

TCP 题:

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(第一、二题使用 tcp-ethereal-trace-1)

1、传输文件到 gaia.cs.umass.edu 的客户端计算机 (源) 使用的 IP 地址和 TCP 端口号:

The IP address is **192.168.1.102**; The TCP port number is **1161**。

2、gaia.cs.umass.edu 的 IP 地址、它发送和接收 TCP 端的端口号分别是:

The IP address is **128.119.245.12**; The TCP port number is **80**。

No.	Time	Source	Destination	Protocol	Length	Info
193	5.198388	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=157929 Ack=1 Win=17520 Len=1460 [
194	5.199275	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=159389 Ack=1 Win=17520 Len=1460 [
195	5.200252	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=160849 Ack=1 Win=17520 Len=1460 [
196	5.201150	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=162309 Ack=1 Win=17520 Len=1460 [
197	5.202024	192.168.1.102	128.119.245.12	TCP	326	1161 → 80 [PSH, ACK] Seq=163769 Ack=1 Win=17520 Len=2
198	5.297257	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=159389 Win=62780 Len=0
199	5.297341	192.168.1.102	128.119.245.12	HTTP	104	POST /ethereal-labs/lab3-1-reply.htm HTTP/1.1 (text/
200	5.389471	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=162309 Win=62780 Len=0
201	5.447887	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=164041 Win=62780 Len=0

> Frame 199: 104 bytes on wire (832 bits), 104 bytes captured (832 bits)
> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 164041, Ack: 1, Len: 50
> [122 Reassembled TCP Segments (164090 bytes): #4(565), #5(1460), #7(1460), #8(1460), #10(1460), #11(1460), #13(1147), #18(1460)]
> Hypertext Transfer Protocol
> MIME Multipart Media Encapsulation, Type: multipart/form-data, Boundary: "-----265001916915724"

(第三题使用自己的追踪)

3、The IP address is **172.23.18.55**; The TCP port number is **55745**。

No.	Time	Source	Destination	Protocol	Length	Info
1511	21:28:23.163139	128.119.245.12	172.23.18.55	TCP	66	80 → 55747 [SYN, ACK] Seq=0 Ack=
1512	21:28:23.163182	172.23.18.55	128.119.245.12	TCP	54	55747 → 80 [ACK] Seq=1 Ack=1 Wi
1513	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=712
1514	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=2160
1515	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=3608
1516	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=5050
1517	21:28:23.193628	172.23.18.55	128.119.245.12	TCP	10190	55745 → 80 [PSH, ACK] Seq=13744
1518	21:28:23.194903	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=1084
1519	21:28:23.194903	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=1229
1520	21:28:23.194903	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=1374
1521	21:28:23.194935	172.23.18.55	128.119.245.12	TCP	17430	55745 → 80 [PSH, ACK] Seq=23880
1549	21:28:23.466950	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=1519

> Frame 1517: 10190 bytes on wire (81520 bits), 10190 bytes captured (81520 bits) on interface \Device\NPF_{933
> Ethernet II, Src: IntelCor_a6:e1:7c (60:f2:62:a6:e1:7c), Dst: HuaweiTe_0d:a6:8e (9c:37:f4:0d:a6:8e)
> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 13744, Ack: 1, Len: 10136
> Data (10136 bytes)

(4-12 题中使用的是自己的追踪，我理解的下图文字应该是这个意思……)

This is what we're looking for - a series of TCP segments sent between your computer and gaia.cs.umass.edu. We will use the packet trace that you have captured (and/or the packet trace tcp-ethereal-trace-1 in <http://gaia.cs.umass.edu/wireshark-labs/wireshark-traces.zip>; see earlier footnote) to study TCP behavior in the rest of this lab.

