CSE 421 **ID:** 19101579

Transport Layer Protocols (TCP) Examination Lab

Objectives:

Capture traffic and observe the PDUS for TCP when a HTTP request is made.
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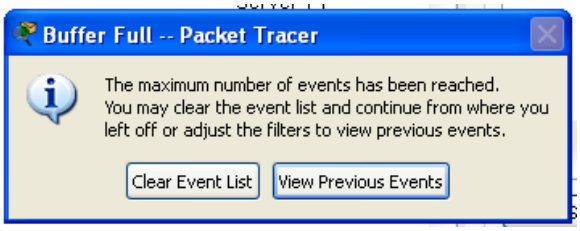
Task 1: Observe TCP traffic exchange between a client and server.

Step 1 – Run the simulation and capture the traffic.

- Enter **Simulation** mode.
- Check that your Event List Filters shows only **HTTP** and **TCP**.
- Click on the PC1. Open the **Web Browser** from the **Desktop**.
- Enter **www.bracu.ac.bd** into the browser. Clicking on **Go** will initiate a web server request. Minimize the Web Client configuration window.
- A TCP packet appears in the **Event List**, as we will only focus on TCP the DNS and ARP packets are not shown.
- Click the **Auto Capture / Play** button to run the simulation and capture events.
- Sit tight and observe the packets flowing through the network.



- When the above message appears Click “View Previous Events".
- Click on PC1. The web browser displays a web page appears.

Step 2 – Examine the following captured traffic.

Our objective in this lab is only to observe TCP traffic.

	Last Device	At Device	Type
1.	PC1	Switch 0	TCP
2.	Local Web Server	Switch 1	TCP
3.	PC1	Switch 0	HTTP
4.	Local Web Server	Switch 1	HTTP
5.	PC1 (after HTTP response)	Switch 0	TCP
6.	Local Web Server	Switch 1	TCP
7.	PC1	Switch 0	TCP

- As before find the following packets given in the table above in the **Event List**, and click on the colored square in the **Info** column.

- When you click on the Info square for a packet in the event list the **PDU Information** window opens. If you click on these layers, the algorithm used by the device (in this case, the PC) is displayed. View what is going on at each layer.

For packet 1::

Click onto “Inbound PDU details” tab. Scroll down and observe the TCP header.

A. What is this TCP segment created by PC1 for? How do you know what is it for?

The TCP segment was created to establish the TCP connection. The flags determine the connection state and control specific connection. Here, since the SYN flag is 1 we understand that it has been used as an enable for the TCP connection.

B. What control flags are visible?

Only the SYN or Synchronization Request Flag is visible.

C. What are the sequence and acknowledgement numbers?

Both are 0

For packet 2:

Click onto “Inbound PDU details” tab. Scroll down and observe the TCP header.

A. Why is this TCP segment created by the Local Web Server?

The TCP packet was created to do the three-way handshaking and it was sent as an acknowledgement of the previous SYN request.

B. What control flags are visible?

SYN and ACK flags

C. Why is the acknowledgement number “ 1”?

The SYN flag is 1 because PC1's SYN request was received. For the ACK flag, to identify the next segment's connection it has been set to 1.

For packet 3:

This HTTP PDU is actually the third packet of the “Three Way Handshake” process, along with the HTTP request.

A. Explain why control flags **ACK(Acknowledgement)** and **PSH (Push)** are visible in the TCP header?

ACK is there to define that the connection was properly built and the packet was received successfully. Additionally, the PSH flag is set to 1 so that the exchanged data is continuously fed into the connection.

For packet 5:

After PC1 receives the HTTP response from the Local Web Server, it again sends a TCP packet to the Local Web server why?

To close the TCP connection that was established with the web server.

Click onto “Inbound PDU details” tab. Scroll down and observe the TCP header.

A. What control flags are visible?

ACK and FIN

B. Why the sequence number is 104 and acknowledge number 254? Note this packet is created after PC1 receives the HTTP response from the server.

Since the packet's length is 104 bytes, the sequence number is 104. And, the acknowledgement number is 254 because the server is expecting 254 packets from PC1 as an acknowledgement and it is the sequence number of the next sequence.

For packet 6:

Click onto “Inbound PDU details” tab. Scroll down and observe the TCP header.

What is this packet sent from the webserver to PC1 for?

To determine if PC1 wants to disconnect from the web server to terminate the ongoing connection and to acknowledge the finish request.

What control flags are visible?

ACK and FIN

Why the sequence number is 254?

Because the acknowledgement number and the packet last sent was 254.