ĐẠI HỌC QUỐC GIA TP. HỒ CHÍ MINH TRƯỜNG ĐẠI HỌC BÁCH KHOA KHOA

KHOA HỌC VÀ KỸ THUẬT MÁY TÍNH


# BÁO CÁO MẠNG MÁY TÍNH THỰC HÀNH (CO3094)

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## LAB 3B

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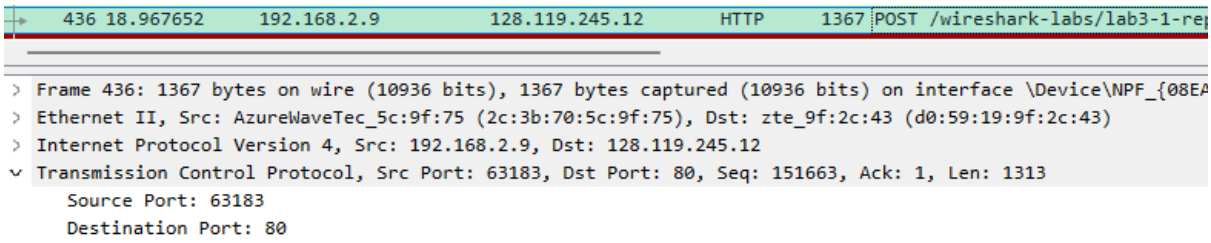
GV hướng dẫn: Lê Bảo Khánh

SV thực hiện: Phùng Xương Cận 2210348

Thành phố Hồ Chí Minh, Tháng 10 năm 2024

## 2. A first look at the captured trace

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.

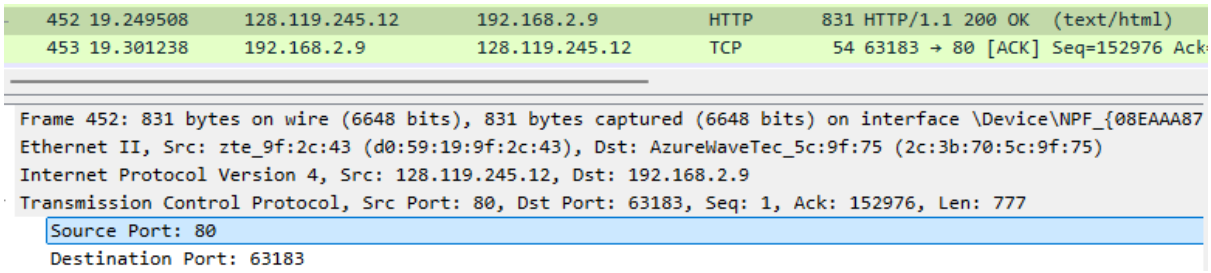



According to above figure, the client computer (source)'s IP address is 192.168.2.9.

Source Port: 63183

Destination Port: 80

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?