4、 The sequence number of TCP SYN segment is 0;

Flags (SYN=1) identifies the segment as a SYN segment。

No.	Time	Source	Destination	Protocol	Length	Info
21	21:28:04.459656	13.107.4.52	172.23.18.55	TCP	60	80 → 55744 [ACK] Seq=514 Ack=2 Win=2052 Len=0
1452	21:28:22.634349	172.23.18.55	128.119.245.12	TCP	54	55712 → 80 [FIN, ACK] Seq=1 Ack=1 Win=514 Len=0
1454	21:28:22.641182	172.23.18.55	128.119.245.12	TCP	66	55745 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=2
1455	21:28:22.641427	172.23.18.55	128.119.245.12	TCP	66	55746 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=2
1480	21:28:22.885949	172.23.18.55	128.119.245.12	TCP	66	55747 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=2
1488	21:28:22.913366	128.119.245.12	172.23.18.55	TCP	60	80 → 55712 [ACK] Seq=1 Ack=2 Win=229 Len=0
1489	21:28:22.921249	128.119.245.12	172.23.18.55	TCP	66	80 → 55745 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MS

> Frame 1454: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface \Device\NPF_{93338A83-F569-4466-B5FA-43A6472094}

> Ethernet II, Src: IntelCor_a6:e1:7c (60:f2:62:a6:e1:7c), Dst: HuaweiTe_0d:a6:8e (9c:37:f4:0d:a6:8e)

> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 0, Len: 0

Source Port: 55745

Destination Port: 80

[Stream index: 2]

[TCP Segment Len: 0]

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 2122333370

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

Acknowledgment Number: 0

Acknowledgment number (raw): 0

1000 = Header Length: 32 bytes (8)

Flags: 0x002 (SYN)

Window: 64240

[Calculated window size: 64240]

Checksum: 0x33f9 [unverified]

5、 The sequence number of SYNACK segment is 0;

The value of Acknowledgement field in the SYNACK segment is 1;

Because this value is the sequence number of SYN + 1;

Flags (SYN=1&&ACK=1) identifies the segment as a SYNACK segment.

No.	Time	Source	Destination	Protocol	Length	Info
1455	21:28:22.641427	172.23.18.55	128.119.245.12	TCP	66	55746 → 80 [SYN] Seq=0 Win=6424
1480	21:28:22.885949	172.23.18.55	128.119.245.12	TCP	66	55747 → 80 [SYN] Seq=0 Win=6424
1488	21:28:22.913366	128.119.245.12	172.23.18.55	TCP	60	80 → 55712 [ACK] Seq=1 Ack=2 Wi
1489	21:28:22.921249	128.119.245.12	172.23.18.55	TCP	66	80 → 55745 [SYN, ACK] Seq=0 Ack
1490	21:28:22.921296	172.23.18.55	128.119.245.12	TCP	54	55745 → 80 [ACK] Seq=1 Ack=1 Wi

> Frame 1489: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface \Device\NPF_{93338A83-F569}

> Ethernet II, Src: HuaweiTe_0d:a6:8e (9c:37:f4:0d:a6:8e), Dst: IntelCor_a6:e1:7c (60:f2:62:a6:e1:7c)

> Internet Protocol Version 4, Src: 128.119.245.12, Dst: 172.23.18.55

> Transmission Control Protocol, Src Port: 80, Dst Port: 55745, Seq: 0, Ack: 1, Len: 0

Source Port: 80

Destination Port: 55745

[Stream index: 2]

[TCP Segment Len: 0]

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 1169840317

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

Acknowledgment Number: 1 (relative ack number)

Acknowledgment number (raw): 2122333371

1000 = Header Length: 32 bytes (8)

Flags: 0x012 (SYN, ACK)

Window: 29200

[Calculated window size: 29200]

Checksum: 0x9565 [unverified]

[Checksum Status: Unverified]

6、The sequence number of the TCP segment containing HTTP POST command is **1**.

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tcp
No. Time Source Destination Protocol Length Info
1489 21:28:22.921249 128.119.245.12 172.23.18.55 TCP 66 80 → 55745 [SYN, ACK] Seq=1 A
1490 21:28:22.921296 172.23.18.55 128.119.245.12 TCP 54 55745 → 80 [ACK] Seq=1 A
1491 21:28:22.921733 172.23.18.55 128.119.245.12 TCP 765 55745 → 80 [PSH, ACK] Seq=1 A
1492 21:28:22.921817 172.23.18.55 128.119.245.12 TCP 13086 55745 → 80 [ACK] Seq=712
1493 21:28:22.938737 128.119.245.12 172.23.18.55 TCP 66 80 → 55746 [SYN, ACK] Seq=1 A

