

**HỌ TÊN : NGUYỄN XUÂN TRỰC**

**MSSV : 1513804**

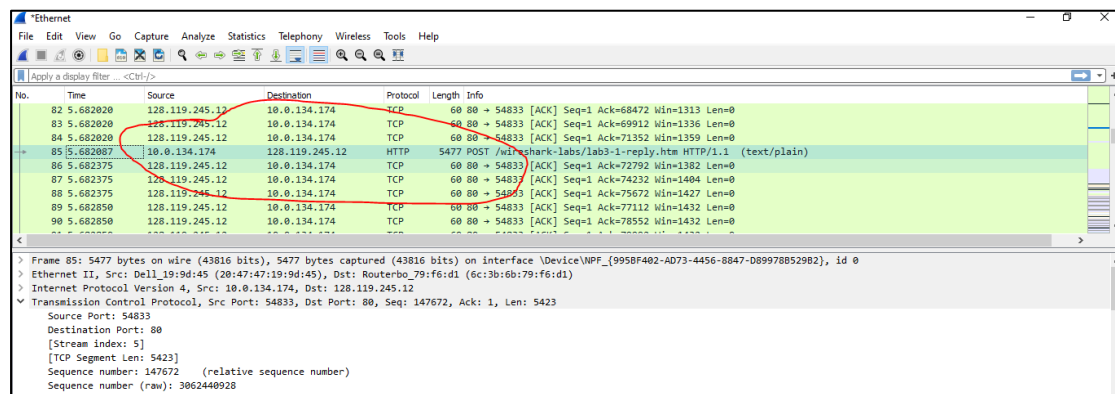
**LỚP : L04**

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**Question 01.** 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).

### ANSWER

Địa chỉ IP nguồn 10.0.134.174 và sử dụng port 54833



**Question 02.** What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection?

### ANSWER

Địa chỉ đích 128.119.245.12 và sử dụng port 80

**Question 03.** What is the IP address and TCP port number used by your client computer (source) to transfer the file to gaia.cs.umass.edu?

### ANSWER

Địa chỉ IP là IP local, TCP port là port local

**Question 04.** 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?

**ANSWER**

Số thứ tự của phân đoạn được sử dụng để kết nối đến TCP là 0. Chúng ta có thể thấy rằng thông báo cho chứa cờ SYN chỉ ra rằng đó là một phân đoạn SYN.

**Question 05.** 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?

**ANSWER**

Số thứ tự phân đoạn của SYNACK là 0. giá trị của trường xác nhận 1. Thông báo mang cờ (flag) cho thấy nó là một thông báo SYNACK

