CS 725/825 & IT 725

Lecture 16

Transport Layer

November 2, 2026

TCP session management

TCP Flags

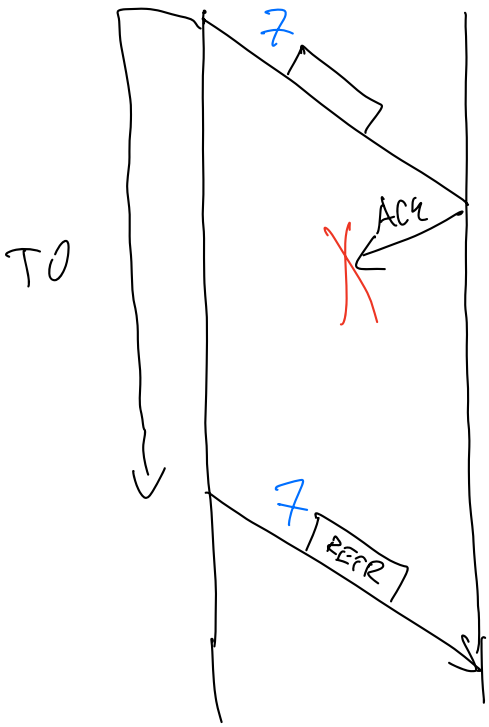
TCP Header

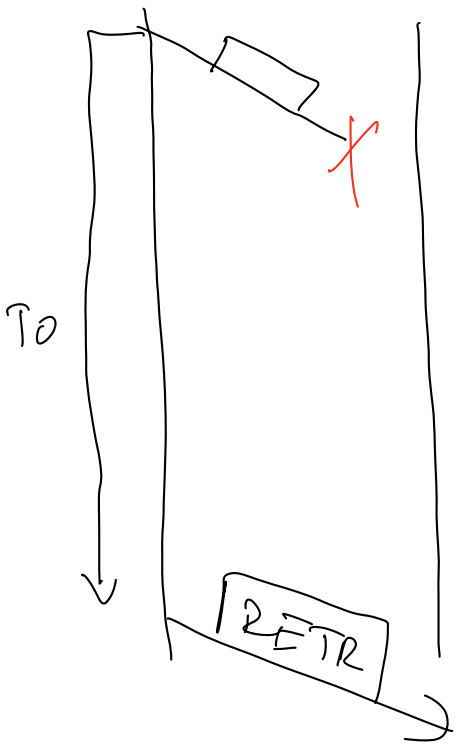
Offsets Octet	0								1								2								3							
Octet	Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	0	Source port																Destination port															
4	32	Sequence number																															
8	64	Acknowledgment number (if ACK set)																															
12	96	Data offset				Reserved 0 0 0				NS	CWR	ECE	URG	ACK	PSH	RST	SYN	FIN	Window Size														
16	128	Checksum																	Urgent pointer (if URG set)														
20 ...	160 ...	Options (if Data Offset > 5, padded at the end with "0" bytes if necessary) ...																															

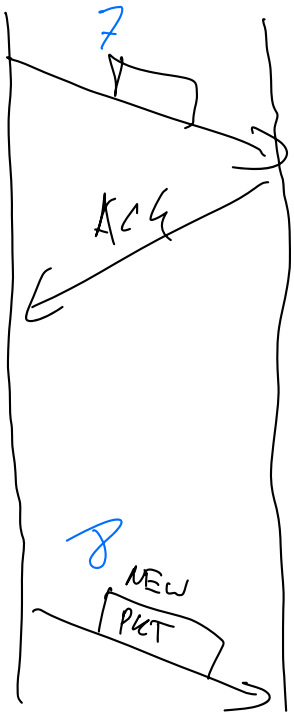
Another image appropriated from Wikipedia...