> Frame 1491: 765 bytes on wire (6120 bits), 765 bytes captured (6120 bits) on interface \Device\NPF...
> Ethernet II, Src: IntelCor_a6:e1:7c (60:f2:62:a6:e1:7c), Dst: HuaweiTe_0d:a6:8e (9c:37:f4:0d:a6:8e)
> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12
v Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 1, Ack: 1, Len: 711
    Source Port: 55745
    Destination Port: 80
    [Stream index: 2]
    [TCP Segment Len: 711]
    Sequence Number: 1 (relative sequence number)
    Sequence Number (raw): 2122333371
    [Next Sequence Number: 712 (relative sequence number)]
    Acknowledgment Number: 1 (relative ack number)
    Acknowledgment number (raw): 1169840318

0030 01 04 36 b4 00 00 50 4f 53 54 20 2f 77 69 72 65 ..6...PO ST/wire
0040 73 68 61 72 6b 2d 6c 61 62 73 2f 6c 61 62 73 2d 63 20 shark-lab3/lab3
0050 31 2d 72 65 70 6c 79 2e 68 74 6d 20 48 54 54 50 1-reply.htm HTTP
0060 2f 31 2e 31 0d 0a 48 6f 73 74 3a 20 67 61 69 61 /1.1..Host: gaia
0070 2e 63 73 2e 75 6d 61 73 73 2e 65 64 75 0d 0a 43 .cs.umas.s.edu.cn
0080 6f 6e 6e 65 63 74 69 6f 6e 3a 20 6b 65 65 70 2d onnection: keep-
0090 61 6c 69 76 65 0d 0a 43 6f 6e 74 65 6e 74 2d 4c alive..Content-L
00a0 65 6e 67 74 68 3a 20 31 35 32 33 32 31 0d 0a 43 length: 1 52321..C

```

7、 The sequence numbers, sent time, receive ACK time, RTT, Estimated RTT of the first six segments in the TCP connection 如下表所示:

	Sequence time	Sent time	Receive ACK time	RTT	Estimated RTT
Segment1	1	18.861111	19.132966	0.271855	0.271855
Segment2	712	18.861195	19.134281	0.273086	0.272008875
Segment3	13744	19.133006	19.406328	0.273322	0.272173016
Segment4	23880	19.134313	19.411218	0.276905	0.272764514
Segment5	41256	19.406376	19.694754	0.288378	0.274716199
Segment6	61528	19.407808	19.697454	0.289646	0.276582425

$$\text{\$ Estimated RTT} = 0.875 * \text{Estimated RTT} + 0.125 * \text{Sample RTT}$$

8、The length of first six segments 如下表所示:

	Segment1	Segment2	Segment3	Segment4	Segment5	Segment6
length	711	13032	10136	17376	20272	8688

7、8 题依据如下图所示:

No.	Time	Source	Destination	Protocol	Length	Info
1490	21:28:22.921296	172.23.18.55	128.119.245.12	TCP	54	55745 → 80 [ACK] Seq=1 Ack=1 Win=66560 L
1491	21:28:22.921733	172.23.18.55	128.119.245.12	TCP	765	55745 → 80 [PSH, ACK] Seq=1 Ack=1 Win=66
1492	21:28:22.921817	172.23.18.55	128.119.245.12	TCP	13086	55745 → 80 [ACK] Seq=712 Ack=1 Win=6560
1493	21:28:22.938737	128.119.245.12	172.23.18.55	TCP	66	80 → 55746 [SYN, ACK] Seq=0 Ack=1 Win=29
1494	21:28:22.938774	172.23.18.55	128.119.245.12	TCP	54	55746 → 80 [ACK] Seq=1 Ack=1 Win=66560 L

> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 1, Ack: 1, Len: 711

Source Port: 55745
Destination Port: 80
[Stream index: 2]

[TCP Segment Len: 711]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 212233371