**Question 06.** 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.

**ANSWER**

Số thứ tự phân đoạn là 147672

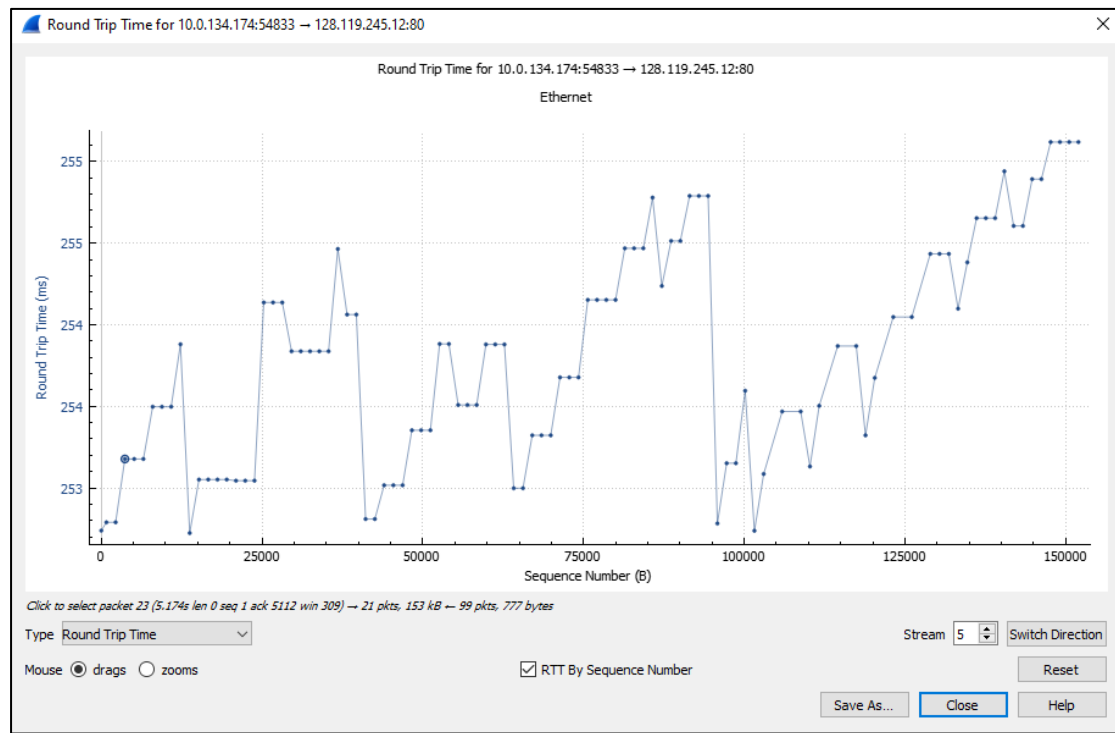
No.	Time	Source	Destination	Protocol	Length	Info
79	5.681696	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=65592 Win=1268 Len=0
80	5.681696	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=67832 Win=1290 Len=0
81	5.681732	10.0.134.174	128.119.245.12	TCP	5814	54833 → 80 [ACK] Seq=141912 Ack=1 Win=517 Len=5760 [TCP segment of a reassembled PDU]
82	5.682020	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=68472 Win=1313 Len=0
83	5.682020	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=69912 Win=1336 Len=0
84	5.682020	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=71352 Win=1359 Len=0
85	5.682087	10.0.134.174	128.119.245.12	HTTP	5477	POST /wireshark-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)
86	5.682375	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=72792 Win=1382 Len=0
87	5.682375	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=74232 Win=1404 Len=0

Frame 85: 5477 bytes on wire (43816 bits), 5477 bytes captured (43816 bits) on interface \Device\NPF\_{995BF402-AD73-4456-8847-D89978B52982}, id 0  
 Ethernet II, Src: Dell\_19:9d:45 (28:47:47:19:9d:45), Dst: Routerbo\_79:f6:d1 (6c:3b:6b:79:f6:d1)  
 Internet Protocol Version 4, Src: 10.0.134.174, Dst: 128.119.245.12  
 Transmission Control Protocol, Src Port: 54833, Dst Port: 80, Seq: 147672, Ack: 1, Len: 5423  
   Source Port: 54833  
   Destination Port: 80  
   [Stream index: 5]  
   [TCP Segment Len: 5423]  
   Sequence number: 147672 (relative sequence number)  
   Sequence number (raw): 3062440928  
   Next sequence number: 153095 (relative sequence number)  
   Acknowledgment number: 1 (relative ack number)  
   Acknowledgment number (raw): 257921512  
   0101 ... = Header Length: 20 bytes (5)  
   Flags: 0x018 (PSH, ACK)

**Question 07.** 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 239 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 239 for all subsequent segments.

## ANSWER



**Question 08.** What is the length of each of the first six TCP segments?

## ANSWER

791

The image shows a Wireshark packet capture of a TCP connection. The packet list pane shows the first six TCP segments (packets 7-12). The packet details pane shows the structure of a TCP segment (packet 13).

No.	Time	Source	Destination	Protocol	Length	Info
7	3.525135	122.11.128.126	10.0.134.174	TCP	114	19000 -> 54300 [PSH, ACK] Seq=1 Ack=1 Win=231 Len=0
8	3.565102	10.0.134.174	122.11.128.126	TCP	54	54300 -> 19000 [ACK] Seq=1 Ack=61 Win=512 Len=0
9	4.055497	10.0.134.174	128.119.245.12	TCP	60	54300 -> 80 [FIN, ACK] Seq=1 Ack=1 Win=516 Len=0
10	4.677466	10.0.134.174	128.119.245.12	TCP	54	54825 -> 80 [FIN, ACK] Seq=1 Ack=1 Win=516 Len=0
11	4.891439	10.0.134.174	128.119.245.12	TCP	54	54828 -> 80 [FIN, ACK] Seq=1 Ack=1 Win=516 Len=0
12	4.891848	10.0.134.174	128.119.245.12	TCP	66	54835 -> 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
13	4.920913	10.0.134.174	128.119.245.12	TCP	845	54833 -> 80 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=791 [TCP segment of a reassembled PDU]
14	4.921191	10.0.134.174	128.119.245.12	TCP	13014	54833 -> 80 [ACK] Seq=792 Ack=1 Win=517 Len=12960 [TCP segment of a reassembled PDU]
15	5.072208	10.0.134.174	128.119.245.12	ARP	42	Who has 10.0.130.153? Tell 10.0.134.174

