WLAN tests algorithm:

1. Erstellung von 1 MB = 1_000_000 Bytes Dummy Datei mittels linux command:
   truncate -s 1000000 file.test

2. Upload file.test on remote server mittels scp.

3. Download file from remote adress with WLAN and working Wireshark.

4. Filter captured packets in Wireshark:
   tcp and src host xxx.xxx.xxx.xxx
   (only tcp packets from specified host address.
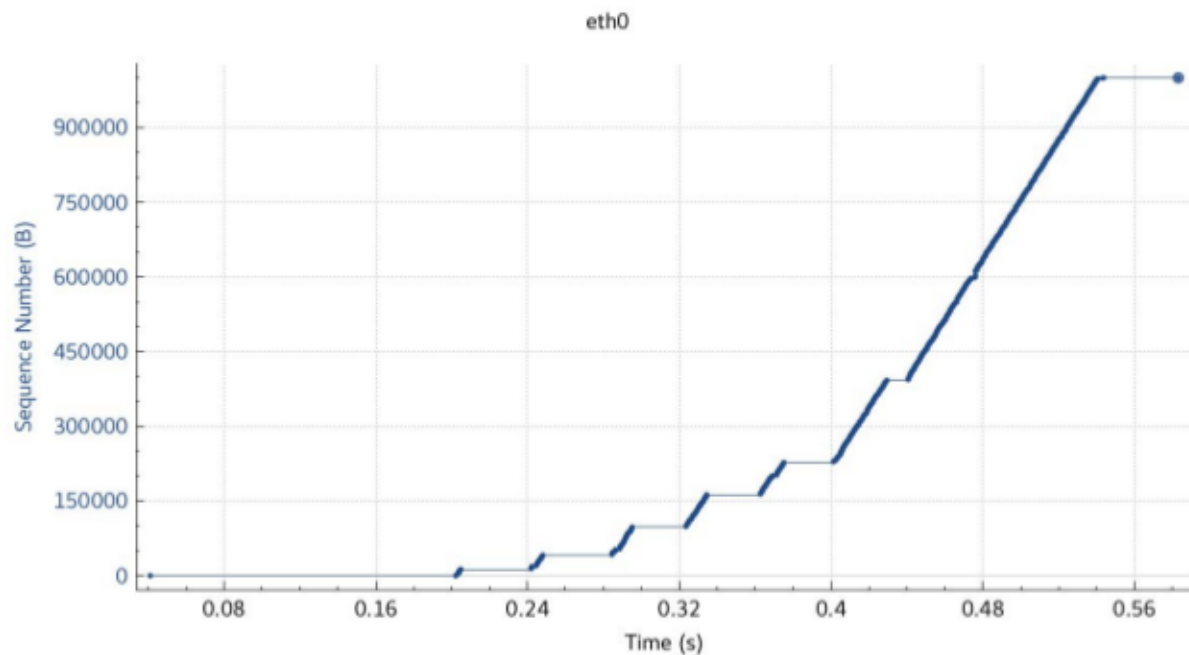
5. Plot grafics.

Types of tests:

#1, #2 -> LAN tests.
#3 - #5 -> private WLAN with different signal quality
#6 - #8 -> public WLAN with different signal quality
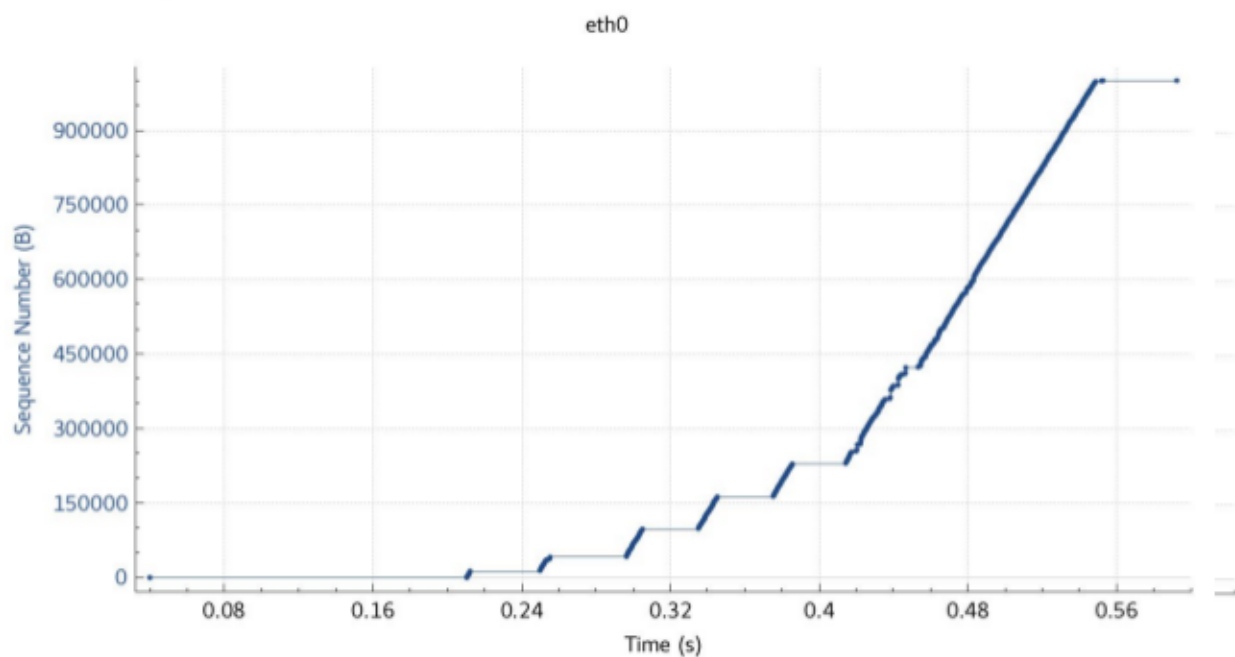#9 - #10 ->einwickeln des Routers mit Alufolie