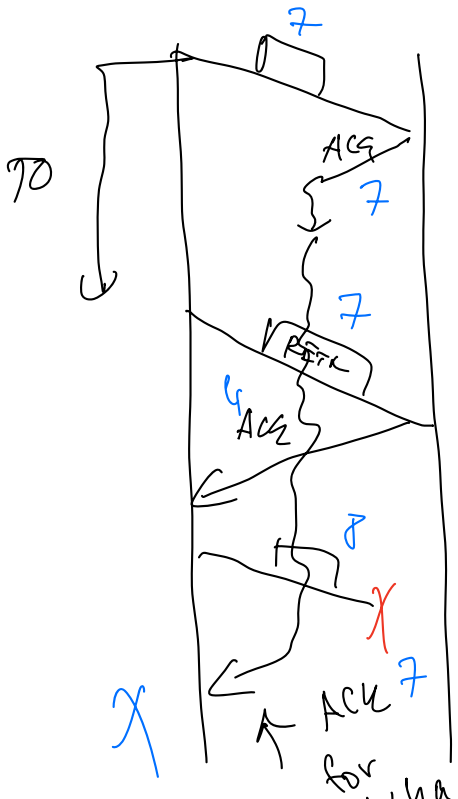
MOTIVATION:

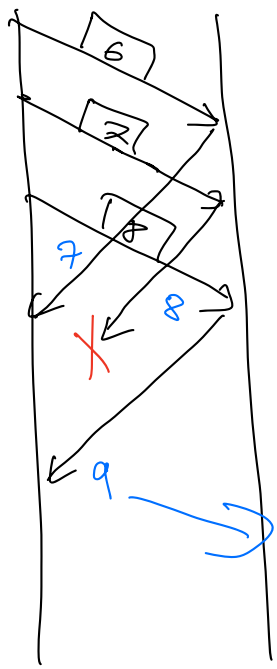
- SEQUENCE NUMBERS
- ACKNOWLEDGMENT NUMBERS