Transmission Control Protocol, Src Port: 54833, Dst Port: 80, Seq: 1, Ack: 1, Len: 791

Source Port: 54833

Destination Port: 80

[Stream index: 5]

[TCP Segment Len: 791]

Sequence number: 1 (relative sequence number)

Sequence number (raw): 3062293257

[Next sequence number: 792 (relative sequence number)]

Acknowledgment number: 1 (relative ack number)

Acknowledgment number (raw): 257921512

0101 .... = Header Length: 20 bytes (5)

Flags: 0x018 (PSH, ACK)

**Question 09.** What is the minimum amount of available buffer space advertised at the receiver for the entire trace? Does the lack of receiver buffer space ever throttle the sender?

## ANSWER

Minimum amount of buffet space is 29200 bytes

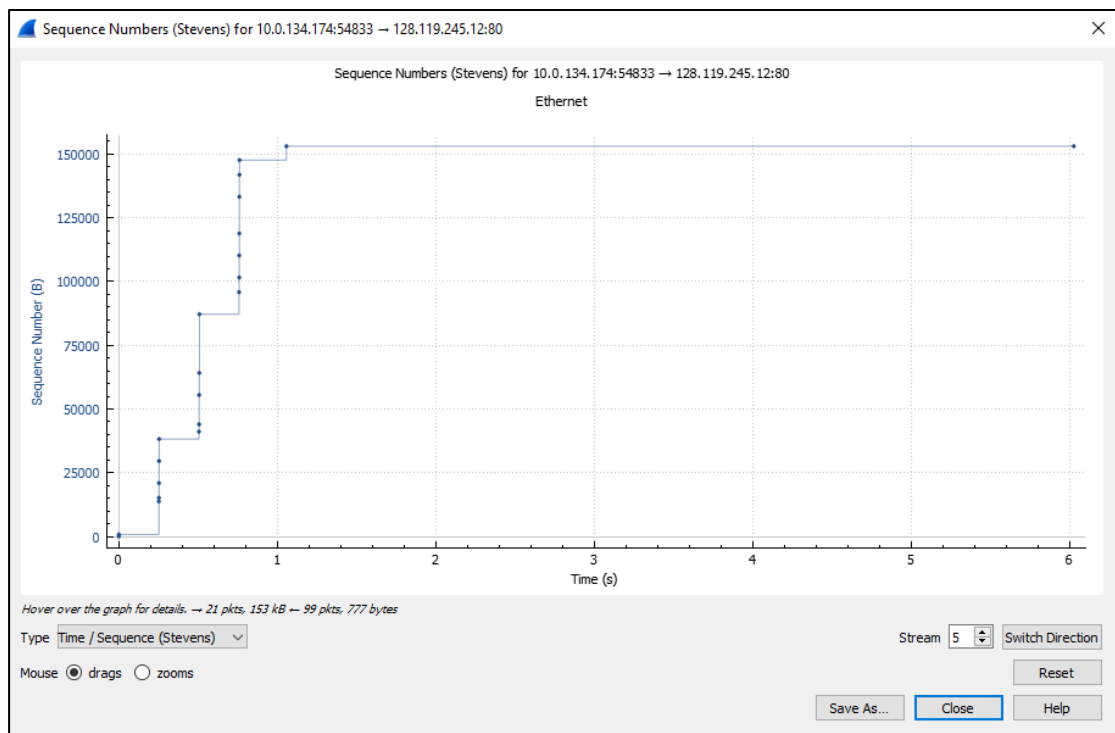
No.	Time	Source	Destination	Protocol	Length	Info
13	4.928913	10.0.134.174	128.119.245.12	TCP	845	54833 → 80 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=791 [TCP segment of a reassembled PDU]
14	4.921191	10.0.134.174	128.119.245.12	TCP	13014	54833 → 80 [ACK] Seq=792 Ack=1 Win=517 Len=12960 [TCP segment of a reassembled PDU]
15	5.072288	Dell_19:9d:45	Broadcast	ARP	42	Who has 10.0.130.153? Tell 10.0.134.174
16	5.138421	128.119.245.12	10.0.134.174	TCP	66	80 → 54835 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1440 SACK_PERM=1 WS=128
17	5.138635	10.0.134.174	128.119.245.12	TCP	54	54835 → 80 [ACK] Seq=1 Ack=1 Win=12352 Len=0
18	5.173651	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=13752 Ack=1 Win=517 Len=1440 [TCP segment of a reassembled PDU]
19	5.173704	10.0.134.174	128.119.245.12	TCP	1494	54833 → 80 [ACK] Seq=13752 Ack=1 Win=517 Len=1440 [TCP segment of a reassembled PDU]
20	5.173980	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=2232 Win=264 Len=0
21	5.173980	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=3672 Win=287 Len=0

