

# 计算机网络实验报告-lab4

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实验使用文档中的数据包

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? To answer this question, it's probably easiest to select an HTTP message and explore the details of the TCP packet used to carry this HTTP message, using the "details of the selected packet header window" (refer to Figure 2 in the "Getting Started with Wireshark" Lab if you're uncertain about the Wireshark windows.

```
> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12  
> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 0, Len
```

IP:192.168.1.102  
port:1161

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

IP:128.119.245.12  
port:80

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?

```
> Internet Protocol Version 4, Src: 114.214.218.114, Dst: 128.119.245.12  
> Transmission Control Protocol, Src Port: 53944, Dst Port: 80, Seq: 0, Len: 0
```

IP:114.214.218.114  
port:53944

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?

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
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
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
8	0.054690	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460
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
11	0.078157	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460
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
14	0.169118	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=7866 Win=14600 Len=0

Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 0, Len: 0

Source Port: 1161

Destination Port: 80

[Stream index: 0]

[Conversation completeness: Incomplete, DATA (15)]

[TCP Segment Len: 0]

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 232129012

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

Acknowledgment Number: 0

Acknowledgment number (raw): 0

0111 .... = Header Length: 28 bytes (7)

Flags: 0x002 (SYN)

000. .... = Reserved: Not set

Sequence Number (tcp.seq), 4 byte(s)

分組: 213 · 已显示: 202 (94.6%)

配置: Default

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 232129012

syn为1(flags为0x2)

- 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?

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
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

[Stream index: 0]

[Conversation completeness: Incomplete, DATA (15)]

[TCP Segment Len: 0]

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 883061785

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

Acknowledgment Number: 1 (relative ack number)

Acknowledgment number (raw): 232129013

0111 .... = Header Length: 28 bytes (7)

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

....0... .... = Acknowledgment: Set

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

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

> ....0... .... = Syn: Set

....0... .... = Fin: Not set

[TCP Flags: .....A..S.]

Window: 5840

[Calculated window size: 5840]

Acknowledgment Number (tcp.ack), 4 byte(s)

分組: 213 · 已显示: 202 (94.6%)

配置: Default

Sequence Number: 0 (relative sequence number)