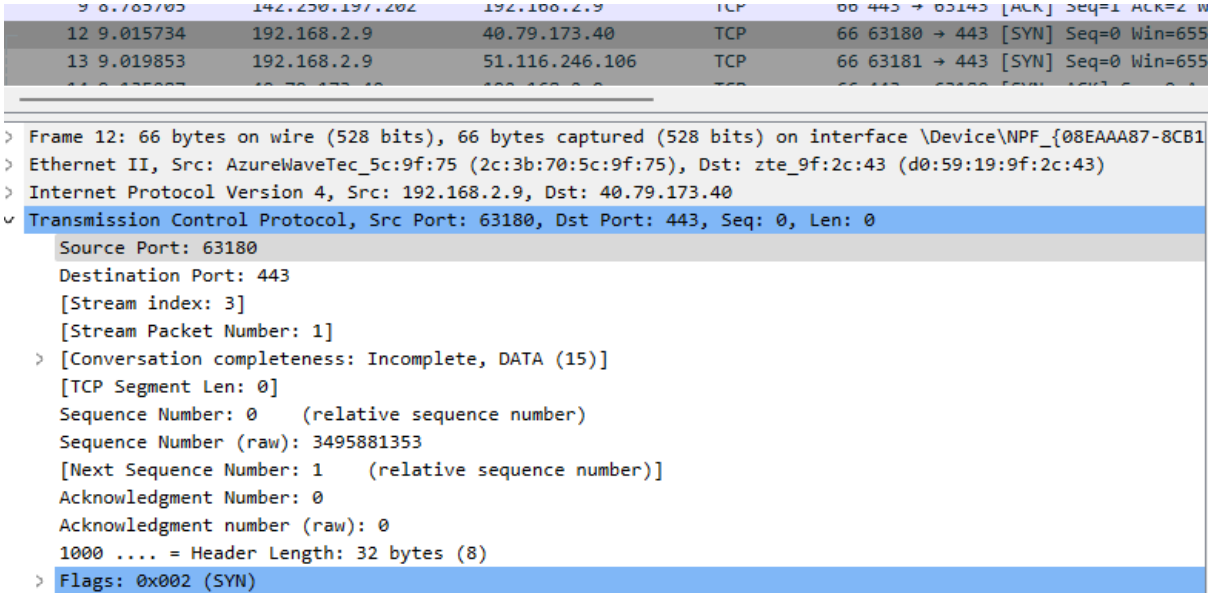

According to above figure, the IP address of gaia.cs.umass.edu is 128.119.245.12 and the TCP port number is 80.

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?

my client computer's IP address is 192.168.2.9 and the TCP port is 63183.

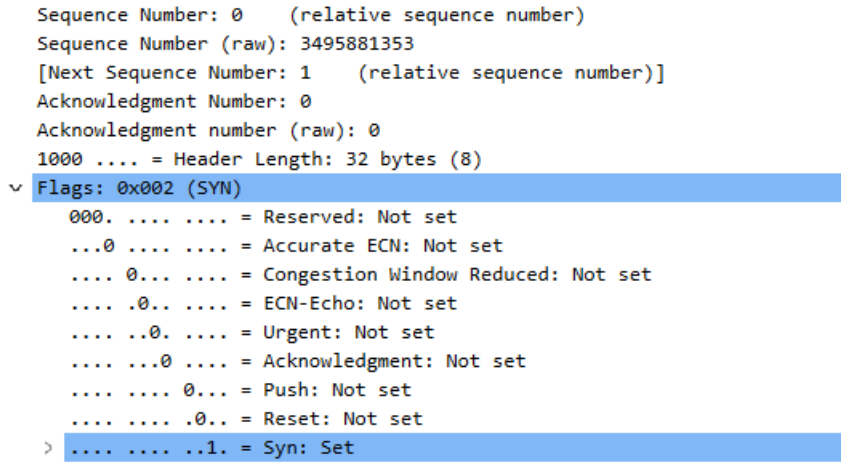
## 3. TCP Basics

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?




The sequence number of the segment used to initiate the TCP connection is 0. We can see that the message contains a SYN flag indicating that it is 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?

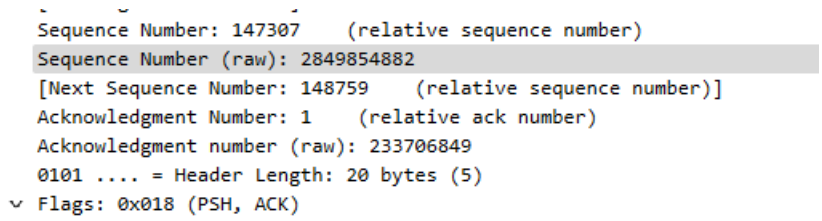



According to the above figure, the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN is 0.

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 gaia.cs.umass.edu. 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.

