

Key Ideas:

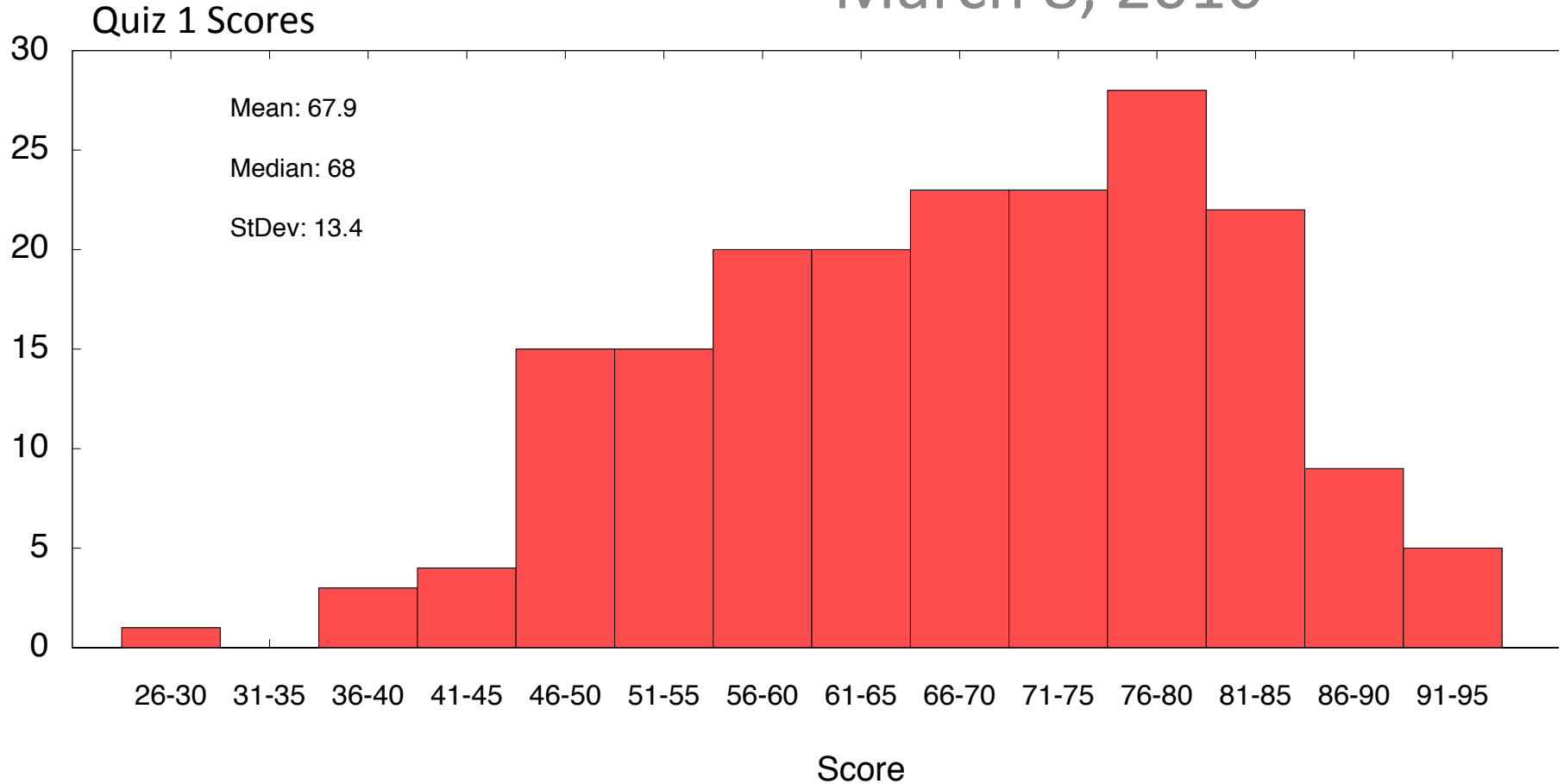
- 3 Layer Network
- At least once delivery
- At most once delivery
- Sliding window protocol

