 73 75 72 65 20 74 68 6f 73 65 20 61 72 65 ...e sure t hose are
 00b0 20 6e 6f 74 20 74 68 65 20 72 69 67 68 74 20 77 ...not the right w
 00c0 6f 72 64 73 2c 27 20 73 61 69 64 20 70 6f 6f 72 ...ords,'s aid poor
 00d0 20 41 6c 69 63 65 2c 20 61 6e 64 04 0a 68 65 72 ...Alice, and her
 00e0 20 65 79 65 73 20 66 69 6c 6c 65 64 20 77 69 74 ...eyes filled wit
 00f0 68 20 74 65 61 72 73 20 61 67 61 69 6e 20 61 73 ...h tears again as
 0100 20 73 68 65 20 77 65 6e 74 20 6f 6e 2c 20 60 49 ...she wen t on, 'I
 0110 20 6d 75 73 74 20 62 65 20 4d 61 62 65 6c 04 0a ...must be Habel..
 0120 61 66 74 65 72 20 61 6c 6c 2c 20 61 6e 64 20 49 ...after al l, and I
 0130 20 73 68 61 6c 6c 20 68 61 76 65 20 74 6f 20 67 ...shall h ave to g
 0140 6f 20 61 6e 64 20 6c 69 76 65 20 69 6e 20 74 68 ...o and ll ve in th
 0150 61 74 20 70 6f 66 79 20 6c 69 74 74 6c 65 04 0a ...at poky little..
 0160 68 6f 75 73 65 2c 20 61 6e 64 20 68 61 76 65 20 ...house, a nd have
 0170 6e 65 78 74 20 74 6f 20 6e 6f 20 74 6f 79 73 20 ...next to no toys
 0180 74 6f 20 70 6c 61 79 20 77 69 74 68 2c 20 61 6e ...to play with, an
 0190 64 20 6f 68 21 20 65 76 65 72 20 73 6f 04 0a 6d ...d oh! ev er so-m
 01a0 61 6e 79 20 6c 65 73 73 6f 6e 73 20 74 6f 20 6c ...any less ons to l
 01b0 65 61 72 6e 21 20 20 4a 6f 2c 20 45 27 76 65 20 ...earn! H o, I've
 01c0 6d 61 64 65 20 75 70 20 6d 79 20 6d 69 6e 64 20 ...made up my mind
 01d0 61 62 6f 75 74 20 69 74 3b 20 69 66 20 49 27 6d ...about it ; if I'm

Sequence numbers of the 1st segments – 320160662

Sequence numbers of the 2nd segments – 320162122
 ack=.053937,seq=.041717,RTT=0.0122secs

Sequence numbers of the 3rd segments - 320163582
 ack=.077294,seq=.054026,RTT=0.023268secs

Sequence numbers of the 4th segments - 32016504
 ack=.124085,seq=.054690,RTT=0.069395secs

Sequence numbers of the 5th segments - 320166502
 ack=.169118,seq=.077405,RTT=0.091713secs

Sequence numbers of the 6th segments - 320167962

ack=.217299,seq=.078157,RTT=0.139142secs

8. What is the length of each of the first six TCP segments?

ANS-

Length of the 1st segments – 1460 bytes

Length of the 2nd segments - 1460 bytes

Length of the 3rd segments - 1460 bytes

Length of the 4th segments -1460 bytes

Length of the 5th segments - 1460 bytes

Length of the 6th segments - 1460 bytes

9. What is the minimum amount of available buffer space advertised at the received

for the entire trace? Does the lack of receiver buffer space ever throttle the sender?

ANS-

The image shows a Wireshark packet capture analysis of a TCP connection. The main packet list shows a series of ACK packets from the receiver to the sender. The packet details pane for packet 808 (a TCP ACK) shows the following information:

- Window: 513
- [Calculated window size: 131328]
- [Window size scaling factor: 256]
- Checksum: 0xb7b6 [unverified]
- [Checksum Status: Unverified]
- Urgent Pointer: 0
- [Timestamps]
- [SEQ/ACK analysis]
- TCP payload (1460 bytes)
- [Reassembled PDU in frame: 941]
- TCP segment data (1460 bytes)

The packet bytes pane shows the raw data of the TCP segment, including the window size field (0x00000000) and the sequence number (0x00000000).

Minimum amount of available buffer space IS 131328 bytes

NO the lack of receiver buffer space ever throttle the sender

10. Are there any retransmitted segments in the trace file? What did you check for (in

the trace) in order to answer this question?

ANS – NO there are not , and we have examined the TTT graph

11. How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment (see

Table 3.2 on page 250 in the text).

ANS – 1460 bytes , NO we can't identify cases where the receiver is ACKing every other received segment

12. What is the throughput (bytes transferred per unit time) for the TCP connection?

Explain how you calculated this value.

ANS-

Here the first TCP Segment is 1 bytes

And the last segment is 164091 bytes

So the total data is $164091 - 1 = 164090$ bytes

Transmission time for the 1st segment is 0.026477 secs

Transmission time for the last segment is 5.455830 secs

Difference = $5.455830 - 0.026477 = 5.4294$ secs

Now the Throughput is $= 164090 / 5.4294 = 30,222.49235642981$ bytes/sec