

- Address: 192.168.254.70
Port: 50389

227	2.580116	192.168.254.70	128.119.245.12	HTTP	1187	POST /wireshark-labs/	
228	2.584659	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
229	2.592635	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
230	2.597445	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
231	2.605188	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
232	2.609352	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
233	2.616997	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
234	2.621842	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915
235	2.629428	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK]	Seq: 151915

▶ Frame 227: 1187 bytes on wire (9496 bits), 1187 bytes captured (9496 bits) on interface en0, id 0
 ▶ Ethernet II, Src: Apple_93:6e:ef (ac:bc:32:93:6e:ef), Dst: Actionte_73:ea:a0 (10:78:5b:73:ea:a0)
 ▶ Internet Protocol Version 4, Src: 192.168.254.70, Dst: 128.119.245.12
 ▶ Transmission Control Protocol, Src Port: 50389, Dst Port: 80, Seq: 151915, Ack: 1, Len: 1121

- Address: 128.119.245.12
Port: 80
- Address: 192.168.254.70
Port: 50389

- Sequence number: 0
The flag 0x002 identifies it as a SYN segment

48	2.083870	192.168.254.70	128.119.245.12	TCP	78	50389 → 80 [SYN]	Seq: 0
49	2.118655	3.231.192.63	192.168.254.70	TCP	66	443 → 50234 [ACK]	Seq: 151915
50	2.118658	3.231.192.63	192.168.254.70	TLSv1.2	112	Application Data	
51	2.118731	192.168.254.70	3.231.192.63	TCP	66	50234 → 443 [ACK]	Seq: 151915
52	2.136583	128.119.245.12	192.168.254.70	TCP	74	80 → 50389 [SYN, ACK]	Seq: 0
53	2.137074	192.168.254.70	128.119.245.12	TCP	66	50389 → 80 [ACK]	Seq: 151915
54	2.137452	192.168.254.70	128.119.245.12	TCP	780	50389 → 80 [PSH, ACK]	Seq: 151915

▶ Frame 48: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface en0, id 0
 ▶ Ethernet II, Src: Apple_93:6e:ef (ac:bc:32:93:6e:ef), Dst: Actionte_73:ea:a0 (10:78:5b:73:ea:a0)
 ▶ Internet Protocol Version 4, Src: 192.168.254.70, Dst: 128.119.245.12
 ▼ Transmission Control Protocol, Src Port: 50389, Dst Port: 80, Seq: 0, Len: 0

Source Port: 50389
 Destination Port: 80
 [Stream index: 3]
 [TCP Segment Len: 0]
 Sequence number: 0 (relative sequence number)
 Sequence number (raw): 2428824037
 [Next sequence number: 1 (relative sequence number)]
 Acknowledgment number: 0
 Acknowledgment number (raw): 0
 1011 = Header Length: 44 bytes (11)

▶ Flags: 0x002 (SYN)

- Sequence number: 0
Acknowledgement: 1
If the sequence number is 0, then the ack value is 1 and vice versa
The flag identifies it

52	2.136583	128.119.245.12	192.168.254.70	TCP	74	80 → 50389	[SYN, ACK]
53	2.137074	192.168.254.70	128.119.245.12	TCP	66	50389 → 80	[ACK] Seq=7
54	2.137452	192.168.254.70	128.119.245.12	TCP	780	50389 → 80	[PSH, ACK]

▶ Frame 52: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface en0, id 0
 ▶ Ethernet II, Src: Actionte_73:ea:a0 (10:78:5b:73:ea:a0), Dst: Apple_93:6e:ef (ac:bc:32:93:6e:ef)
 ▶ Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.254.70

▼ Transmission Control Protocol, Src Port: 80, Dst Port: 50389, Seq: 0, Ack: 1, Len: 0

Source Port: 80
 Destination Port: 50389
 [Stream index: 3]
 [TCP Segment Len: 0]
 Sequence number: 0 (relative sequence number)
 Sequence number (raw): 3256207309
 [Next sequence number: 1 (relative sequence number)]
 Acknowledgment number: 1 (relative ack number)
 Acknowledgment number (raw): 2428824038
 1010 = Header Length: 40 bytes (10)

▶ Flags: 0x012 (SYN, ACK)

6. Sequence number: 1

54	2.137452	192.168.254.70	128.119.245.12	TCP	780	50389 → 80	[PSH, ACK] Seq=7
55	2.137595	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80	[ACK] Seq=7
56	2.137596	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80	[ACK] Seq=2

▶ Frame 54: 780 bytes on wire (6240 bits), 780 bytes captured (6240 bits) on interface en0, id 0
 ▶ Ethernet II, Src: Apple_93:6e:ef (ac:bc:32:93:6e:ef), Dst: Actionte_73:ea:a0 (10:78:5b:73:ea:a0)
 ▶ Internet Protocol Version 4, Src: 192.168.254.70, Dst: 128.119.245.12

▼ Transmission Control Protocol, Src Port: 50389, Dst Port: 80, Seq: 1, Ack: 1, Len: 714