6.033 Lecture 10

Layering and Reliability

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End-to-end Interface

Src

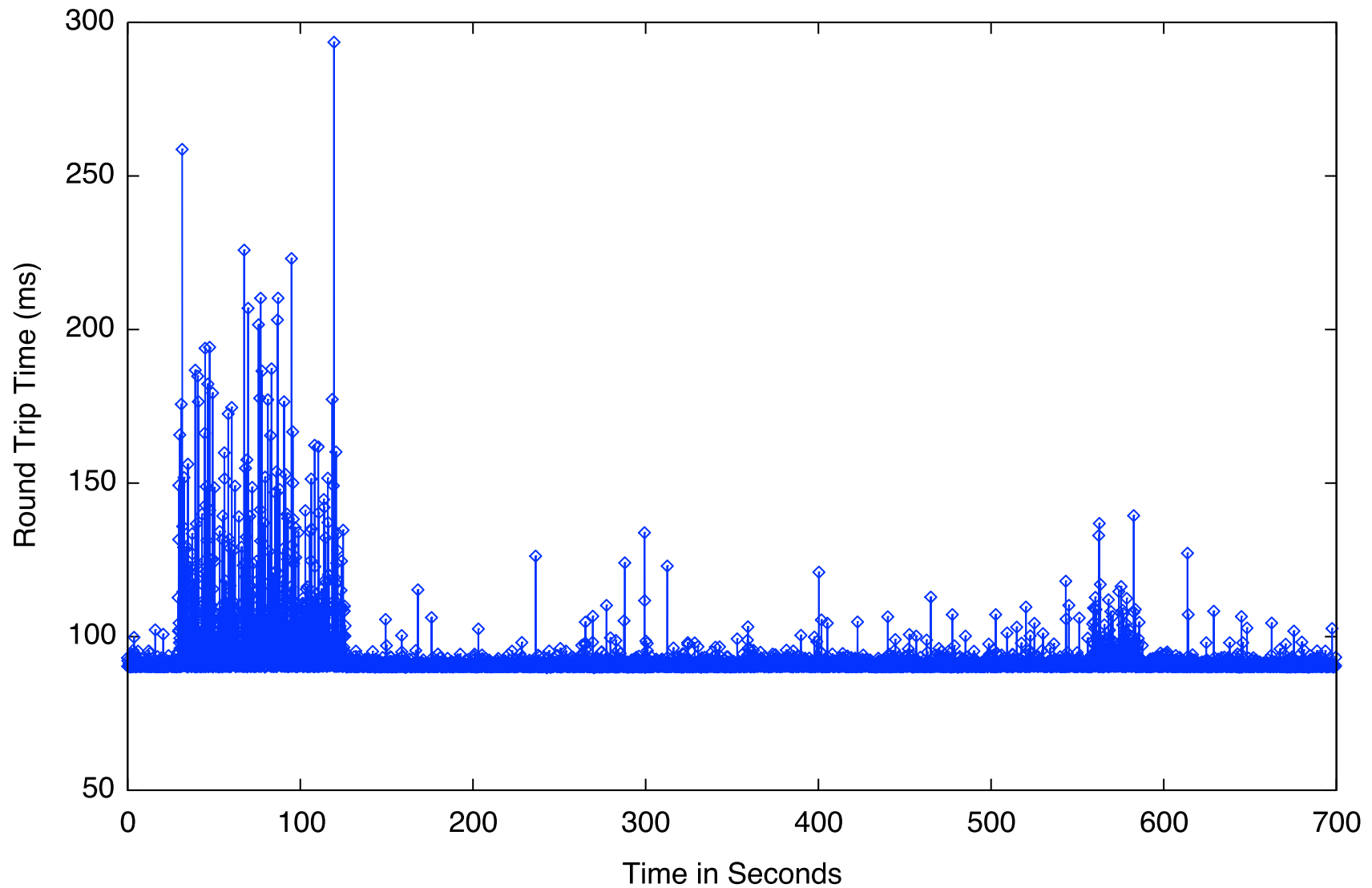
```
conn=open_stream  
    (dest,port)  
send(conn,bytes1)  
send(conn,bytes2)  
close_stream(conn)
```