LAN tests

Messung 1 Lan:

Sequence Numbers (Stevens) for 141.201.2.189:80 → 10.0.2.15:40694

Messung 2 LAN:

Sequence Numbers (Stevens) for 141.201.2.189:80 → 10.0.2.15:40704
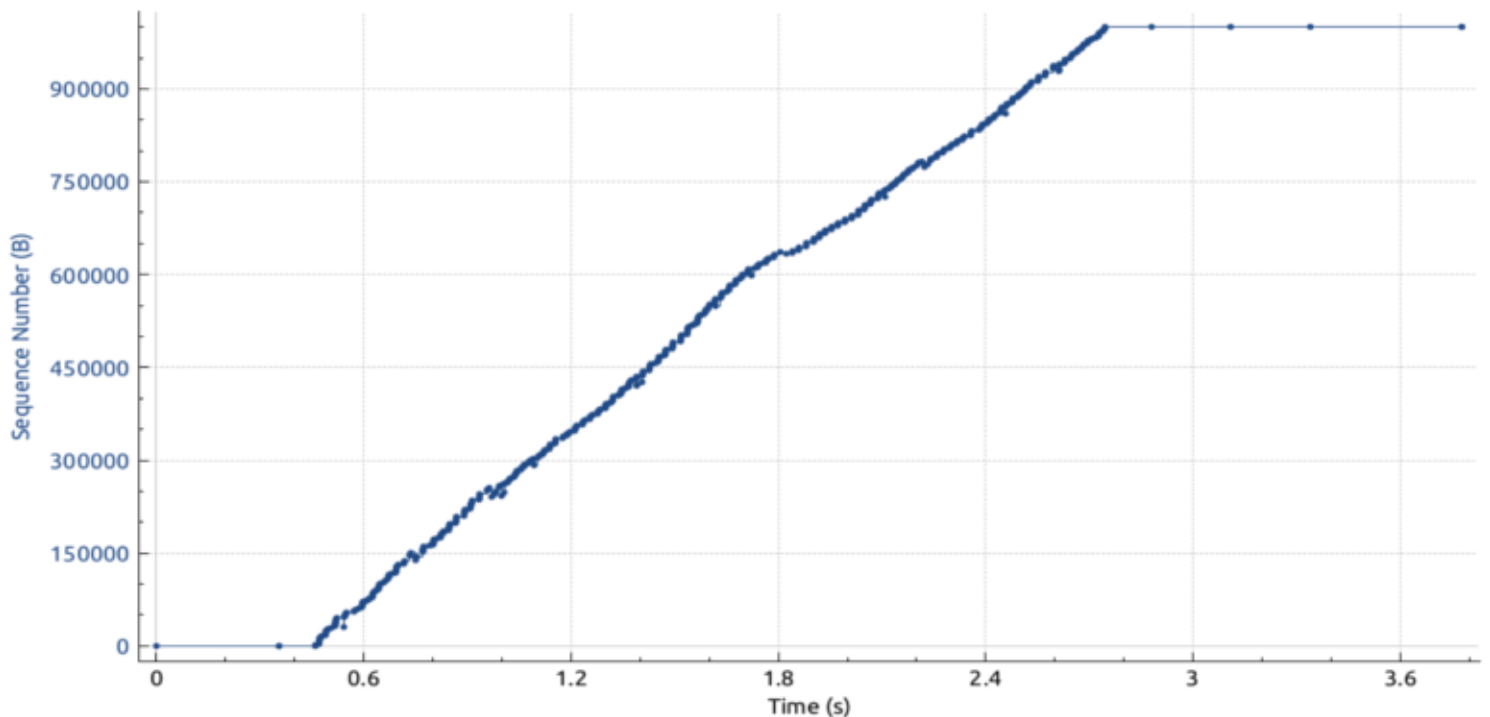
Private WLAN (100% quality):

```
┌─Interface───────────────────────────────────────────────────────────────────
│wlp3s0 (IEEE 802.11bgn, WPA/WPA2), phy 0, reg: n/a
├─Levels──────────────────────────────────────────────────────────────────────
│
│link quality: 100%  (70/70)
│▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
│
│signal level: -40 dBm (0,10 uW)
│▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
├─Statistics──────────────────────────────────────────────────────────────────
│RX: 1.385 (439,49 KiB), drop: 51
│TX: 574 (121,01 KiB), retries: 73
├─Info────────────────────────────────────────────────────────────────────────
│mode: Managed, connected to: 00:1B:11:9C:07:DE, time: 43 sec, inactive: 0,1s
│freq: 2437 MHz, channel: 6 (width: 20 MHz (no HT))
│rx rate: 54.0 MBit/s, tx rate: 54.0 MBit/s
│beacons: 331, avg sig: -40 dBm, interval: 0,1s, DTIM: 3
│power mgt: on,  tx-power: 14 dBm (25,12 mW)
│retry: short limit 7,  rts/cts: off,  frag: off
│encryption: n/a (requires CAP_NET_ADMIN permissions)
├─Network─────────────────────────────────────────────────────────────────────
│wlp3s0 (UP RUNNING BROADCAST MULTICAST)
│mac: 78:92:9C:93:86:A2, qlen: 1000
│ip: 192.168.0.163/24
```