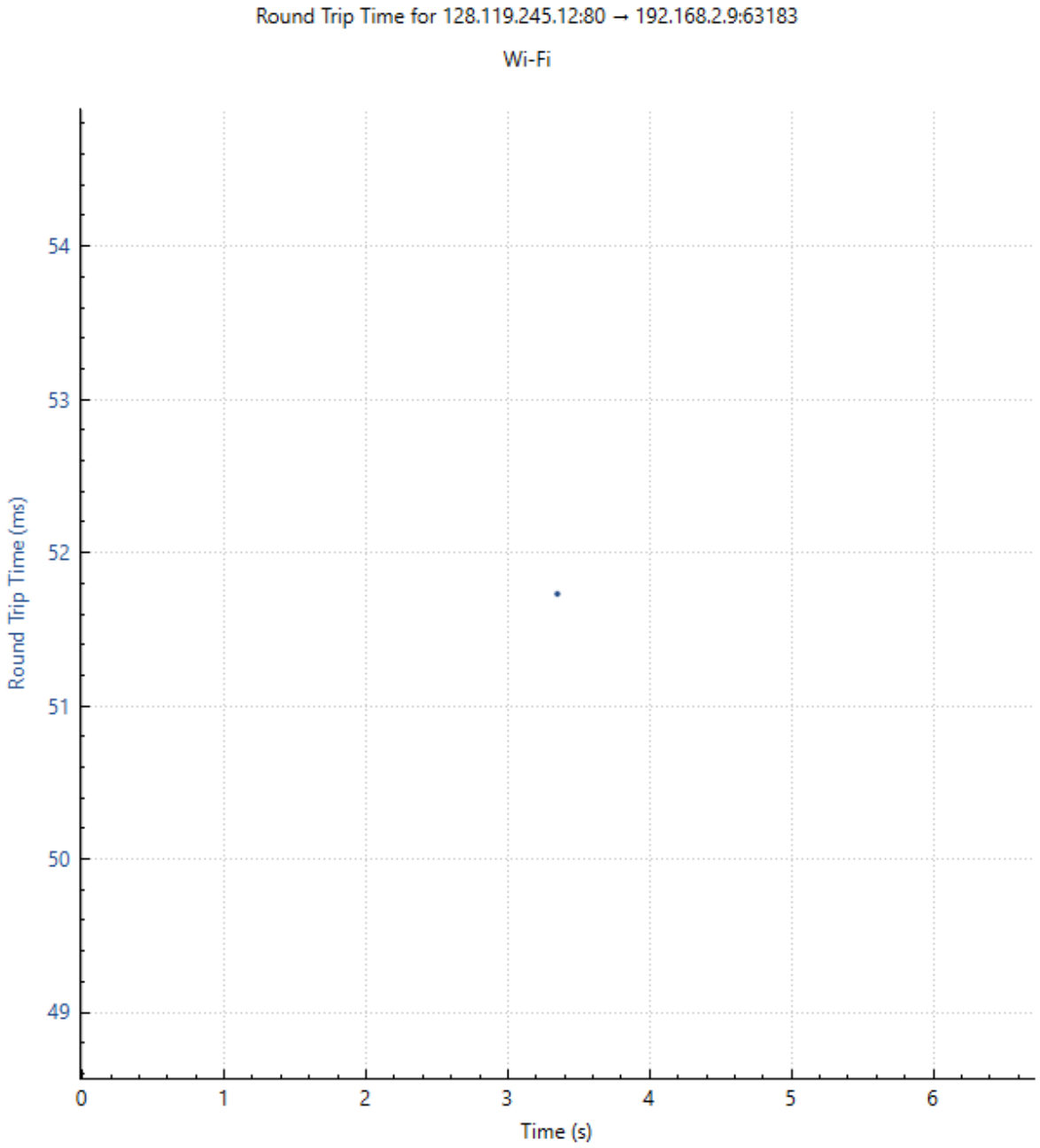
A segment will be identified as a SYNACK segment if both SYN flag and Acknowledgement in the segment are set to 1.