Dest

```
conn=listen(port)  
bytes=recv(conn)
```

RTT Is Variable

Ping time from mit.edu to stanford.edu

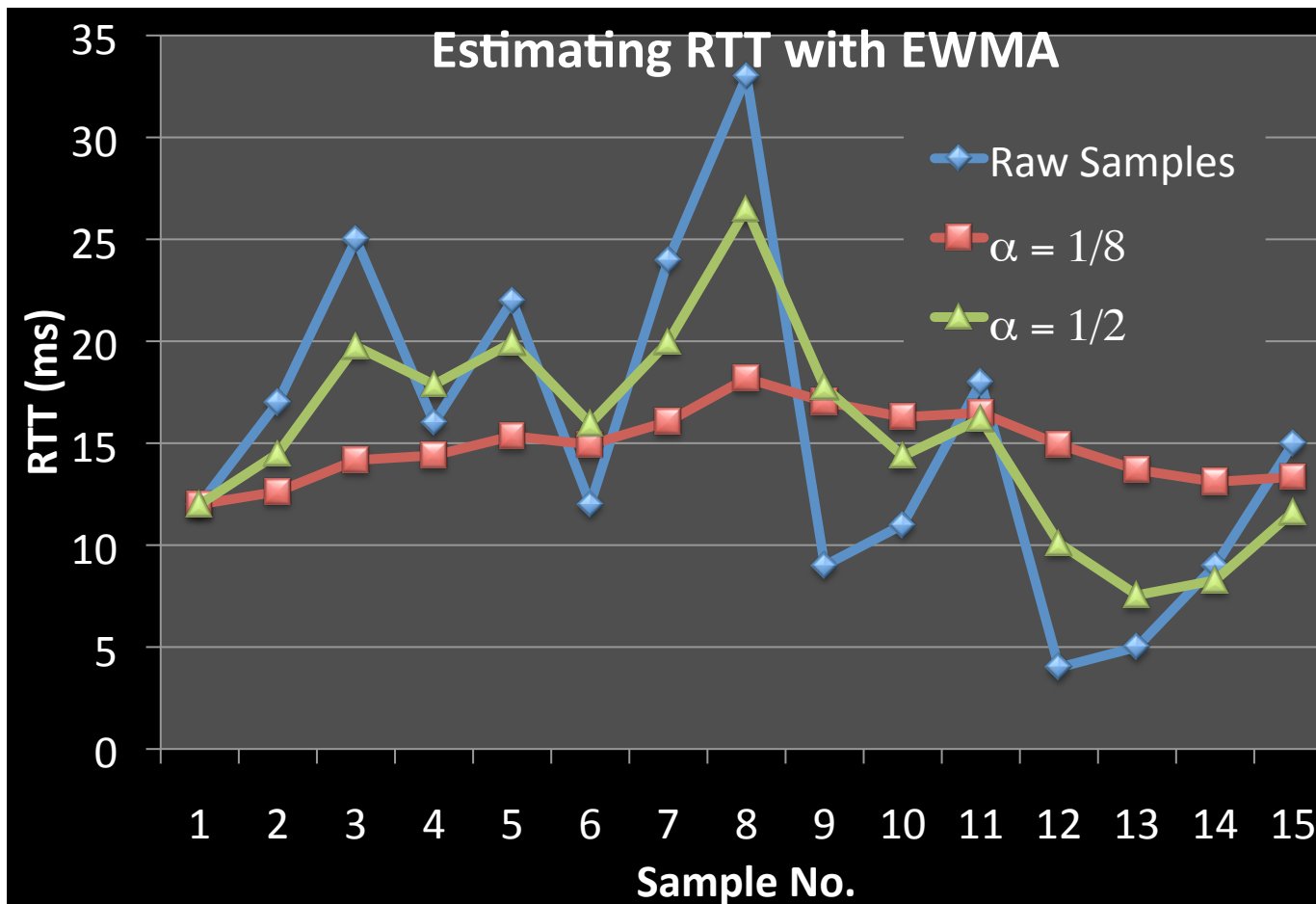


Exponentially Weighted Moving Average (EWMA)