Sequence Numbers (Stevens) for 141.201.2.189:80 → 192.168.0.163:35308

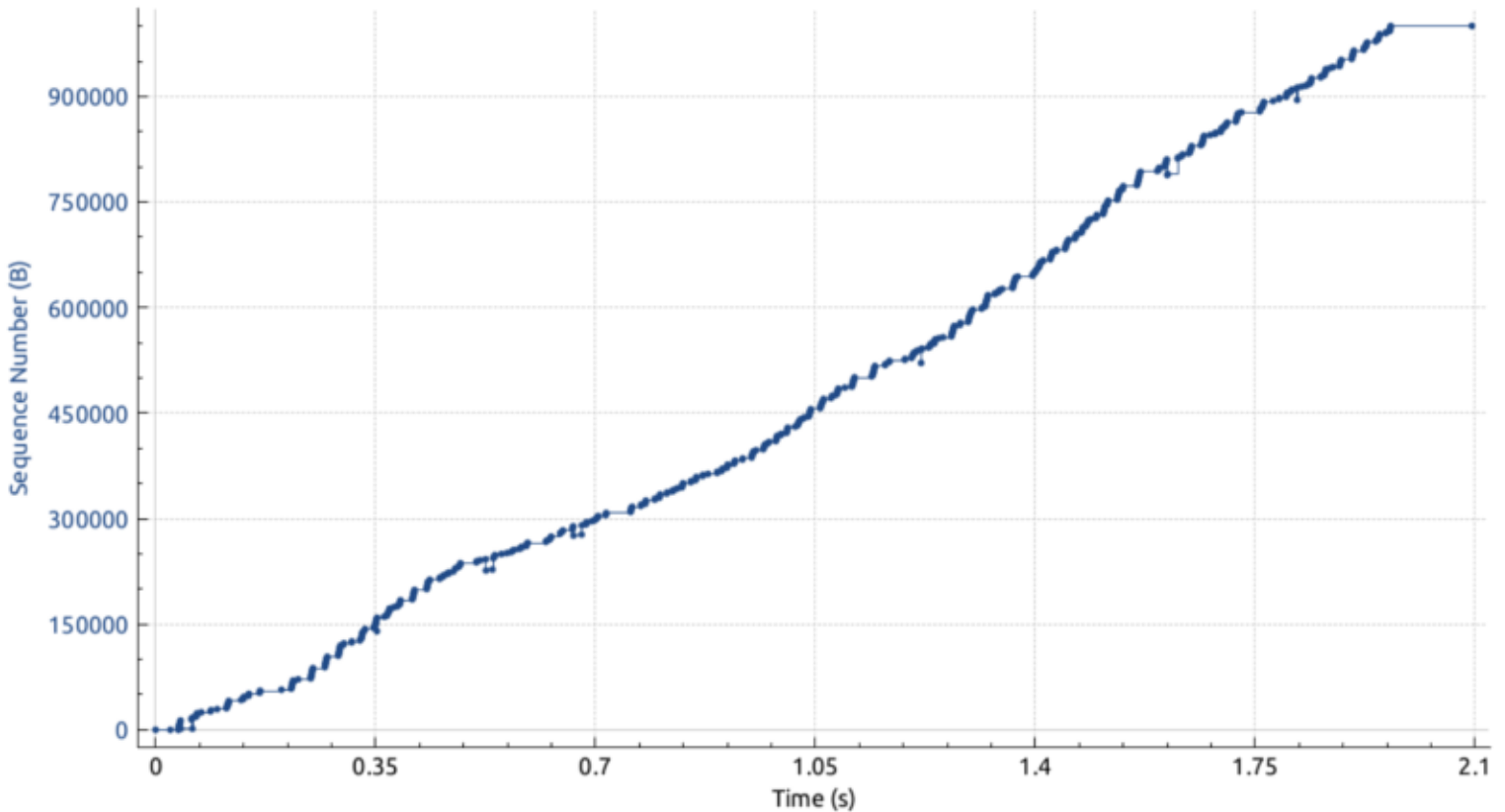wlp3s0 (tcp and src host 141.201.2.189)