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

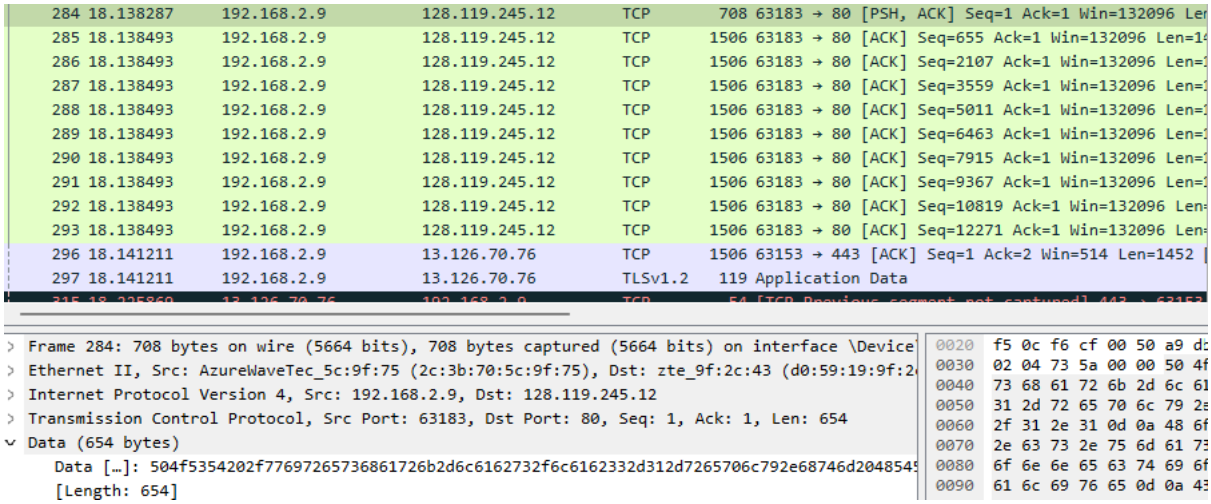



The sequence number of the TCP segment containing the HTTP Post Command is 147307

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 whenits 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.

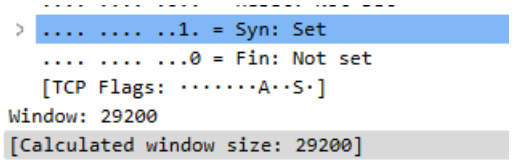



8. What is the length of each of the first six TCP segments?




The length of the first TCP segment is 654 bytes, the length of the second TCP segment is 1452 bytes. The length of each of the following five TCP segments is 1506 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?




The minimum amount of available buffer space advertised at the received for the entire trace is indicated first ACK from the server, its value is 29200 bytes (shown in above figure).

The sender is never throttled because we never reach full capacity of the window.

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

No, no segments were ever retransmitted. This is shown by the fact that an old Acknowledgement number was never resent in order to re-request former packets.

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 247 in the text).

From the screenshot , we see that the ACK numbers increase in the sequence 32599, 15175, 18079, . . . . Note that the ACK numbers increase by 2904 each time, indicating that

| | | | | |
|---|---|---|---|---|
| 4 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [PSH, ACK] Seq=32599 Ack=1 Win=132096 Len=1452 |
| 4 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [ACK] Seq=34051 Ack=1 Win=132096 Len=1452 |
| 4 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [ACK] Seq=35503 Ack=1 Win=132096 Len=1452 |
| 4 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [ACK] Seq=36955 Ack=1 Win=132096 Len=1452 |
| 4 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [ACK] Seq=38407 Ack=1 Win=132096 Len=1452 |
| 4 | 192.168.2.9 | 142.250.197.206 | TCP | 55 63151 → 443 [ACK] Seq=1 Ack=1 Win=509 Len=1 |
| 5 | 142.250.197.206 | 192.168.2.9 | TCP | 66 443 → 63151 [ACK] Seq=1 Ack=2 Win=1046 Len=0 SLE=1 SRE=2 |
| 5 | 128.119.245.12 | 192.168.2.9 | TCP | 54 80 → 63183 [ACK] Seq=1 Ack=15175 Win=59648 Len=0 |
| 8 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [ACK] Seq=39859 Ack=1 Win=132096 Len=1452 |
| 8 | 192.168.2.9 | 128.119.245.12 | TCP | 1506 63183 → 80 [ACK] Seq=41311 Ack=1 Win=132096 Len=1452 |
| 1 | 128.119.245.12 | 192.168.2.9 | TCP | 54 80 → 63183 [ACK] Seq=1 Ack=18079 Win=65408 Len=0 |
| 1 | 128.119.245.12 | 192.168.2.9 | TCP | 54 80 → 63183 [ACK] Seq=1 Ack=22435 Win=74112 Len=0 |