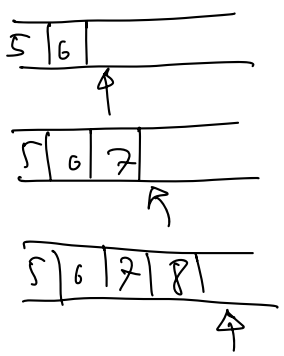








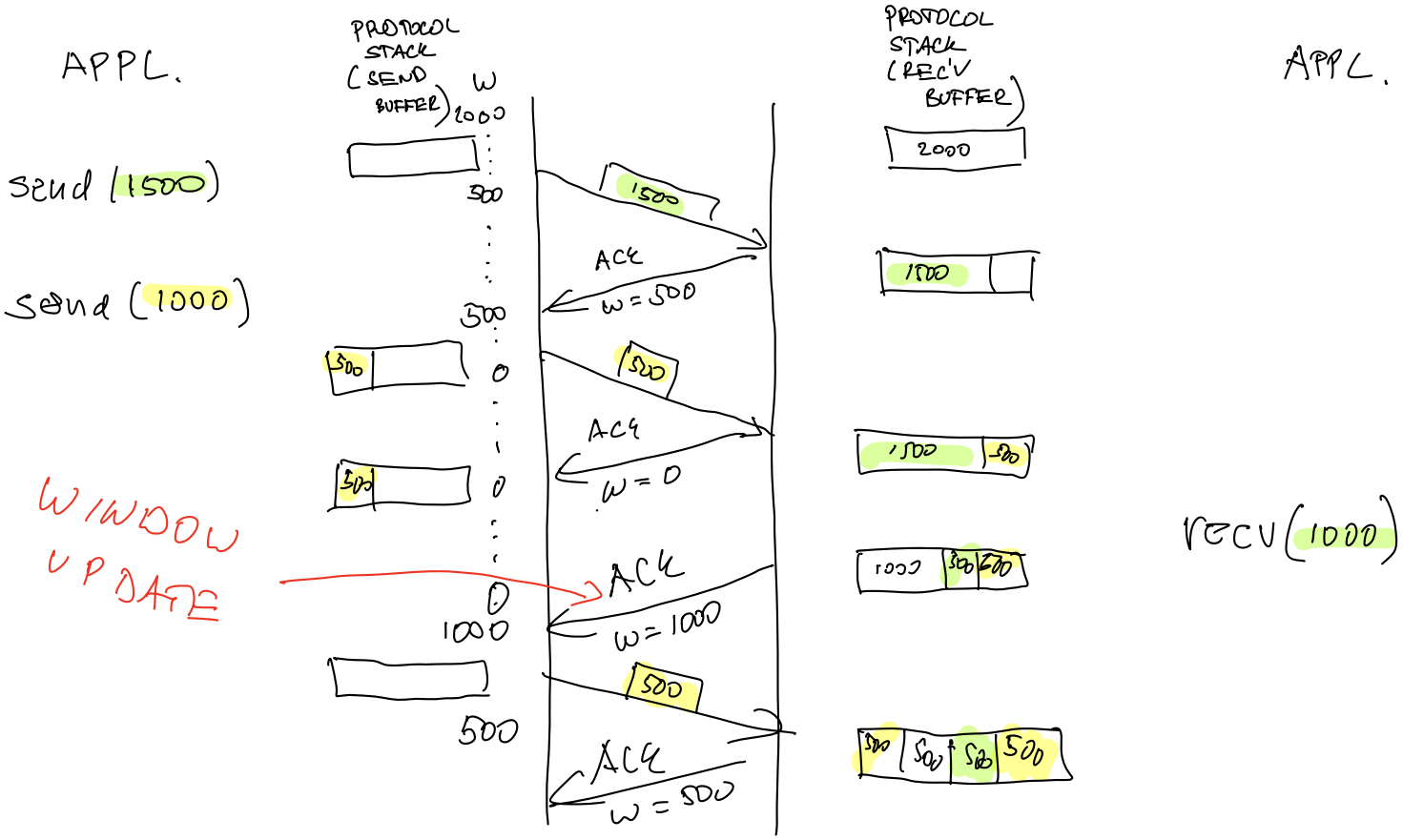




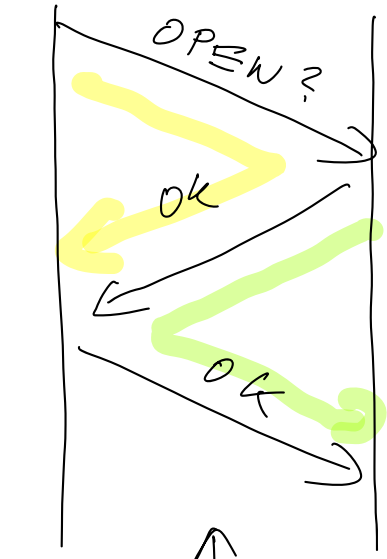
9 → 5, 6, 7, 8 rec'd

=!