[Next Sequence Number: 712 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 1169840318
0101 = Header Length: 20 bytes (5)
> Flags: 0x018 (PSH, ACK)

0020 f5 0c d9 c1 00 50 7e 80 3c b4 45 ba 58 be 50 18 ...P...F...X...P...
0030 01 04 36 b4 00 00 50 4f 53 54 20 2f 77 69 72 65 ...3...yo u don't...
0040 73 68 61 72 6b 2d 6c 61 62 73 2f 6c 61 62 33 2d ...h...
0050 31 2d 72 65 70 6c 79 2e 68 74 6d 20 48 54 54 50 1-reply, http HTTP
0060 2f 31 2e 31 0d 0a 48 6f 73 74 3a 20 67 61 69 61 /1.1-Host: gaia
0070 2e 63 73 2e 75 6d 61 73 73 2e 65 64 75 0d 0a 43 ...cs.umass.edu...C

No.	Time	Source	Destination	Protocol	Length	Info
1490	21:28:22.921296	172.23.18.55	128.119.245.12	TCP	54	55745 → 80 [ACK] Seq=1 Ack=1 Win=665
1491	21:28:22.921733	172.23.18.55	128.119.245.12	TCP	765	55745 → 80 [PSH, ACK] Seq=1 Ack=1 Wi
1492	21:28:22.921817	172.23.18.55	128.119.245.12	TCP	13086	55745 → 80 [ACK] Seq=712 Ack=1 Win=6
1493	21:28:22.938737	128.119.245.12	172.23.18.55	TCP	66	80 → 55746 [SYN, ACK] Seq=0 Ack=1 Wi
1494	21:28:22.938774	172.23.18.55	128.119.245.12	TCP	54	55746 → 80 [ACK] Seq=1 Ack=1 Win=665

> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 712, Ack: 1, Len: 13032

Source Port: 55745
Destination Port: 80
[Stream index: 2]

[TCP Segment Len: 13032]
Sequence Number: 712 (relative sequence number)
Sequence Number (raw): 2122334082
[Next Sequence Number: 13744 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 1169840318
0101 = Header Length: 20 bytes (5)
> Flags: 0x018 (PSH, ACK)

No.	Time	Source	Destination	Protocol	Length	Info
1513	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=7
1514	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=2
1515	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=3
1516	21:28:23.193588	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=5
1517	21:28:23.193628	172.23.18.55	128.119.245.12	TCP	10190	55745 → 80 [PSH, ACK] Seq=137

> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 13744, Ack: 1, Len: 10136

Source Port: 55745
Destination Port: 80
[Stream index: 2]

[TCP Segment Len: 10136]
Sequence Number: 13744 (relative sequence number)
Sequence Number (raw): 2122347114
[Next Sequence Number: 23880 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 1169840318
0101 = Header Length: 20 bytes (5)
> Flags: 0x018 (PSH, ACK)

0020 f5 0c d9 c1 00 50 7e 80 72 6a 45 ba 58 be 50 18 ...P...F...X...P...
0030 01 04 33 d9 00 00 79 6f 75 20 64 6f 6e 27 74 0d ...3...yo u don't...
0040 0a 36 60 c8 ff 20 74 60 65 64 31 37 20 20 67 20 ...10...th...th...

No.	Time	Source	Destination	Protocol	Length	Info
1517	21:28:23.193628	172.23.18.55	128.119.245.12	TCP	10190	55745 → 80 [PSH, ACK] Seq=137
1518	21:28:23.194903	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=10