Sequence Number (raw): 883061785

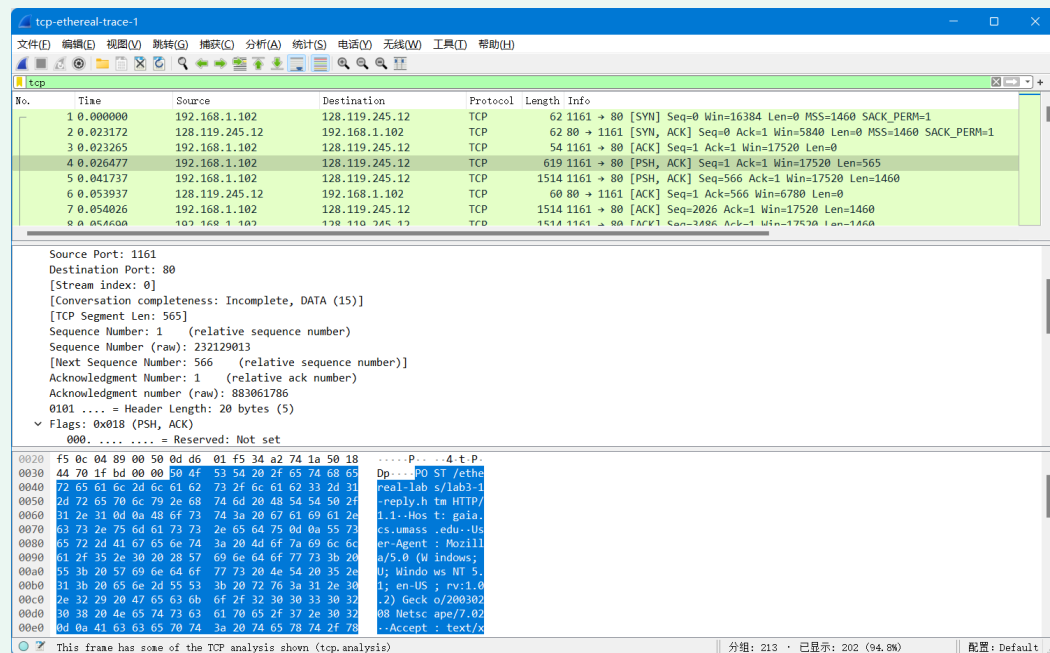
Acknowledgement Number: 1

Acknowledgement number(raw): 232129013

通过握手 ACK = seq + 1

Flags中0x012

6. What is the sequence number of the TCP segment containing the HTTP POST command? Note that in order to find the POST command, you'll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with a "POST" within its DATA field



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? Assume that the value of the EstimatedRTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 242 for all subsequent segments.

### 使用官方文档数据包， $\alpha$ 取0.125

No.	Time	Source	Destination	Protocol	Length	Info
3	0.026477	192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565
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
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
8	0.054690	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460
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
11	0.078157	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460

Sequence Number: 1 (relative sequence number)

发送时间[Time since first frame in this TCP stream: 0.026477 seconds]

Acknowledgment Number: 566 (relative ack number)

ACK:[Time since first frame in this TCP stream: 0.053937 seconds]

RTT:0.02746s

EstimatedRTT:0.02746s

Sequence Number: 566 (relative sequence number)  
发送时间[Time since first frame in this TCP stream: 0.041737 seconds]  
Acknowledgment Number: 2026 (relative ack number)  
ACK:[Time since first frame in this TCP stream: 0.077294 seconds]  
RTT:0.035557s  
EstimatedRTT:0.028472s

Sequence Number: 2026 (relative sequence number)  
发送时间[Time since first frame in this TCP stream: 0.054026 seconds]  
Acknowledgment Number: 3486 (relative ack number)  
ACK:[Time since first frame in this TCP stream: 0.124085 seconds]  
RTT:0.070059s  
EstimatedRTT:0.033670s

Sequence Number: 3486 (relative sequence number)  
发送时间[Time since first frame in this TCP stream:0.054690 seconds]  
Acknowledgment Number: 4946 (relative ack number)  
ACK:[Time since first frame in this TCP stream: 0.169118 seconds]  
RTT:0.114428 s  
EstimatedRTT:0.043765s

Sequence Number: 4946 (relative sequence number)  
发送时间[Time since first frame in this TCP stream:0.077405 seconds]  
Acknowledgment Number: 6406 (relative ack number)  
ACK:[Time since first frame in this TCP stream:0.217299 seconds]  
RTT: 0.139894s  
EstimatedRTT:0.055781s

Sequence Number: 6406 (relative sequence number)  
发送时间[Time since first frame in this TCP stream:0.078157 seconds]  
Acknowledgment Number: 7866 (relative ack number)  
ACK:[Time since first frame in this TCP stream:0.2678029 seconds]  
RTT: 0.189645s  
EstimatedRTT:0.072514s

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

见上截图: 565 1460 1460 1460 1460 1460

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?