Header checksum: 0x495a [validation disabled]  
[Header checksum status: Unverified]  
Source: 128.119.245.12  
Destination: 10.0.134.174

Transmission Control Protocol, Src Port: 80, Dst Port: 54835, Seq: 0, Ack: 1, Len: 0  
Source Port: 80  
Destination Port: 54835  
[Stream index: 4]  
[TCP Segment Len: 0]  
Sequence number: 0 (relative sequence number)  
Sequence number (raw): 371569284  
[Next sequence number: 1 (relative sequence number)]  
Acknowledgement number: 1 (relative ack number)

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

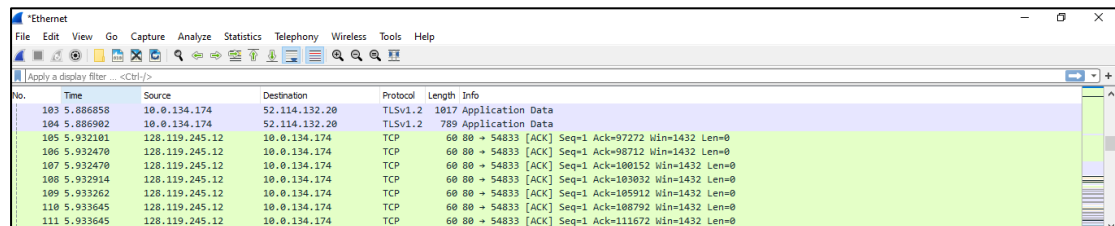
## ANSWER



**Question 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 278 in the text).

### ANSWER

Như hình dưới thì ACK number tăng lên mỗi 1432 lần. Vì vậy kết quả là 1432 bytes



The image shows a Wireshark packet capture window titled "Ethernet". The packet list pane displays several TCP segments. The selected packet (No. 106) is a TCP ACK from source 128.119.245.12 to destination 10.0.134.174. The packet details pane shows the TCP header with Seq=1, Ack=97272, Win=1432, Len=0. The packet bytes pane shows the application data. The packet list pane shows the following packets:

No.	Time	Source	Destination	Protocol	Length	Info
103	5.886858	10.0.134.174	52.114.132.20	TLSv1.2	1017	Application Data
104	5.886982	10.0.134.174	52.114.132.20	TLSv1.2	789	Application Data
105	5.932181	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=97272 Win=1432 Len=0
106	5.932470	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=98712 Win=1432 Len=0
107	5.932470	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=100152 Win=1432 Len=0
108	5.932914	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=103032 Win=1432 Len=0
109	5.933262	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=105912 Win=1432 Len=0
110	5.933645	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=108792 Win=1432 Len=0
111	5.933645	128.119.245.12	10.0.134.174	TCP	60	80 → 54833 [ACK] Seq=1 Ack=111672 Win=1432 Len=0

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

### ANSWER

Average throughput of a connection =  $(0.75 * W) / RTT$

**Question 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

### ANSWER