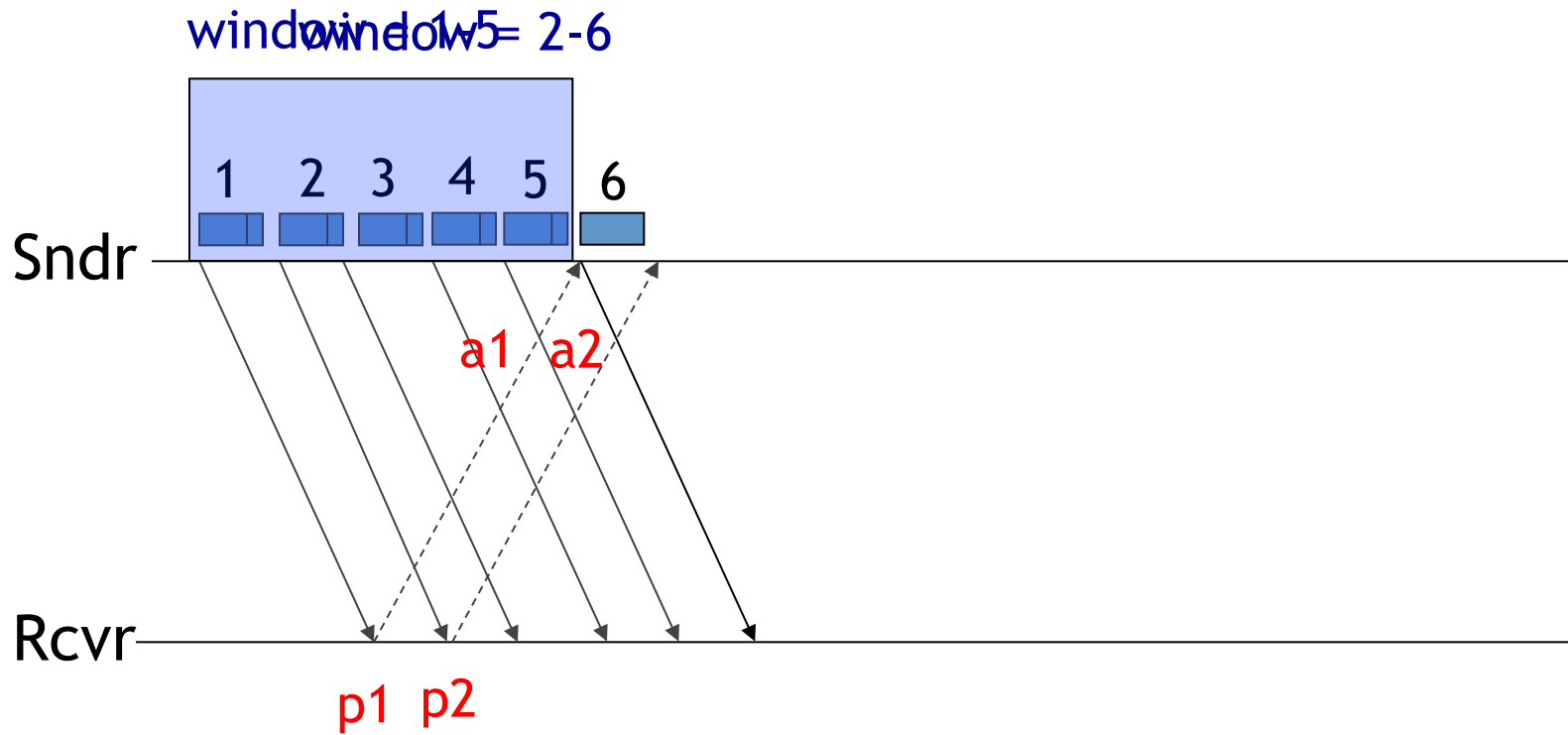
measure = new RTT measurement

$$rtt = \alpha(\text{measure}) + (1-\alpha)(rtt) \quad ; \quad \alpha = 1/8$$

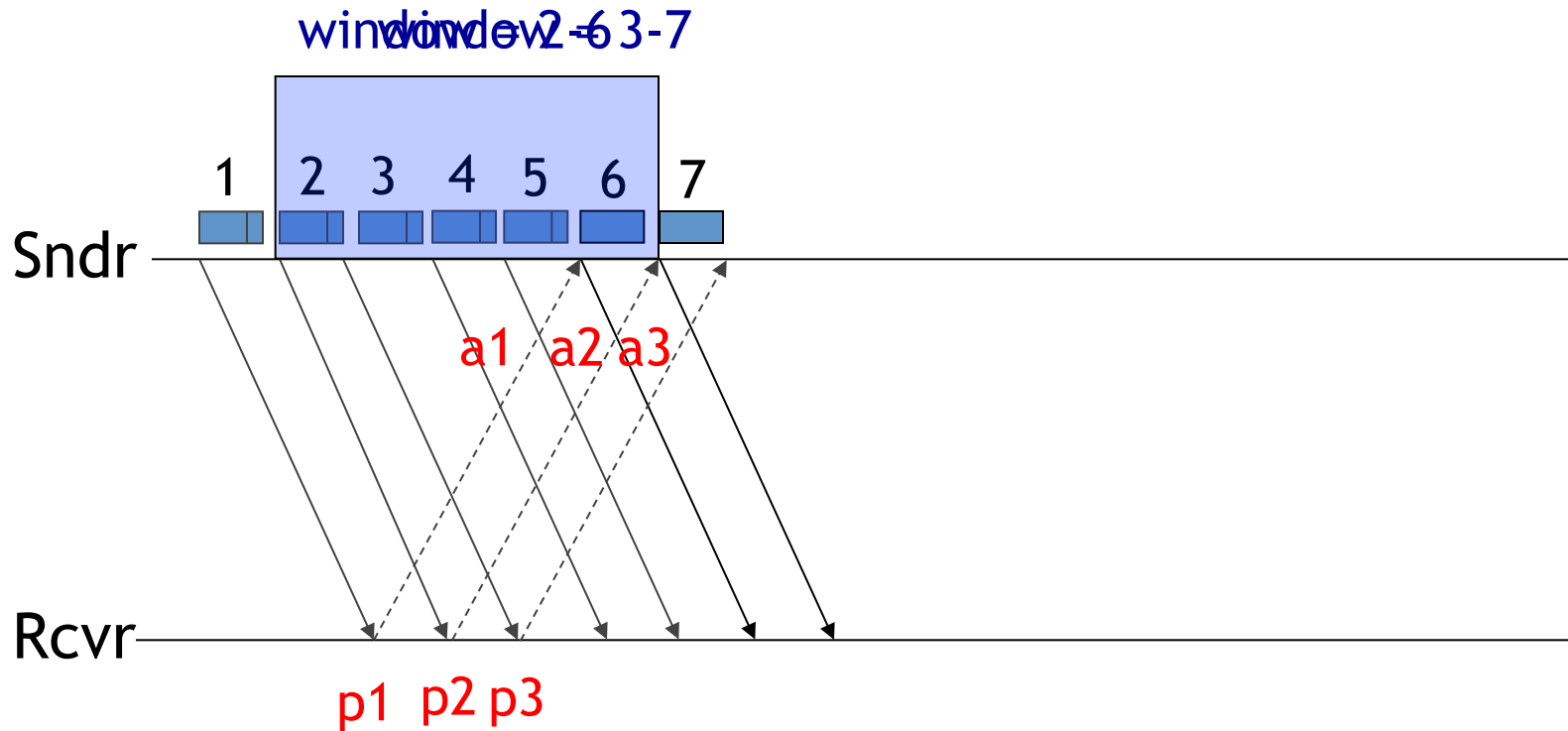
$$\text{timeout} = \beta * rtt \quad ; \quad \beta = 2$$



Sliding Window in Action



Sliding Window in Action



Send next packet as acks arrive, rather than waiting for all acks in window

Still may wait