Private WLAN (76% quality):

```
┌Interface────────────────────────────────────────────────────────────
 wlp3s0 (IEEE 802.11bgn, WPA/WPA2), phy 0, reg: n/a
 ┌Levels──────────────────────────────────────────────────────────────

 link quality: 76%  (53/70)
 ========================================================================


 signal level: -57 dBm (2,00 nW)
 ================================================
 ┌Statistics──────────────────────────────────────────────────────────
 RX: 4.822 (2,52 MiB), drop: 61
 TX: 1.691 (204,94 KiB), retries: 201
 ┌Info────────────────────────────────────────────────────────────────
 mode: Managed, connected to: 00:1B:11:9C:07:DE, time: 3:02m, inactive: 24,9s
 freq: 2437 MHz, channel: 6 (width: 20 MHz (no HT))
 rx rate: 48.0 MBit/s, tx rate: 54.0 MBit/s
 beacons: 1.353, avg sig: -61 dBm, interval: 0,1s, DTIM: 3
 power mgt: on,   tx-power: 14 dBm (25,12 mW)
 retry: short limit 7,  rts/cts: off,  frag: off
 encryption: n/a (requires CAP_NET_ADMIN permissions)
 ┌Network─────────────────────────────────────────────────────────────
 wlp3s0 (UP RUNNING BROADCAST MULTICAST)
 mac: 78:92:9C:93:86:A2, qlen: 1000
 ip: 192.168.0.163/24
```


Sequence Numbers (Stevens) for 141.201.2.189:80 → 192.168.0.163:35328

wlp3s0 (tcp and src host 141.201.2.189)
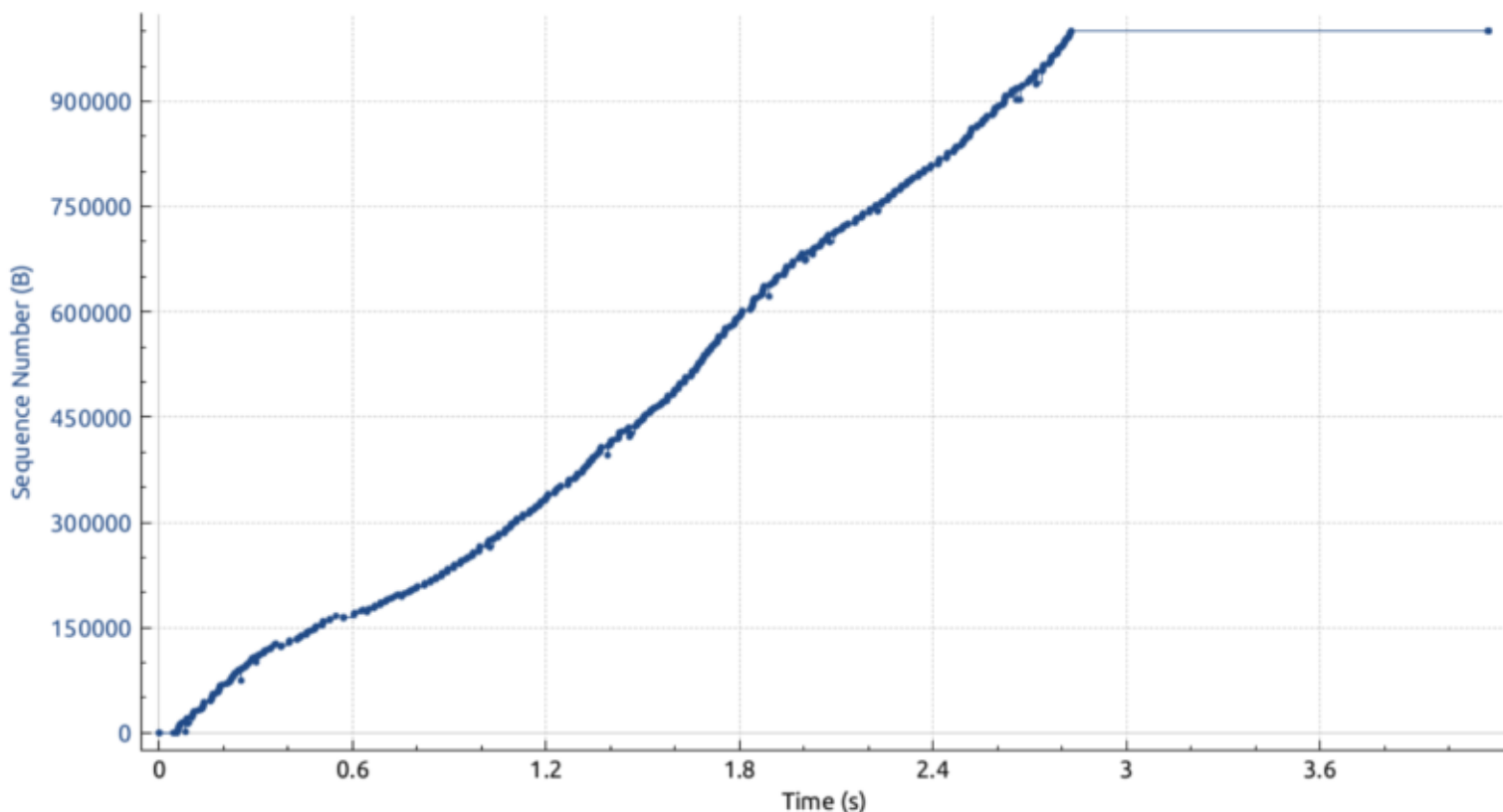
Private WLAN (50% quality):

```
┌Interface────────────────────────────────────────────────────────────
 wlp3s0 (IEEE 802.11bgn, WPA/WPA2), phy 0, reg: n/a
┌Levels───────────────────────────────────────────────────────────────

 link quality: 50%  (35/70)
 ============================================================

 signal level: -75 dBm (0,03 nW)
 ============================================
┌Statistics───────────────────────────────────────────────────────────
 RX: 9.429 (4,66 MiB), drop: 153
 TX: 2.648 (275,67 KiB), retries: 889, failed: 1
┌Info─────────────────────────────────────────────────────────────────
 mode: Managed, connected to: 00:1B:11:9C:07:DE, time: 6:10m, inactive: 14,0s
 freq: 2437 MHz, channel: 6 (width: 20 MHz (no HT))
 rx rate: 36.0 MBit/s, tx rate: 1.0 MBit/s
 beacons: 2.897, avg sig: -75 dBm, interval: 0,1s, DTIM: 3
 power mgt: on,  tx-power: 14 dBm (25,12 mW)
 retry: short limit 7,  rts/cts: off,  frag: off
 encryption: n/a (requires CAP_NET_ADMIN permissions)
┌Network──────────────────────────────────────────────────────────────
 wlp3s0 (UP RUNNING BROADCAST MULTICAST)
 mac: 78:92:9C:93:86:A2, qlen: 1000
 ip: 192.168.0.163/24
```