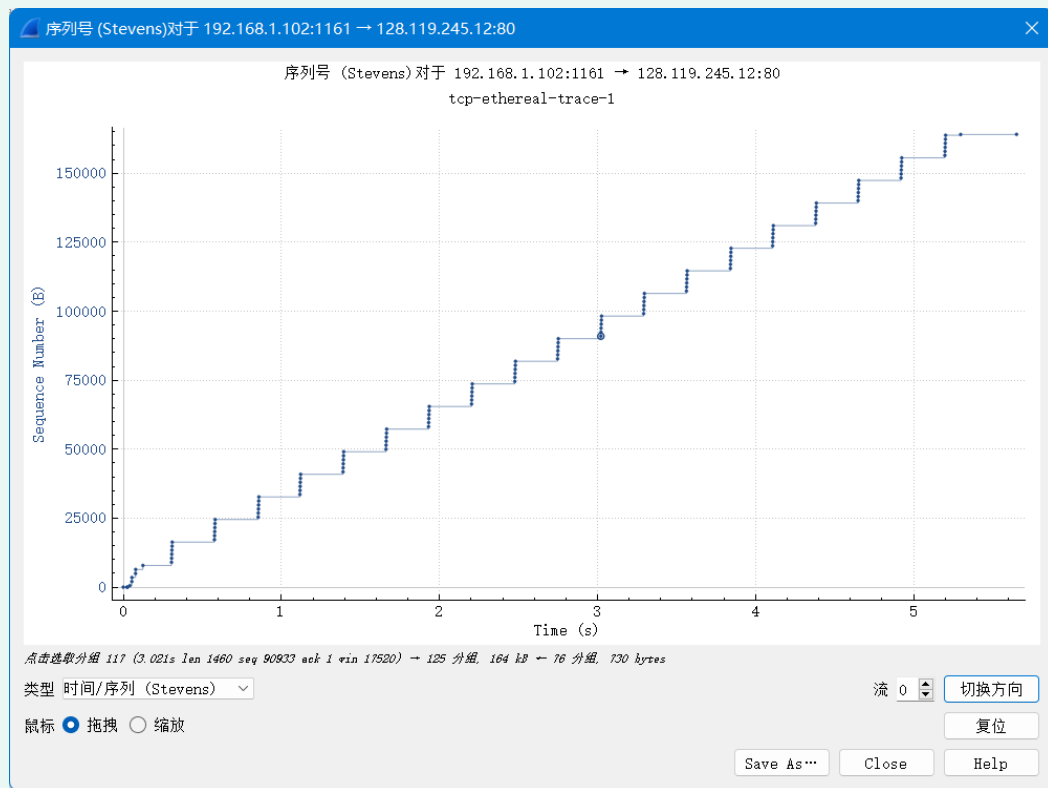
```
> Flags: 0x012 (SYN, ACK)
Window: 5840
[Calculated window size: 5840]
Checksum: 0x774d [unverified]
[Checksum Status: Unverified]
Urgent Pointer: 0
```

如图所示: 5840

没有

10. Are there any retransmitted segments in the trace file? What did you check for (in the trace) in order to answer this question?

没有重传, 通过观察seq一直增大



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).