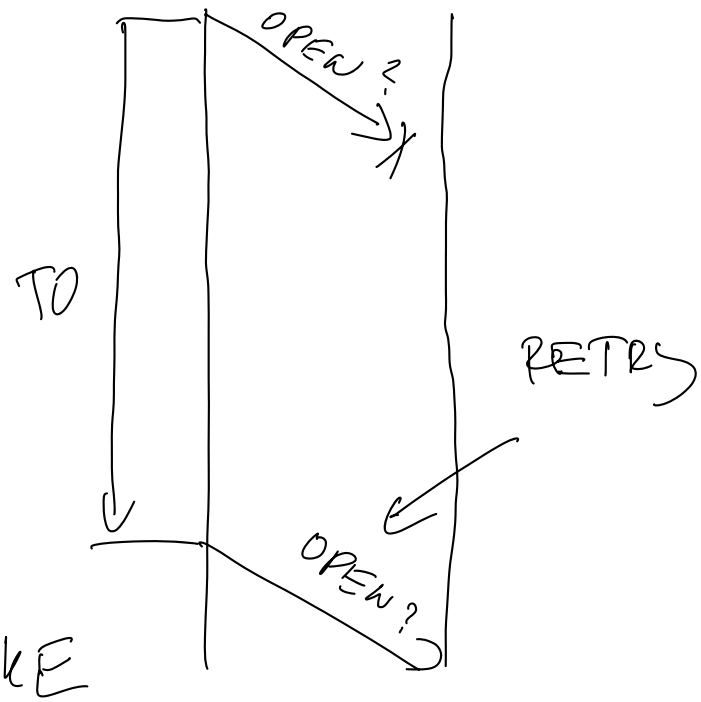
FLOW CONTROL



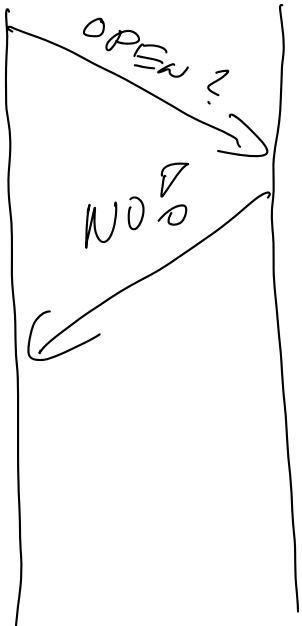
CONNECTION OPEN PRINCIPLES



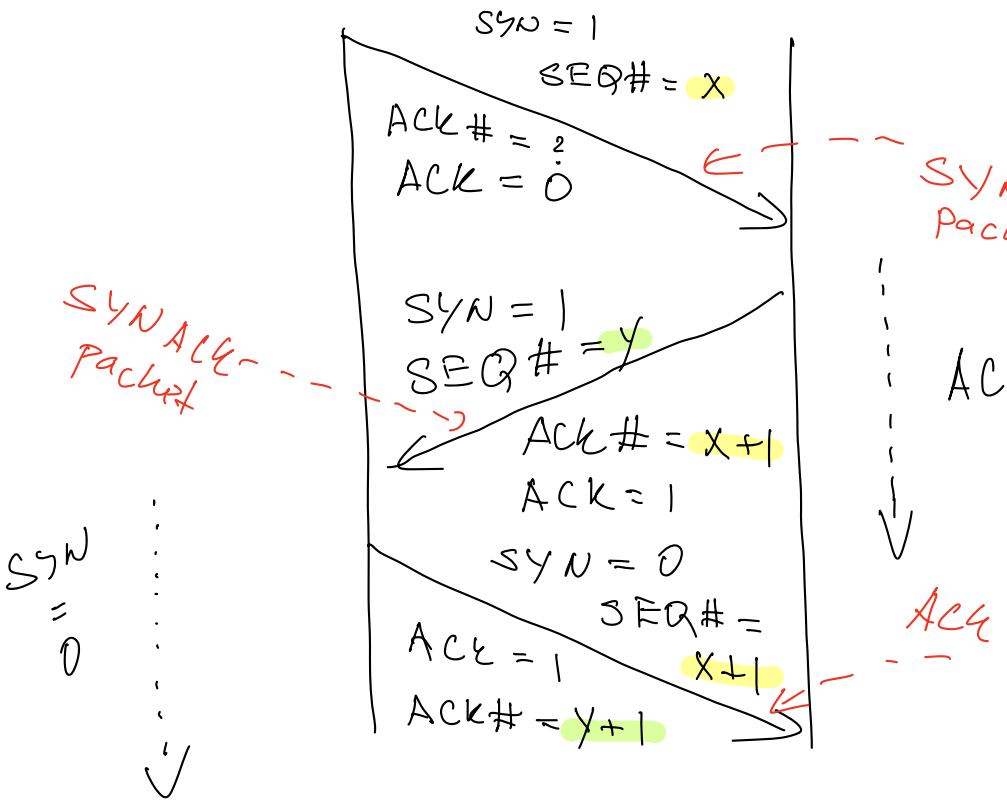
3-WAY HANDSHAKE



CONNECTION REJECTED