Sequence Numbers (Stevens) for 141.201.2.189:80 → 192.168.0.163:35364
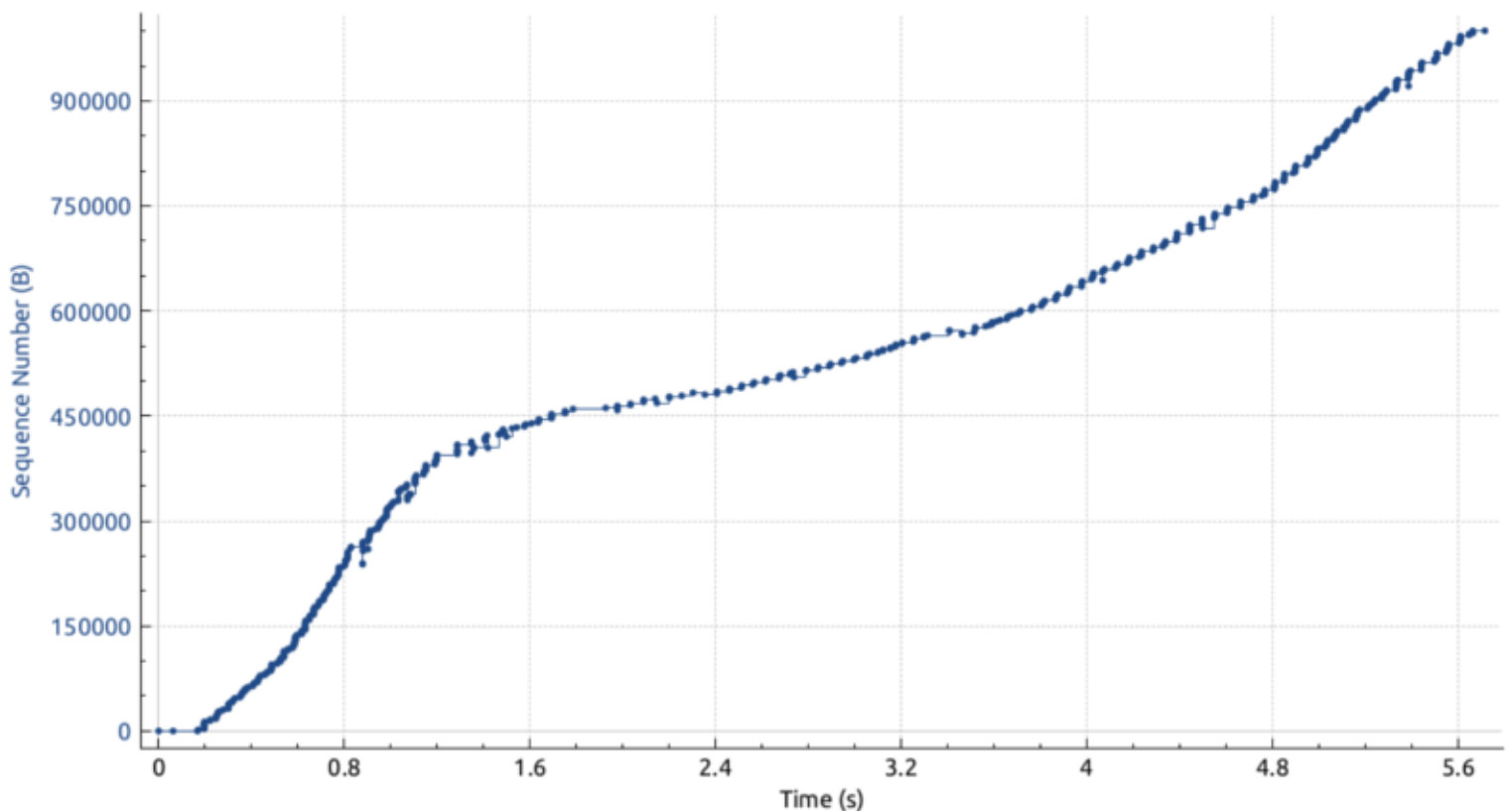
wlp3s0 (tcp and src host 141.201.2.189)

