TCP Versions: Tahoe

Kameswari Chebrolu

Recap

- TCP relies on a variety of techniques to achieve congestion control
  - Slow start → filling the pipe
  - RTT estimation → conservation
  - Congestion avoidance (AIMD) → adapting
- Lets put it all together

TCP Tahoe

- Basic go-back-N with slow start, congestion avoidance
- Uses two variables cwnd (congestion window) and ssthresh (slow-start threshold)
- At the beginning: slow-start phase
  - cwnd=1;
  - When new data is acked, cwnd +=1
- Bound to overestimate leading to loss of data

w = 25

1, 2, 4, 8, 16, 32
↑

Estimate = 16

→ slow Start

TCP Tahoe

- On time out: Congestion avoidance
  - set ssthresh = cwnd/2; cwnd = 1

32

cwnd = 16

- When ***new*** data is acked,
  - If (cwnd < ssthresh) cwnd += 1;
  - Else cwnd += 1/cwnd;

ack

16

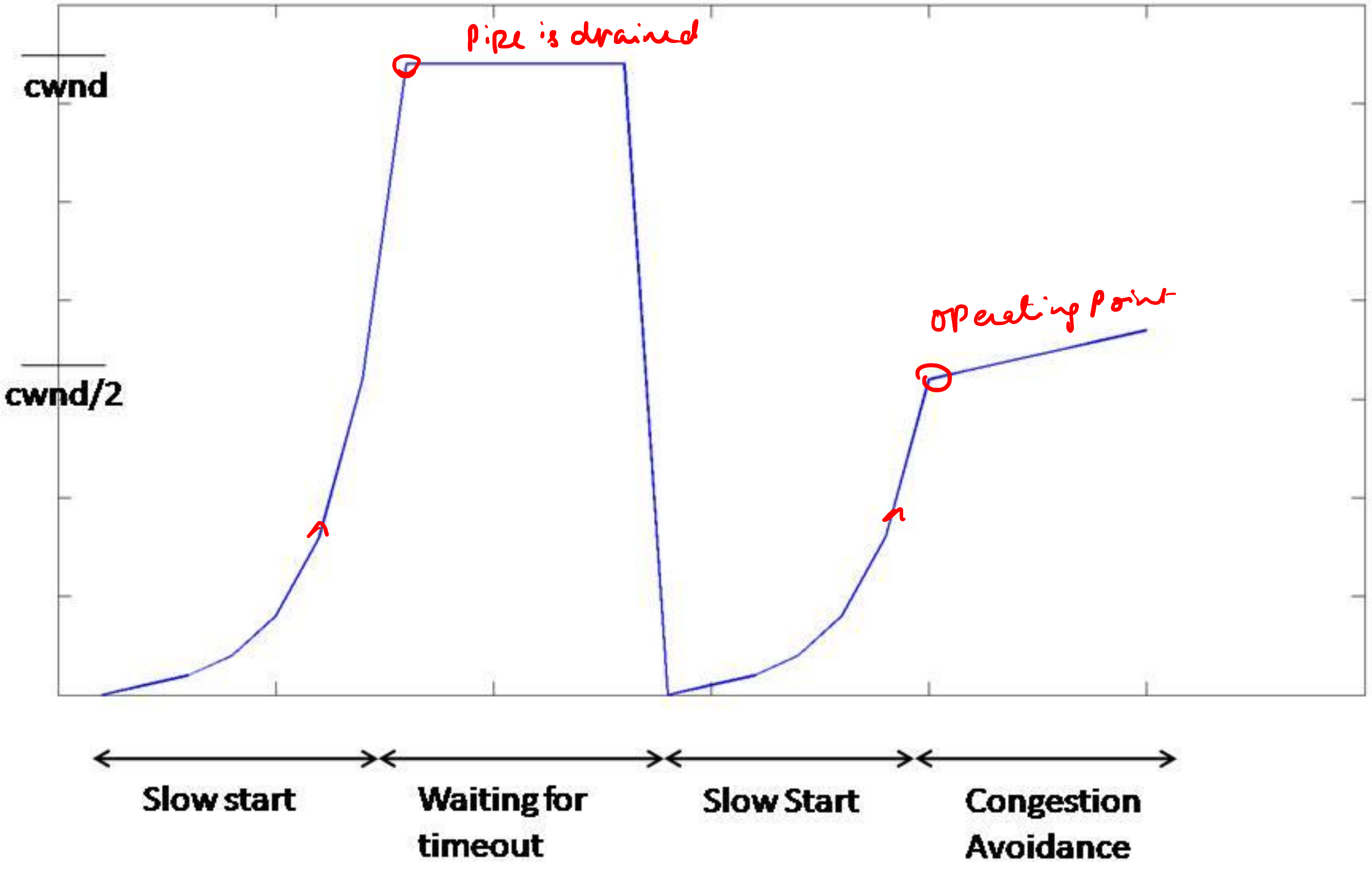
1, 2, 4, 8, 16

additive increase

16, 17, 18, . . . 25

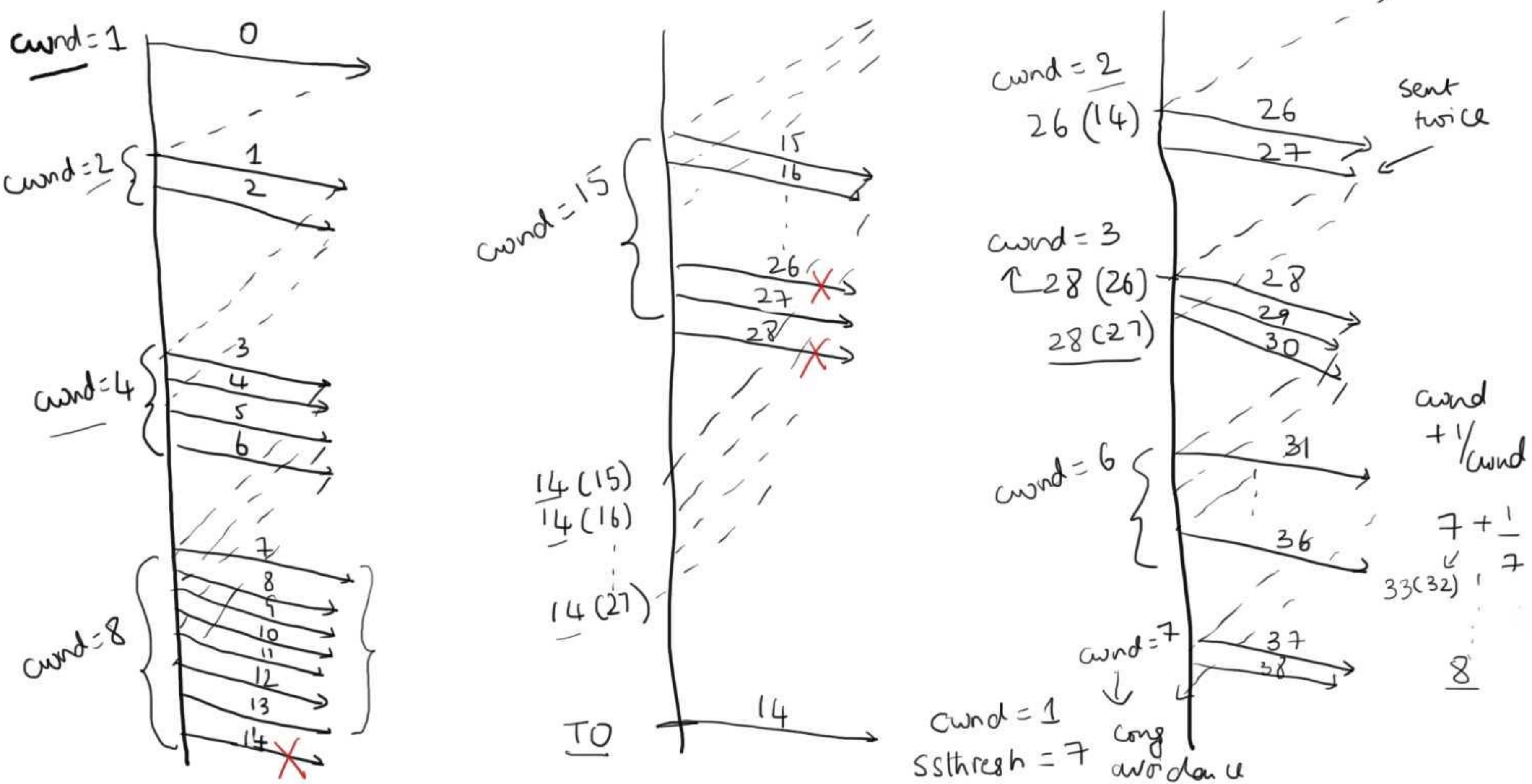
ack

ignore → duplicate


Pipe is drained
cwnd
cwnd/2
operating point
Slow start
Waiting for timeout
Slow Start
Congestion Avoidance

x (Y) → who generated
↳ asking for

TCP Tahoe (Not drawn to scale)



TCP Tahoe Drawbacks

- Slow recovery of losses
- Timeouts drain the pipe → Forces one to do slow start which takes time to fill the pipe

Break