1519	21:28:23.194903	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=12
1520	21:28:23.194903	128.119.245.12	172.23.18.55	TCP	60	80 → 55745 [ACK] Seq=1 Ack=13
1521	21:28:23.194935	172.23.18.55	128.119.245.12	TCP	17430	55745 → 80 [PSH, ACK] Seq=238

> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 23880, Ack: 1, Len: 17376

Source Port: 55745
Destination Port: 80
[Stream index: 2]

[TCP Segment Len: 17376]
Sequence Number: 23880 (relative sequence number)
Sequence Number (raw): 2122357250
[Next Sequence Number: 41256 (relative sequence number)]
Acknowledgment Number: 1 (relative ack number)
Acknowledgment number (raw): 1169840318
0101 = Header Length: 20 bytes (5)
> Flags: 0x018 (PSH, ACK)

0020 f5 0c d9 c1 00 50 7e 80 9a 02 45 ba 58 be 50 18 ...P...F...X...P...
0030 01 04 33 d9 00 00 79 6f 75 20 64 6f 6e 27 74 0d ...3...yo u don't...
0040 0a 36 60 c8 ff 20 74 60 65 64 31 37 20 20 67 20 ...10...th...th...

tcp					
No.	Time	Source	Destination	Protocol	Length Info
1549	21:28:23.466950	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=1519
1550	21:28:23.466950	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=1953
1551	21:28:23.466950	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=2098
1552	21:28:23.466950	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=2388
1553	21:28:23.466998	172.23.18.55	128.119.245.12	TCP	20326 55745 → 80 [PSH, ACK] Seq=41256
> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12 > Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 41256, Ack: 1, Len: 20272 Source Port: 55745 Destination Port: 80 [Stream index: 2] [TCP Segment Len: 20272] Sequence Number: 41256 (relative sequence number) Sequence Number (raw): 212234626 [Next Sequence Number: 61528 (relative sequence number)] Acknowledgment Number: 1 (relative ack number) Acknowledgment number (raw): 1169840318 0101 = Header Length: 20 bytes (5) > Flags: 0x018 (PSH, ACK)					
0020	f5 0c d9 c1 00 50	7e 80 dd e2	45 ba 58 be 50 18P...E..X..P..	
0030	01 04 33 d9 00 00	6f 69 63 65 20 73	68 65 20 68	..3...oi ce she h	
tcp					
No.	Time	Source	Destination	Protocol	Length Info
1553	21:28:23.466998	172.23.18.55	128.119.245.12	TCP	20326 55745 → 80 [PSH, ACK] Seq=41256
1554	21:28:23.468413	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=25328
1555	21:28:23.468413	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=28224
1556	21:28:23.468413	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=26776
1557	21:28:23.468430	172.23.18.55	128.119.245.12	TCP	8742 55745 → 80 [PSH, ACK] Seq=61528