Source Port: 50389
 Destination Port: 80
 [Stream index: 3]
 [TCP Segment Len: 714]
 Sequence number: 1 (relative sequence number)
 Sequence number (raw): 2428824038
 [Next sequence number: 715 (relative sequence number)]
 Acknowledgment number: 1 (relative ack number)
 Acknowledgment number (raw): 3256207310
 1000 = Header Length: 32 bytes (8)

▶ Flags: 0x018 (PSH, ACK)

Window size value: 2070

[Calculated window size: 132480]

[Window size scaling factor: 64]

Checksum: 0x3219 [unverified]

[Checksum Status: Unverified]

Urgent pointer: 0

▶ Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps

[SEQ/ACK analysis]

▶ [Timestamps]

TCP payload (714 bytes)

▼ Data (714 bytes)

Data: 504f5354202f77697265736861726b2d6c6162732f6c6162...
 [Length: 714]

0040 d2 d7 50 4f 53 54 20 2f 77 69 72 65 73 68 61 72 POST / wireshar

7. Segments: 54, 55, 56, 66, 68, 69

Sequence numbers: 1, 715, 2155, 3595, 5035, 6475

Looked at each packets current and next sequence numbers until I had 6 of them connected

Time:

54	2.137452
55	2.137595
56	2.137596
57	2.142281
58	2.142285
59	2.142361
60	2.142406
61	2.144873
62	2.189900
63	2.190004
64	2.190284
65	2.194442
66	2.194598
67	2.197381
68	2.197497
69	2.197498

Ack received sequence number: 65, 67, 70, 78 , 81, 84

Time:

65	2.194442
66	2.194598
67	2.197381
68	2.197497
69	2.197498
70	2.204136
71	2.204233
72	2.204234
78	2.253020
79	2.253173
80	2.253174
81	2.257917
82	2.258021
83	2.258022
84	2.265208

Difference:

- a. 0.05699
- b. 0.059786
- c. 0.06654
- d. 0.058422
- e. 0.06042
- f. 0.06771

EstimatedRTT

$0.875 * \text{EstimatedRTT} + 0.125 * \text{SampleRTT}$

- a. 0.05699
- b. 0.0573395

- c. 0.0584895625
- d. 0.05848111719
- e. 0.05872347754
- f. 0.05984679285

8.

54	2.137452	192.168.254.70	128.119.245.12	TCP	780	50389 → 80 [PSH, ACK]
55	2.137595	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=
56	2.137596	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=
65	2.194442	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK] Seq=
66	2.194598	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=
67	2.197381	128.119.245.12	192.168.254.70	TCP	66	80 → 50389 [ACK] Seq=
68	2.197497	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=
69	2.197498	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=

9. 132480

No, the window size grows large early on negating any throttling

54	2.137452	192.168.254.70	128.119.245.12	TCP	780	50389 → 80 [PSH, ACK]
55	2.137595	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=
56	2.137596	192.168.254.70	128.119.245.12	TCP	1506	50389 → 80 [ACK] Seq=

▶ Frame 54: 780 bytes on wire (6240 bits), 780 bytes captured (6240 bits) on interface en0, id 0

▶ Ethernet II, Src: Apple_93:6e:ef (ac:bc:32:93:6e:ef), Dst: Actionte_73:ea:a0 (10:78:5b:73:ea:a0)

▶ Internet Protocol Version 4, Src: 192.168.254.70, Dst: 128.119.245.12

▼ Transmission Control Protocol, Src Port: 50389, Dst Port: 80, Seq: 1, Ack: 1, Len: 714

Source Port: 50389

Destination Port: 80

[Stream index: 3]

[TCP Segment Len: 714]

Sequence number: 1 (relative sequence number)

Sequence number (raw): 2428824038

[Next sequence number: 715 (relative sequence number)]

Acknowledgment number: 1 (relative ack number)

Acknowledgment number (raw): 3256207310

1000 = Header Length: 32 bytes (8)

▶ Flags: 0x018 (PSH, ACK)

Window size value: 2070

[Calculated window size: 132480]

10. No, checked duplicate sequence numbers

11. Ack received sequence number: 65, 67, 70, 78, 81, 84

Sequence numbers: 715, 2155, 3595, 5035, 6475, 7915

Acked data: 715, 1440, 1440, 1440, 1440, 1440 therefore typically 1440

None identified, traversed the entire trace twice and never encountered a packet acknowledging more than 1440 bytes

12. Data:

Lack ack = 153036

First ack = 0

Last – First = 153036 bytes

Time:

Last ack = 2.911572

First ack = 2.194442
Last - First = 0.71713 s

$153036 / 0.71713 = 213,400.6386568684$ bytes/s

13. Begins around .052 s

Ends around .054 s

Congestion avoidance starts around .12 s

The segments being sent are not sent in an increasing linear manner. Growth rate is surprisingly decreasing.

Sequence Numbers (Stevens) for 192.168.254.70:50389 → 128.119.245.12:80

Wi-Fi: en0

