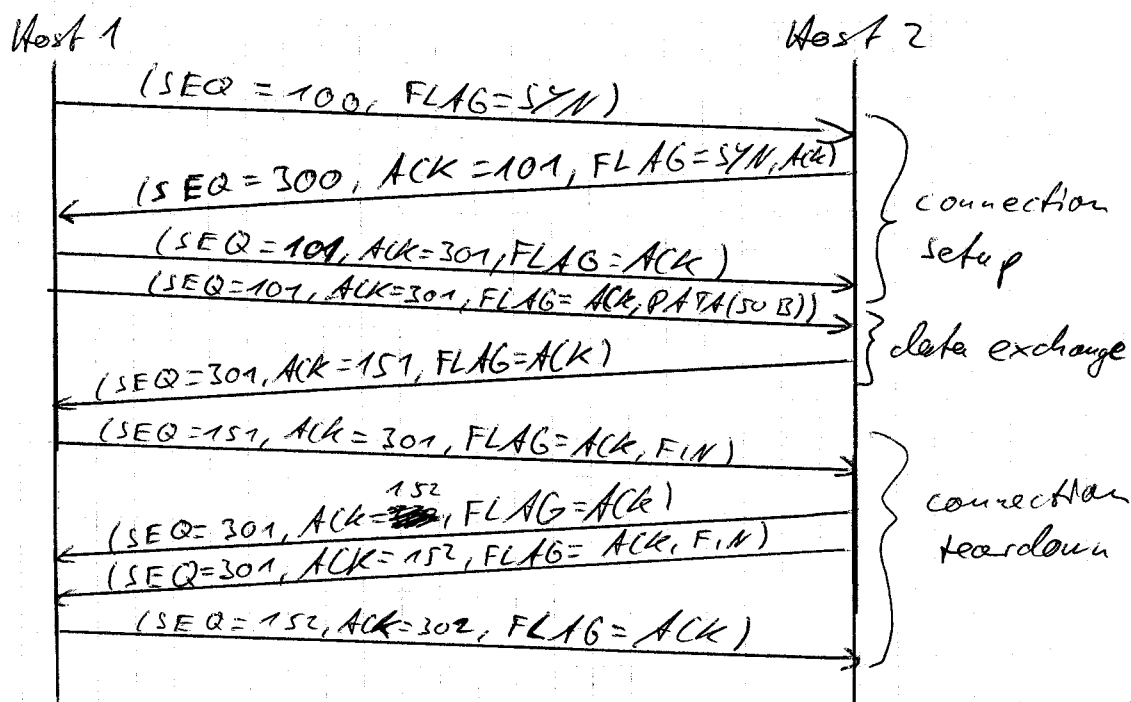KN GÜ

Exercise Set 9

5.) • Random Initial —
• Sequence Numbers

- • Sequence Numbers —
  each byte is numbered
- • SYN - and FIN-packets
  consume 1 byte although
  they do not carry data

Host 1   Host 2

(SEQ = 100, FLAG=SYN)

(SEQ = 300, ACK =101, FLAG=SYN,ACK)   } connection
                                          setup
(SEQ =101, ACK=301, FLAG=ACK)

(SEQ =101, ACK=301, FLAG= ACK,DATA(50 B)) } data exchange

(SEQ =301, ACK =151, FLAG=ACK)

(SEQ =151, ACK= 301, FLAG=ACK, FIN)   } connection
                     152   teardown
(SEQ= 301, ACK=152, FLAG=ACK)

(SEQ=301, ACK= 152, FLAG= ACK,FIN)

(SEQ= 152, ACK=302, FLAG= ACK)

4.)
B→received up to 126th byte
A→ 70 B. 50 B

a.) (126 + 70 =196 are received)
   Sequ. num.: 127, Source Port: 302
                          Dest port: 80

b.) Sequ. num.: 197, source port: 80
       ACK
                          Dest. Port: 302

1

c.) Sequ. num.: 127, source port: 80
$\overset{Ack}{}$

Dest port: 302

3.)

$MSS = 1460\ B$

a.) 32-bit sequence numbers

$L = 2^{32} = 4,2950 \times 10^9 \approx 4,2\ Gbytes$

b.)

10 Mbps, 66 bytes headers

Number of segments: $S = \left\lceil \dfrac{L = 2^{32}}{1460} \right\rceil = 2941759$

→ 66 B·header ⇒ $S \cdot 66 = 194156094$ headerbytes

→ Total number of bytes to transmit in total:

$L + 194156094 = 4,4891 \cdot 10^9\ bytes$

→ $\dfrac{4,49 \cdot 10^9 \cdot 8\ (bits)}{\underbrace{10 \cdot 10^6\ \frac{bits}{sec}}_{10\ Mbps}} = 3,5913 \cdot 10^3\ sec$

$\underline{\underline{= 59,9\ min}}$

2b.) $Est\_RTT = (1-a) \cdot Est\_RTT$

$\qquad\qquad + a \cdot Sample\ RTT \qquad a = 0,1$

$Est\_RTT = 30\ msec$

ACKs after 26, 32, 24 msec

$Est\_RTT = (0,9) \cdot 30 + 0,1 \cdot 26 = 29,6\ msec$

$Est\_RTT = (0,9) \cdot 29,6 + 0,1 \cdot 32 = 29,84\ msec$

$Est\_RTT = (0,9) \cdot 29,84 + 0,1 \cdot 24 = \underline{29,256\ msec}$