Public WLAN (94% quality):

```
┌Interface─────────────────────────────────────────────────────────────────────
wlp3s0 (IEEE 802.11bgn, WPA/WPA2), phy 0, reg: AT (DFS-ETSI)
┌Levels────────────────────────────────────────────────────────────────────────

link quality: 94%  (66/70)
================================================================================

signal level: -44 dBm (0,04 uW)
================================================================
┌Statistics────────────────────────────────────────────────────────────────────
RX: 76.409 (105,48 MiB), drop: 848
TX: 45.274 (4,27 MiB), retries: 5.561
┌Info──────────────────────────────────────────────────────────────────────────
mode: Managed, connected to: A8:9D:21:B3:B4:50, time: 4:52m, inactive: 0,0s
freq: 2437 MHz, channel: 6 (width: 20 MHz)
rx rate: 65.0 MBit/s MCS 6 short GI, tx rate: 65.0 MBit/s MCS 7 short GI
beacons: 2.687, avg sig: -52 dBm, interval: 0,1s, DTIM: 1
power mgt: on,  tx-power: 14 dBm (25,12 mW)
retry: short limit 7,  rts/cts: off,  frag: off
encryption: n/a (requires CAP_NET_ADMIN permissions)
┌Network───────────────────────────────────────────────────────────────────────
wlp3s0 (UP RUNNING BROADCAST MULTICAST)
mac: 78:92:9C:93:86:A2, qlen: 1000
ip: 172.16.7.99/16
```

Sequence Numbers (Stevens) for 141.201.2.189:80 → 172.16.7.99:55982

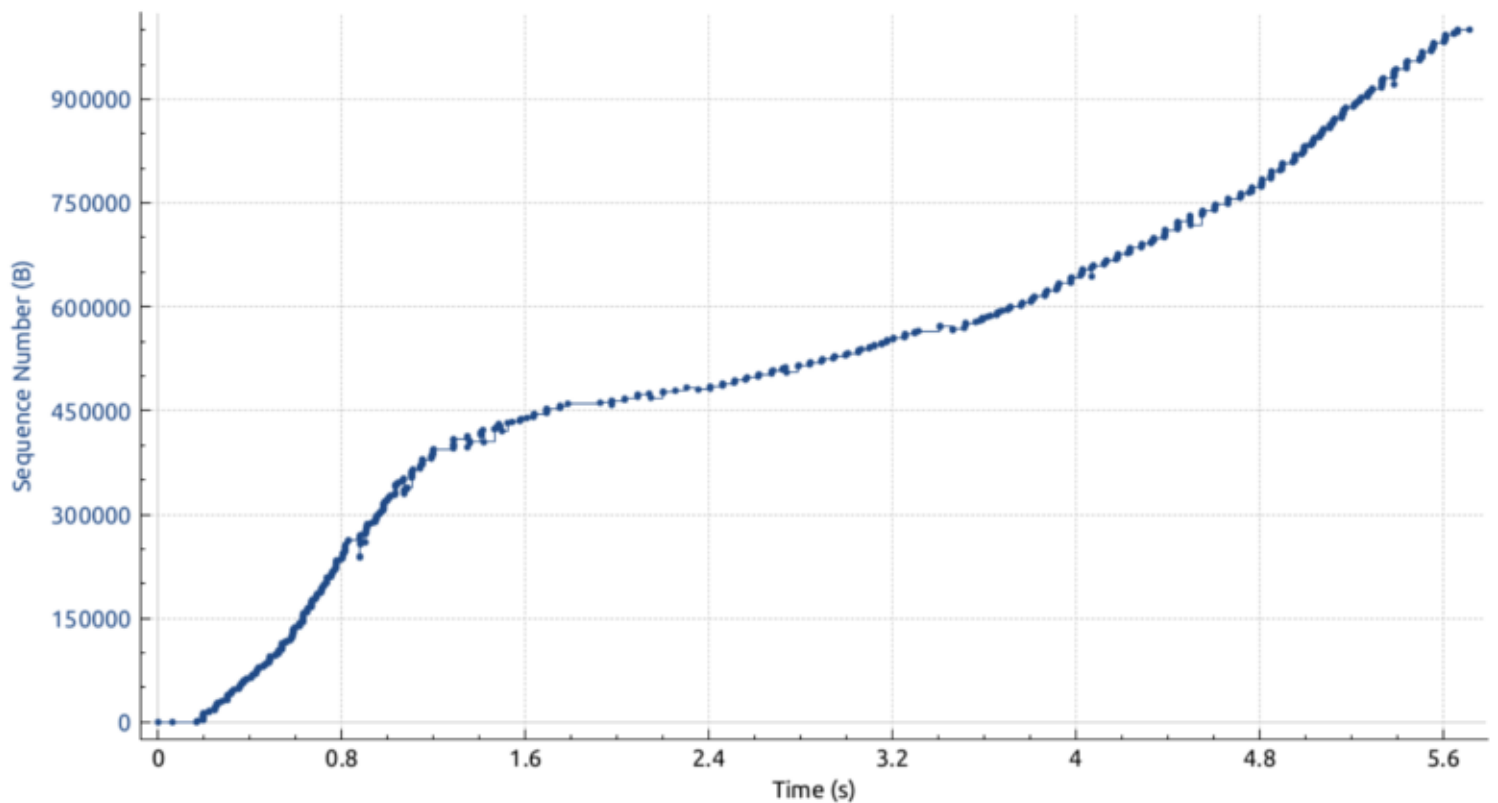wlp3s0 (tcp and src host 141.201.2.189)

