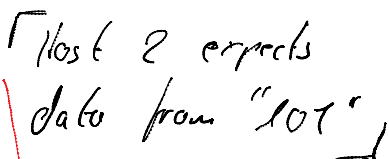


- Random Initial Sequence Numbers
- Sequence Numbers — each byte is numbered
- SYN- and FIN-Packets consume 1 byte although they do not carry data
- NO data in handshake packets!



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GGÜ Seite 1

Seq. num: 197, Source Port: 302

Dest. Port: 80

b) Seq. num: 197, Source Port: 80
Dest. Port: 302

c) Seq. num: 127, Source Port: 80
Dest. Port: 302

3) 1455 = 1460 B

a) 32 bit sequence numbers

$$L = 2^{32} = 4,295 \cdot 10^9 \approx 4,2 \text{ Gbytes}$$

b) 10176ps, 66 bytes Headers

$$\text{Number of segments: } S = \left\lceil \frac{L}{1460} \right\rceil = 2941759$$

→ 66 B. header ⇒ $S \cdot 66 = 194156094$ header Bytes in total

→ Total Bytes to transmit: $L + 194156094 = 4,4891 \cdot 10^9$ Bytes

$$\frac{4,49 \cdot 10^9 \cdot 8 \text{ (bits)}}{\underbrace{10 \cdot 10^6 \frac{\text{bits}}{\text{s}}}_{10 \text{ Mbits}}} = 3,5913 \cdot 10^9 \text{ sec} = 59,9 \text{ min}$$

Exercise 2

b) Est. RTT = $(1-\alpha) \cdot \text{Est. RTT} + \alpha \cdot \text{Sample RTT}$, $\alpha = 0,1$

Est. RTT = 30 msec, RTTs after 26, 32, 24 msec

$$\text{Est. RTT} = (0,9) \cdot 30 + 0,1 \cdot 26 = 29,6 \text{ msec}$$

$$\text{Est. RTT} = (0,9) \cdot 29,84 + 0,1 \cdot 24 = 29,256 \text{ msec}$$