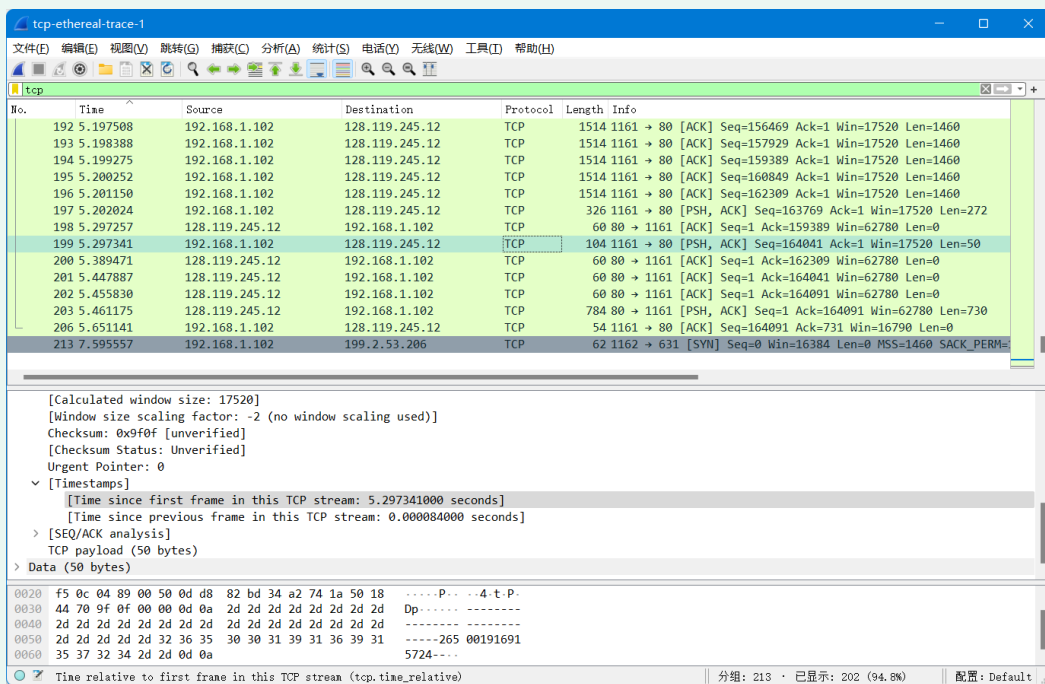
1460 比较ACK差

```

1514 1161 → 80 [ACK] Seq=123701 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=125161 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=126621 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=128081 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=129541 Ack=1 Win=17520 Len=1460
 946 1161 → 80 [PSH, ACK] Seq=131001 Ack=1 Win=17520 Len=892
1514 1161 → 80 [ACK] Seq=131893 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=133353 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=134813 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=136273 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=137733 Ack=1 Win=17520 Len=1460
 946 1161 → 80 [PSH, ACK] Seq=139193 Ack=1 Win=17520 Len=892
1514 1161 → 80 [ACK] Seq=140085 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=141545 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=143005 Ack=1 Win=17520 Len=1460
1514 1161 → 80 [ACK] Seq=144465 Ack=1 Win=17520 Len=1460

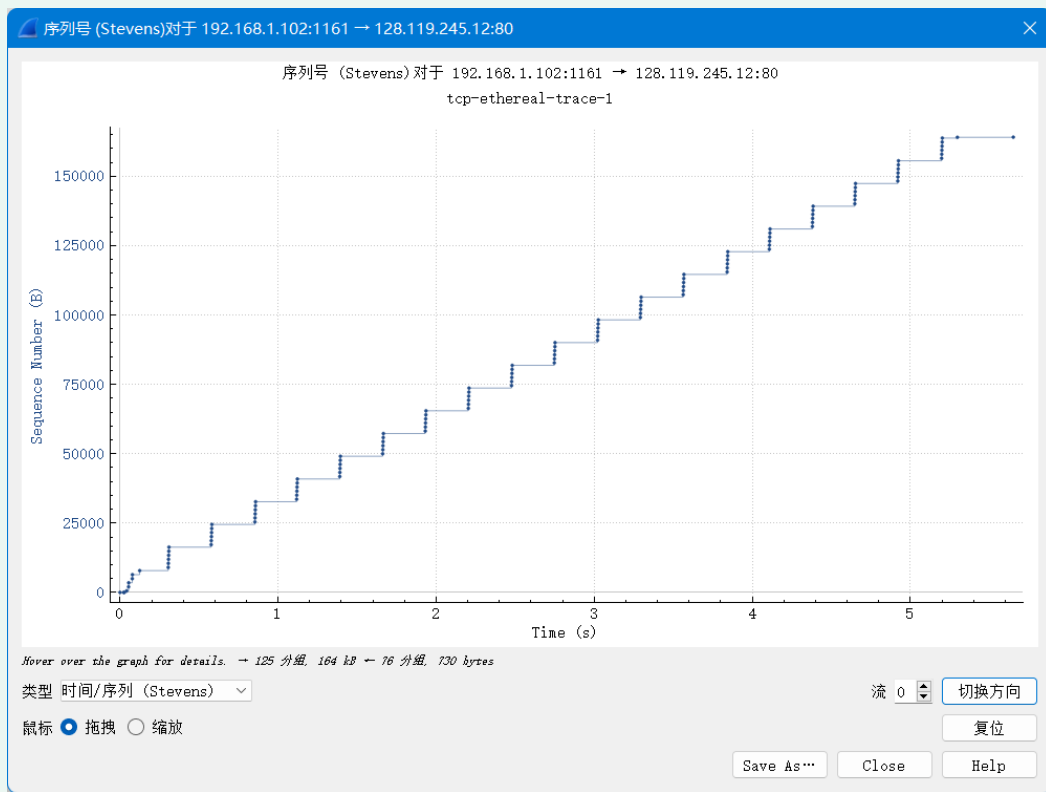
```