> Internet Protocol Version 4, Src: 172.23.18.55, Dst: 128.119.245.12 > Transmission Control Protocol, Src Port: 55745, Dst Port: 80, Seq: 61528, Ack: 1, Len: 8688 Source Port: 55745 Destination Port: 80 [Stream index: 2] [TCP Segment Len: 8688] Sequence Number: 61528 (relative sequence number) Sequence Number (raw): 212234898 [Next Sequence Number: 70216 (relative sequence number)] Acknowledgment Number: 1 (relative ack number) Acknowledgment number (raw): 1169840318 0101 = Header Length: 20 bytes (5) > Flags: 0x018 (PSH, ACK)					
0020	f5 0c d9 c1 00 50	7e 81 2d 12	45 ba 58 be 50 18P...E..X..P..	
0030	01 04 33 d9 00 00	20 73 68 65 20 73	61 69 64 20	..3... s he said	

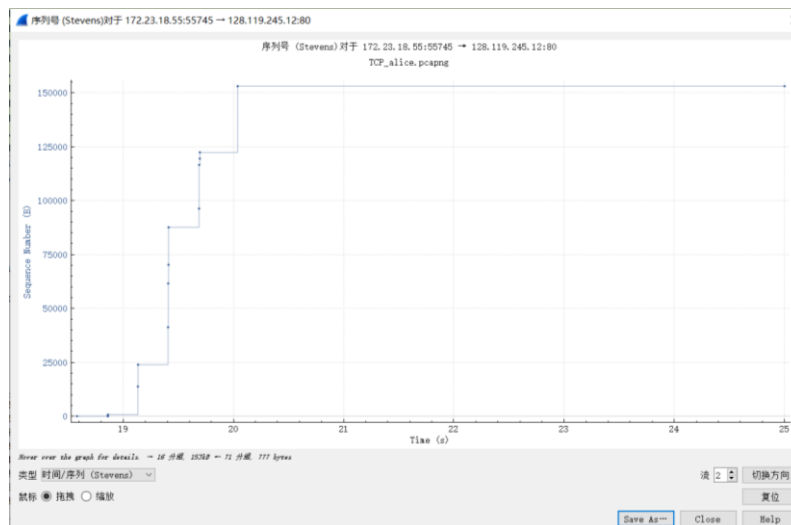
9、 可用缓冲区空间的最小数量为 29200

No.

tcp					
No.	Time	Source	Destination	Protocol	Length Info
1455	18.580805	172.23.18.55	128.119.245.12	TCP	66 55746 → 80 [SYN] Seq=0
1480	18.825327	172.23.18.55	128.119.245.12	TCP	66 55747 → 80 [SYN] Seq=0
1488	18.852744	128.119.245.12	172.23.18.55	TCP	60 80 → 55712 [ACK] Seq=1
1489	18.860627	128.119.245.12	172.23.18.55	TCP	66 80 → 55745 [SYN, ACK] Seq=1
1490	18.860674	172.23.18.55	128.119.245.12	TCP	54 55745 → 80 [ACK] Seq=1
Acknowledgment Number: 1 (relative ack number) Acknowledgment number (raw): 212233371 1000 = Header Length: 32 bytes (8) > Flags: 0x012 (SYN, ACK) Window: 29200 [calculated window size: 29200] Checksum: 0x9565 [unverified] [Checksum Status: Unverified]					

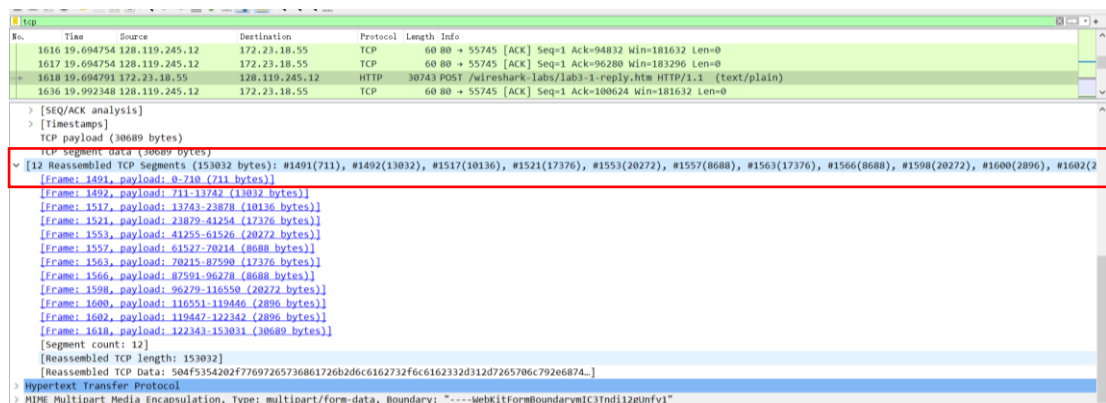
10、No segments are retransmitted in the trace file.

I check the sequence numbers of the trace file. According to the graph below, all sequence numbers are in **ascending** order, so there is no retransmitted segments.



11、153032 Bytes;

可以识别接收方每隔一段接收的情况



12、吞吐量=153032/(19.694791-18.580560)=**137343.154** (Bytes/s)

16	0.163763	172.23.18.55	128.119.245.12	TCP	54 55744 → 80 [FIN, ACK] Seq=1 Ack=96280 Win=0 Len=0
21	0.399034	13.107.4.52	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=514 Ack=2 Win=2 Len=0
1452	18.573727	172.23.18.55	128.119.245.12	TCP	54 55712 → 80 [FIN, ACK] Seq=1 Ack=1 Win=0 Len=0
1454	18.580560	172.23.18.55	128.119.245.12	TCP	66 55745 → 80 [SYN] Seq=0 Win=64240 Len=0
1455	18.580805	172.23.18.55	128.119.245.12	TCP	66 55746 → 80 [SYN] Seq=0 Win=64240 Len=0
1456	18.585337	172.23.18.55	128.119.245.12	TCP	66 55747 → 80 [SYN] Seq=0 Win=64240 Len=0
1617	19.694754	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=96280 Win=0 Len=0
1618	19.694791	172.23.18.55	128.119.245.12	HTTP	30743 POST /wireshark-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)
1636	19.992348	128.119.245.12	172.23.18.55	TCP	60 80 → 55745 [ACK] Seq=1 Ack=100624 Win=181632 Len=0

(13 题使用的是 tcp-ethereal-trace-1)

13、慢启动阶段为 0-0.3s, 0.3s 开始拥塞避免。

书上讲, 在慢启动状态下, cwnd 从一个 MSS 开始, 每个传输的报文段首次被确认时就增加一个 MSS。

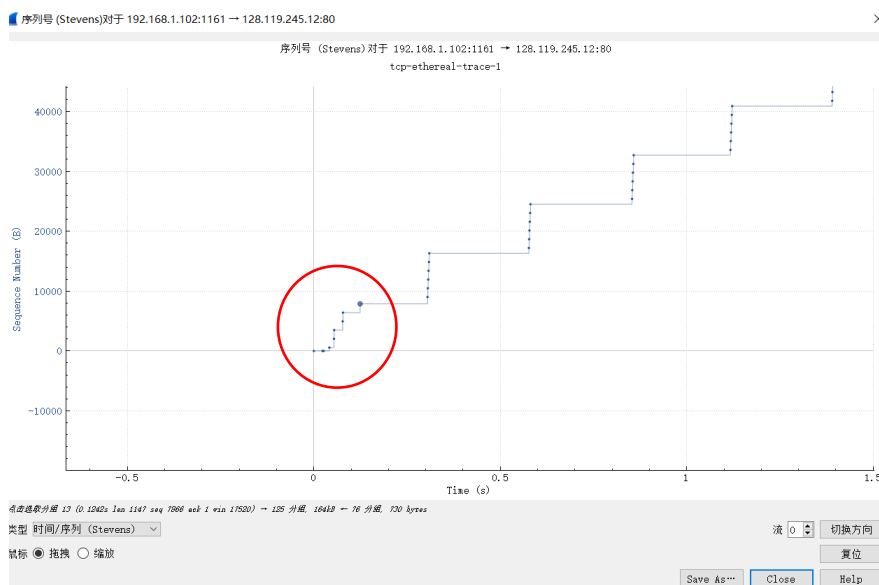
实际情况中, 客户端相继发送了 No.4 和 No.5 (因为 4 和 5 的发送时间间隔较长, 不能视为同时发送), 此时 cwnd=1;

No.6 是对应 No.4 的 ACK, 收到后 cwnd+=1, cwnd=2;

同时发送 No.7、No.8, 同时发送 No.10、No.11, 这段时间内 cwnd=2;