Public WLAN (89% quality):

```
┌Interface┐
wlp3s0 (IEEE 802.11bgn, WPA/WPA2), phy 0, reg: AT (DFS-ETSI)
┌Levels┐
link quality: 89%  (62/70)
========================================================================
signal level: -48 dBm (0,02 uW)
==================================================
┌Statistics┐
RX: 64.325 (88,79 MiB), drop: 705
TX: 37.887 (3,56 MiB), retries: 4.756
┌Info┐
mode: Managed, connected to: A8:9D:21:B3:B4:50, time: 4:12m, inactive: 0,0s
freq: 2437 MHz, channel: 6 (width: 20 MHz)
rx rate: 72.2 MBit/s MCS 7 short GI, tx rate: 65.0 MBit/s MCS 7
beacons: 2.317, avg sig: -49 dBm, interval: 0,1s, DTIM: 1
power mgt: on,  tx-power: 14 dBm (25,12 mW)
retry: short limit 7,  rts/cts: off,  frag: off
encryption: n/a (requires CAP_NET_ADMIN permissions)
┌Network┐
wlp3s0 (UP RUNNING BROADCAST MULTICAST)
mac: 78:92:9C:93:86:A2, qlen: 1000
ip: 172.16.7.99/16
```


Sequence Numbers (Stevens) for 141.201.2.189:80 → 172.16.7.99:55982

wlp3s0 (tcp and src host 141.201.2.189)

Public WLAN (64% quality):

```
┌─Interface─────────────────────────────────────────────────────────────────┐
wlp3s0 (IEEE 802.11bgn, WPA/WPA2), phy 0, reg: AT (DFS-ETSI)
├─Levels────────────────────────────────────────────────────────────────────┤
link quality: 64%  (45/70)
====================================================================
signal level: -65 dBm (0,32 nW)
=====================================
├─Statistics───────────────────────────────────────────────────────────────┤
RX: 142.145 (185,83 MiB), drop: 4.493
TX: 114.643 (13,14 MiB), retries: 20.248, failed: 1
├─Info─────────────────────────────────────────────────────────────────────┤
mode: Managed, connected to: A8:9D:21:B3:B4:50, time: 13:49m, inactive: 0,0s
freq: 2437 MHz, channel: 6 (width: 20 MHz)
rx rate: 65.0 MBit/s MCS 6 short GI, tx rate: 65.0 MBit/s MCS 6 short GI
beacons: 7.738, avg sig: -59 dBm, interval: 0,1s, DTIM: 1
power mgt: on,  tx-power: 14 dBm (25,12 mW)
retry: short limit 7,  rts/cts: off,  frag: off
encryption: n/a (requires CAP_NET_ADMIN permissions)
├─Network──────────────────────────────────────────────────────────────────┤
wlp3s0 (UP RUNNING BROADCAST MULTICAST)
mac: 78:92:9C:93:86:A2, qlen: 1000
ip: 172.16.7.99/16
```
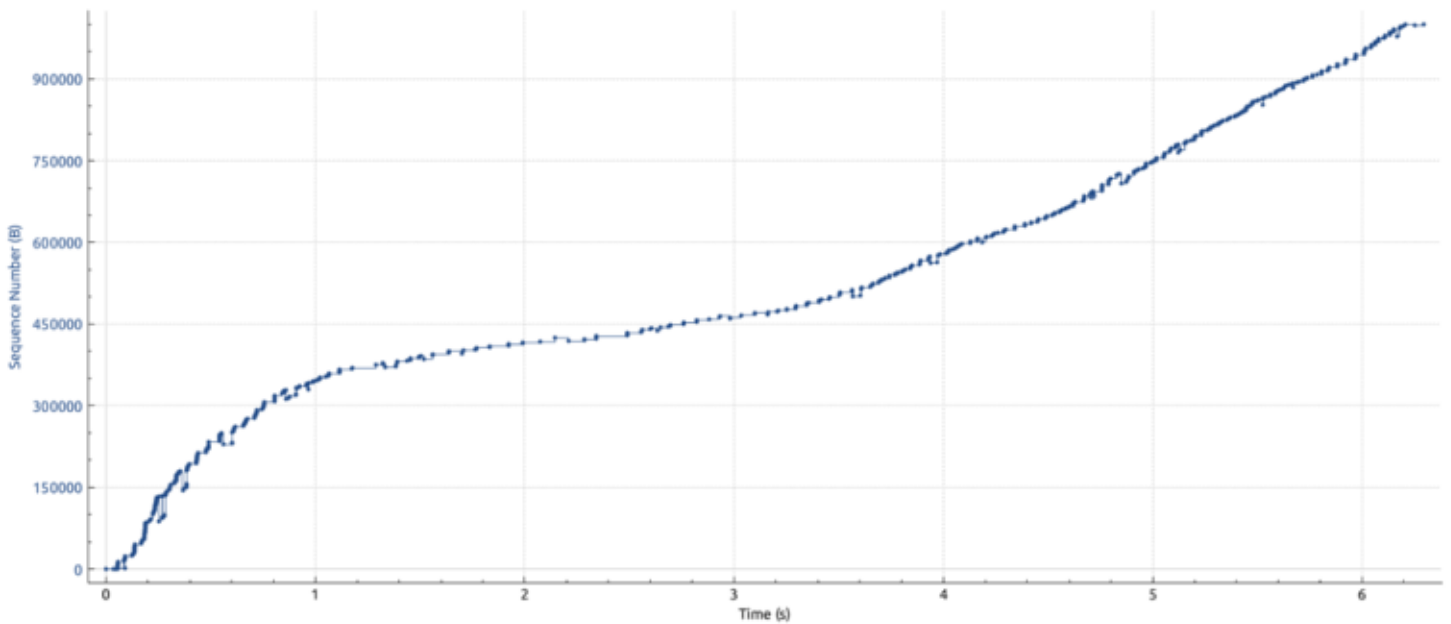