12. What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value.



$$\frac{164041 \times 8}{5.297341 - 0.000084} = 247737.2723 \text{ bps}$$

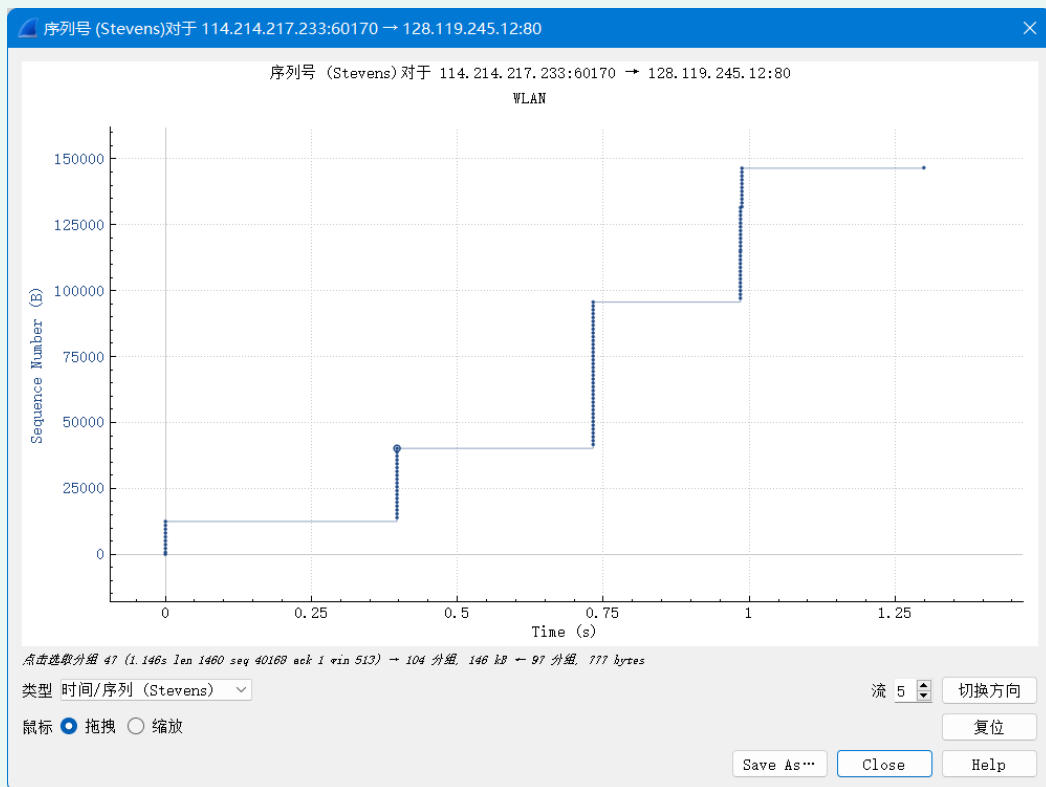
13. Use the Time-Sequence-Graph(Stevens) plotting tool to view the sequence number versus time plot of segments being sent from the client to the gaia.cs.umass.edu server. Can you identify where TCP's slowstart phase begins and ends, and where congestion avoidance takes over? Comment on ways in which the measured data differs from the idealized behavior of TCP that we've studied in the text.



感觉基本看不出来

文件太小，发送速度非常快，且不存在理想的线性或指数曲线

14. Answer each of two questions above for the trace that you have gathered when you transferred a file from your computer to gaia.cs.umass.edu



自己发的文件完全看不出来慢启动