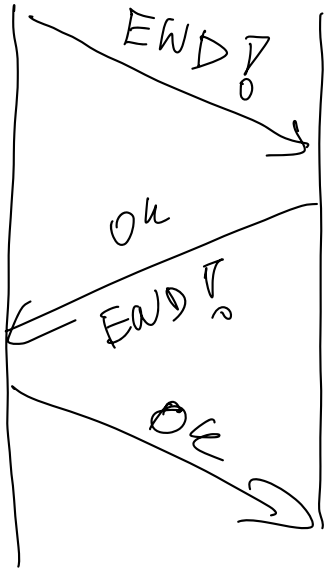
TCP CONNECTION OPEN



SYN - sync. SEQ #'s

ACK - ACK# CONTAINS VALID VALUE

CONNECTION CLOSE PRINCIPLES

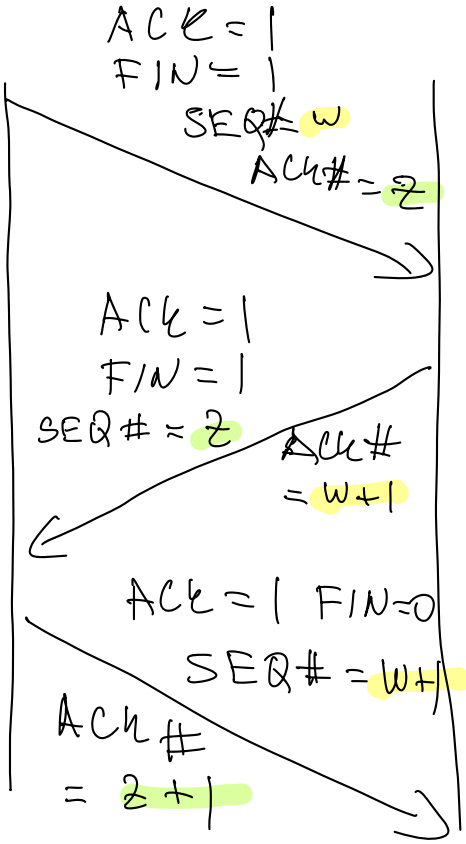


SYM. RELEASE



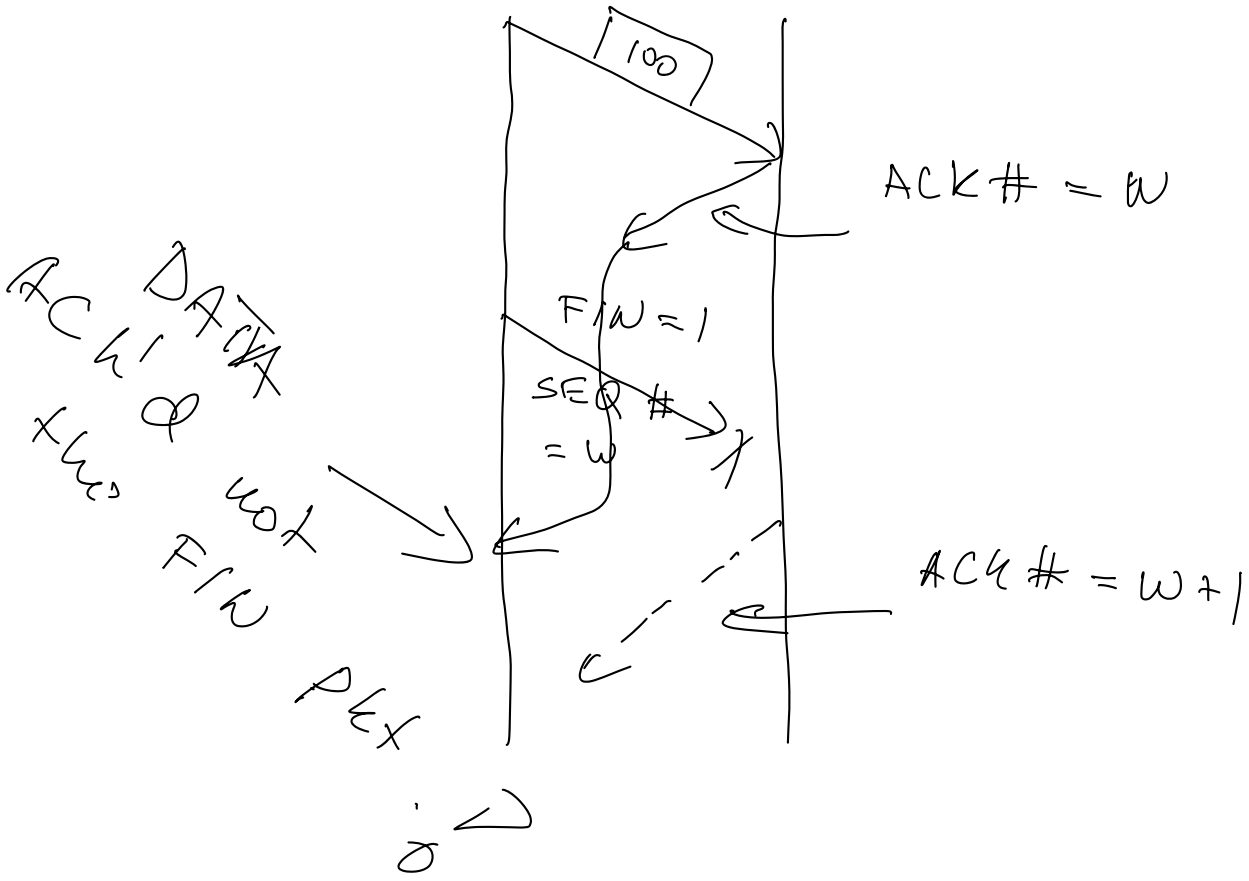