在 No.14-17, 收到了 4 个连续的 ACK, cwnd+=4, cwnd=6;

同时发送 No.18-23 六个包, 此后, 都是发 6 个包, 收到 6 个 ACK, 故 cwnd 达到了慢启动阈值 ssthresh, 进入了拥塞避免状态。



No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.102	128.119.245.12	TCP	62	1161 -> 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1
2	0.023172	128.119.245.12	192.168.1.102	TCP	62	80 -> 1161 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1
3	0.023265	192.168.1.102	128.119.245.12	TCP	54	1161 -> 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	0.026477	192.168.1.102	128.119.245.12	TCP	619	1161 -> 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled
5	0.041737	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
6	0.053937	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	0.054026	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
8	0.054690	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
9	0.077294	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	0.077405	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
11	0.078157	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
12	0.124085	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	0.124185	192.168.1.102	128.119.245.12	TCP	1201	1161 -> 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled
14	0.169118	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	0.217299	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	0.267802	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17	0.304807	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
18	0.305040	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=9013 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
19	0.305813	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=10473 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
20	0.306692	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=11933 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
21	0.307571	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=13393 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
22	0.308699	192.168.1.102	128.119.245.12	TCP	1514	1161 -> 80 [ACK] Seq=14853 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled
23	0.309553	192.168.1.102	128.119.245.12	TCP	946	1161 -> 80 [PSH, ACK] Seq=16313 Ack=1 Win=17520 Len=892 [TCP segment of a reassembled
24	0.356437	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=10473 Win=26280 Len=0
25	0.400164	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=11933 Win=29200 Len=0
26	0.448613	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=13393 Win=32120 Len=0
27	0.500029	128.119.245.12	192.168.1.102	TCP	60	80 -> 1161 [ACK] Seq=1 Ack=14853 Win=35040 Len=0

Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 1, Ack: 1, Len: 565

(14 题使用的是自己的追踪)

14、慢启动阶段为 0-0.8s, 0.8s 之后开始拥塞避免 (很快就发送完毕了)

