http://mit.edu/6.033/www/assignments/lec12.ppt (or .pdf)

6.033 Lecture 12 – TCP details & Intro to Internet Routing

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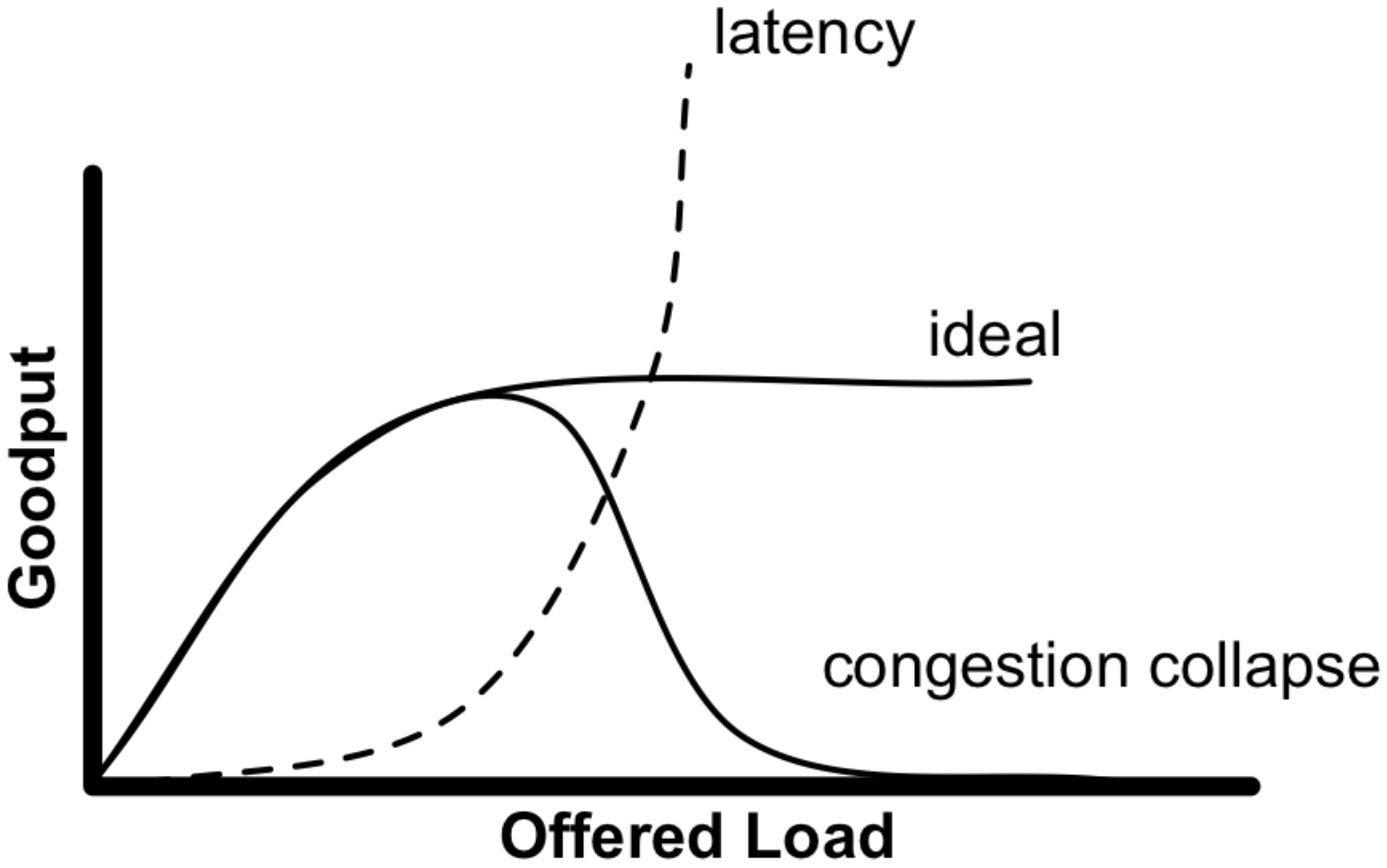
Key ideas:
slow start
reordering buffer
path vector routing

Hands-on 3 due tomorrow; DP1 due Thursday

Congestion collapse



Basic TCP Protocol

```
timeout= b * RTT (or RTT + b * stddev)
wsize = 1 //window size in # outstanding TCP segments

on ack:
    wsize = min(wsize + 1/wsize, receiver window)
    timeout = b * RTT

on retry timer timeout:
    timeout = timeout * 2
    wsize = max(1, wsize/2)
```

Note that the algorithm presented in class (and previous version of these slides) omitted the /wsize erroneously.