ASYM. RELEASE

TCP CON. CLOSE

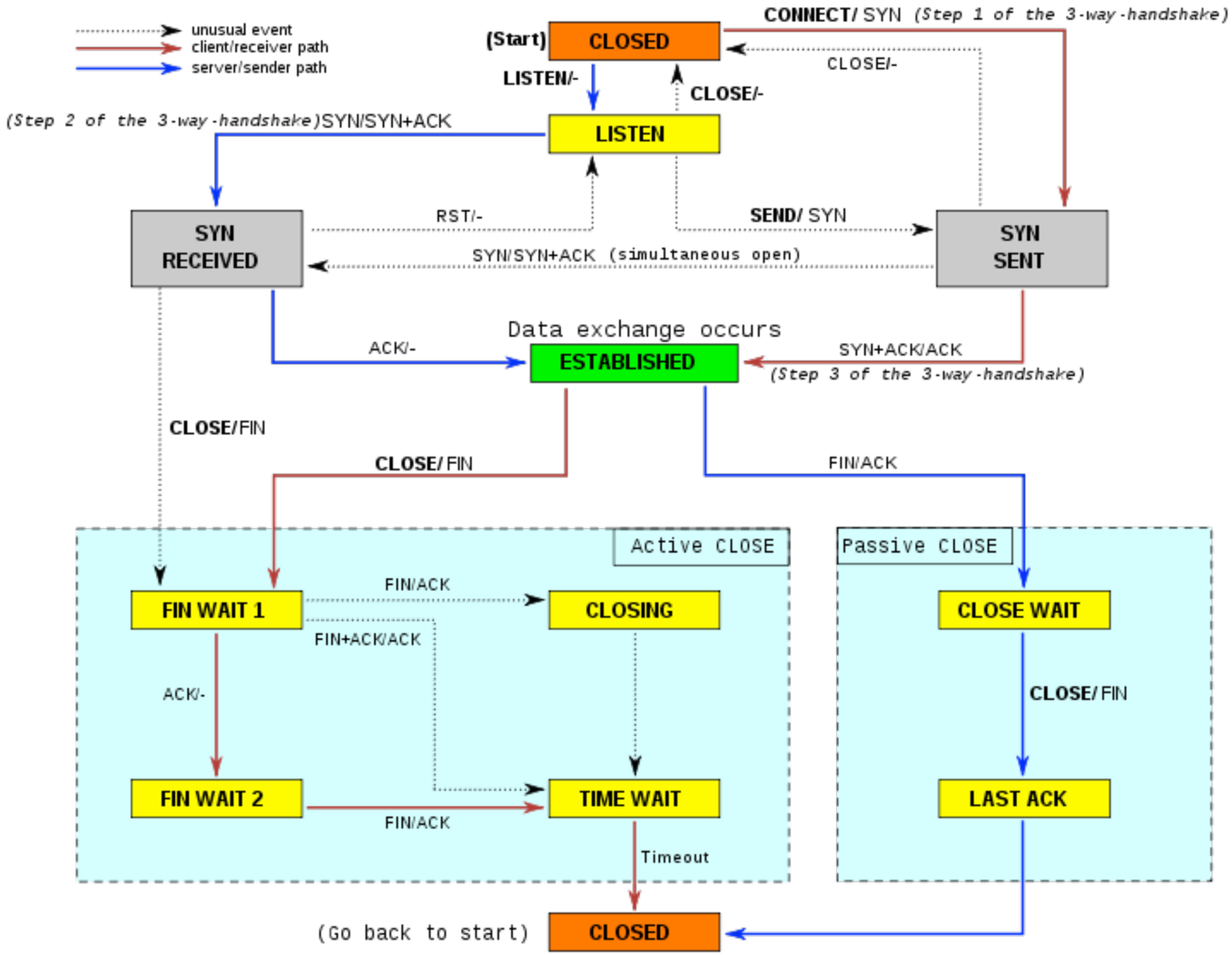


FIN - finish

MOTIVATION FOR ADDING ONE TO SEQ#'s FOR FIN PACKET



TCP State Diagram



TCP PROTOCOL STATES DURING 3-WAY HANDSHAKE