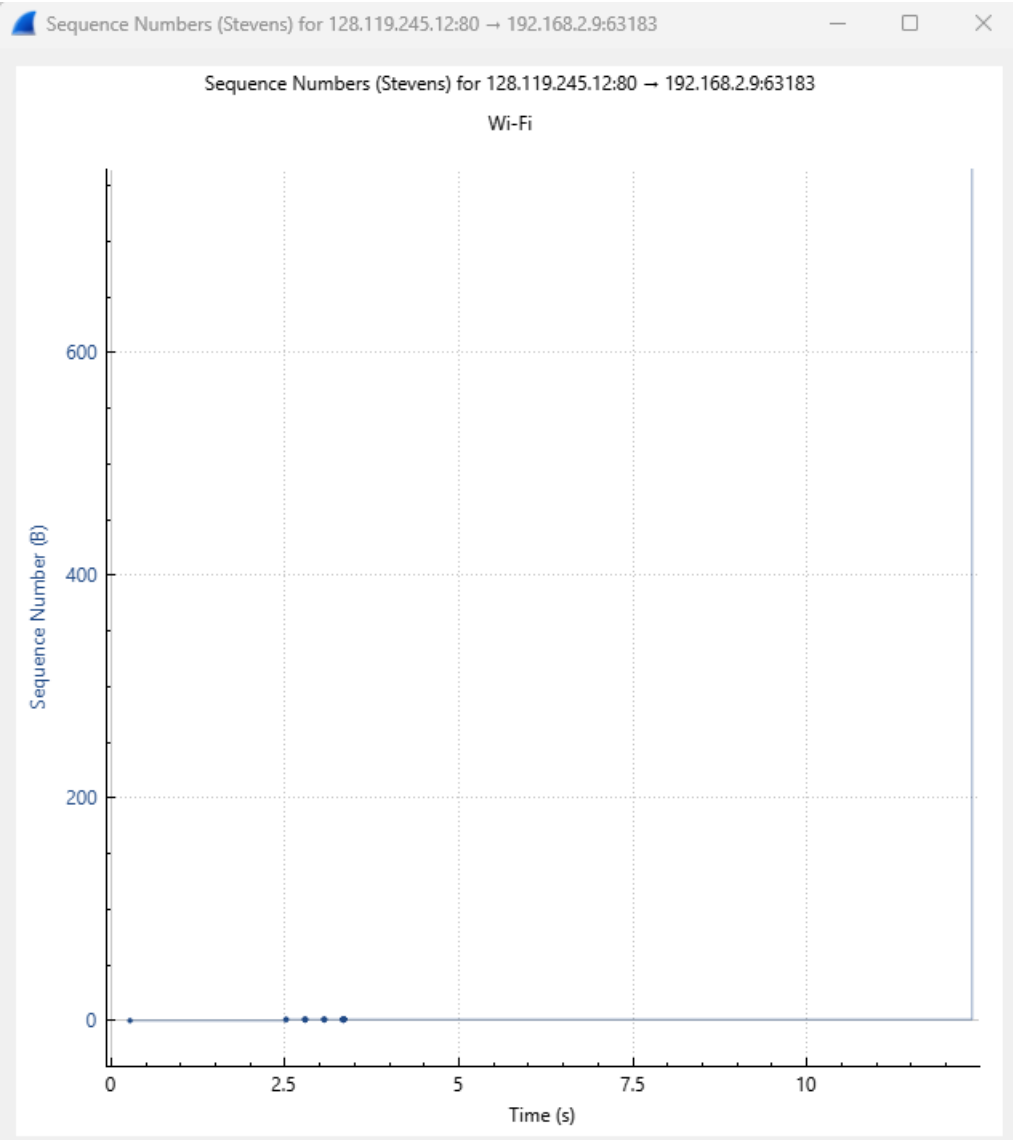
the receiver is ac-knowledging 2904 bytes.

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

The alice.txt on the hard drive is 152,138 bytes, and the download time is 1.578736000 (First TCP segment) - 0.271257000 (last ACK) = 1.307479 second. Therefore, the throughput for the TCP connection is computed as 152,138/1.307479=116359.803867 bytes/second.

**4. TCP congestion control in action**

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.




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

The questions had been answered