TCP with Slow Start

```
timeout= b * RTT
wsize = 1
starting = true

on ack:
    if (starting)
      wsize = min(wsize + 1, receiver window)
    else
      wsize = min(wsize +1/wsize, receiver window)
    timeout = b * RTT

on retry timer timeout:
    timeout = timeout * 2
    wsize = max(1, wsize/2)
    starting = false
```

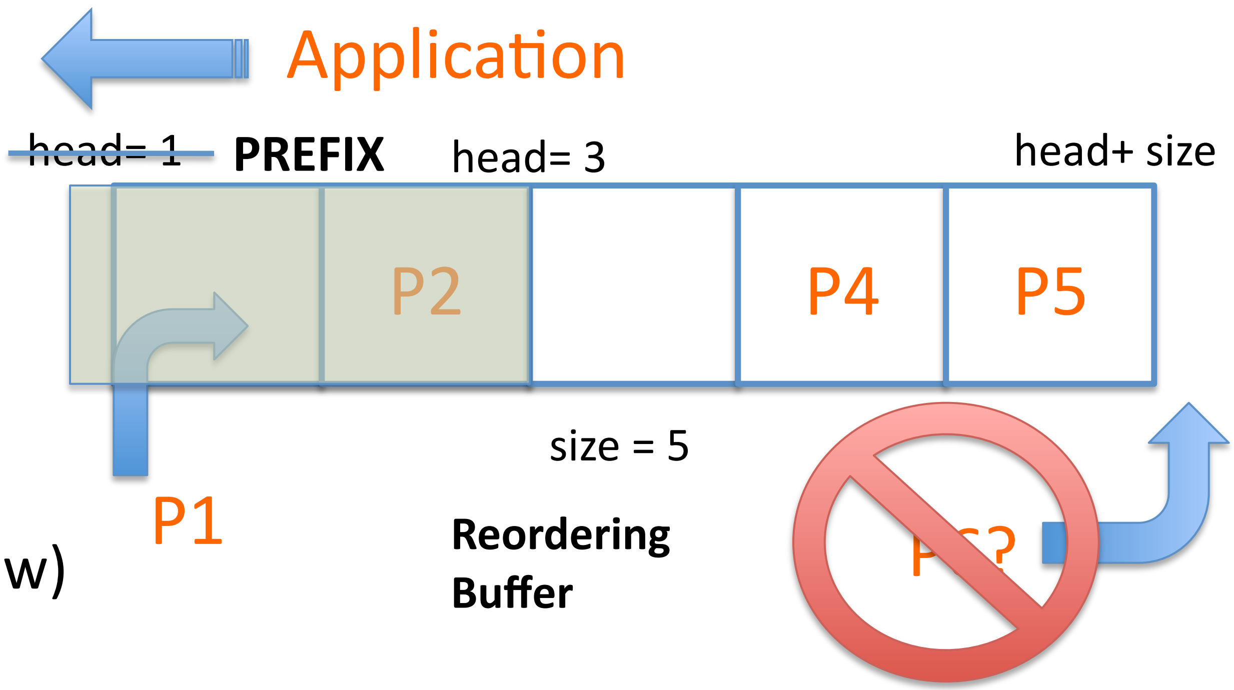
Note that the algorithm presented in class (and previous version of these slides) omitted the /wsize erroneously.

Receiver can also control rate of sender

Reordering

```
recv(p):
    slot = p.sno – head
    if (slot > head + size):
      drop
    else:
      new = isempty(slot)
      if (new) add p to slot
      ack p
    if (slot == head and new)
      deliver prefix to app
      head = head+ len(prefix)
```

head : sno of last delivered packet
size: length of reordering queue
slot: position to insert new packet



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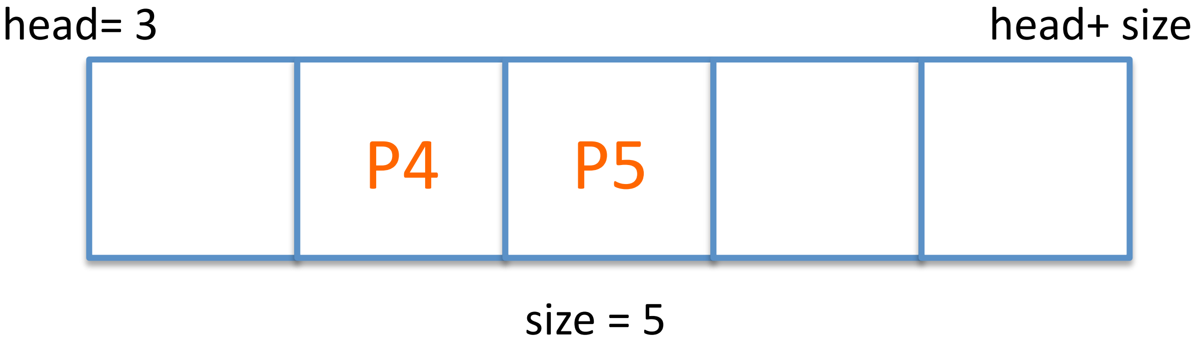

Reordering Buffer