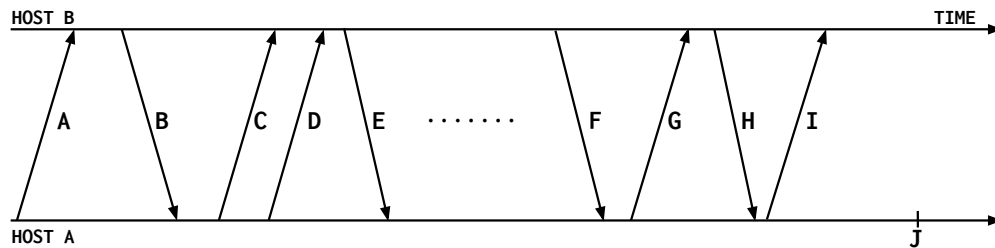


1 Pop Quiz: TCP vs UDP

For each statement below, mark whether describes TCP, UDP, both (mark both) or neither (mark none).

	TCP	UDP
Provides reliable transport		
Limits messages to a single packet		
Has source port in the header		
Requires connection establishment		
You used this for your project 1.		
It is optional to use the L4 checksum with this protocol (under IPv4)		

2 Flags



The above figure shows the life cycle of a TCP connection with normal termination - that is, connection establishment, data exchange, and teardown.

- (1) For each of the arrows, choose whether it is a SYN, ACK, data, FIN or RST packet. A single arrow might have more than one of these flags set.

A: _____ D: _____ G: _____
 B: _____ E: _____ H: _____
 C: _____ F: _____ I: _____

- (2) When host A sends packet I, it sets a timer that ends at point J. What is the purpose of this timeout?

3 TCP in Action

Consider a sender sending 1000 B of data to a receiver over **TCP**. The sender sends packets of 100B, the window size is 300B, and the ISN is 99 (so D100 is the first packet sent, then D200, and so on). Remember, TCP uses a sliding window, and retransmits the packet containing the next expected byte on a timeout or the 3rd duplicate ACK.

The link is **flaky**! The **initial** transmission of packets **D200 and D700** get dropped.

- (1) Fill in the below table with all packets sent by the sender until the receiver has received all packets and the sender knows that. For simplicity, assume that packets (data and ACKs) arrive in order. You may or may not need to fill in all lines.

#	Packet # Sent	Sent on timeout?	Dropped?	Cumulative ACK
1	D100			A200
2	D200		X	
3	D300			A200
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

- (2) If the RTT of the link is 10ms and the timeout is initially 3 seconds, what is the total time needed for the receiver to receive all packets and for the sender to know that? Assume small packets (negligible transmission delay) and negligible processing time, and that the estimates that go into the RTO remain constant during the events below.