Sequence Numbers (Stevens) for 141.201.2.189:80 → 172.16.7.99:55960

wlp3s0 (tcp and src host 141.201.2.189)

Messen Sie dabei nur Ihren Download, warum?
Da man laut dem Gesetzt in einem öffentlichen Netz nur seine eigenen Download
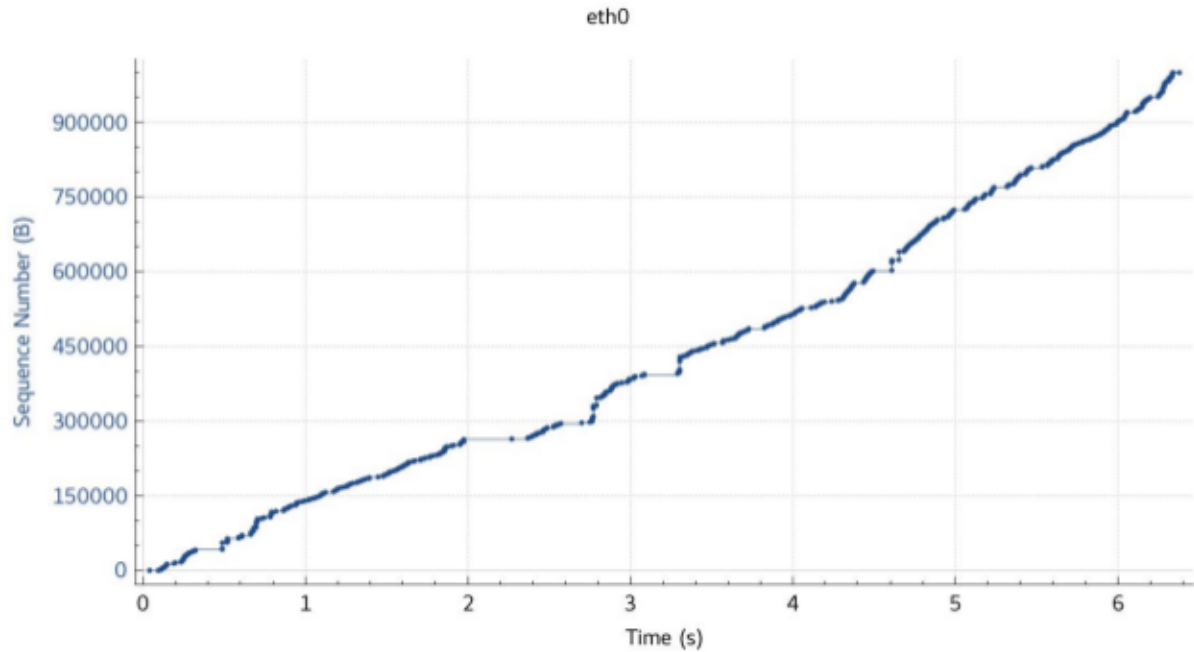betrachten darf.

Bonus: Wie können Sie den Empfang verschlechtern, ohne sich vom AP zu entfernen?

Durch einwickeln des Routers mit Alufolie ergeben sich folgende Graphen:

Einwickeln des Routers mit Alufolie:

Sequence Numbers (Stevens) for 141.201.2.189:80 → 10.0.2.15:40812

eth0

Sequence Numbers (Stevens) for 141.201.2.189:80 → 10.0.2.15:40822

eth0