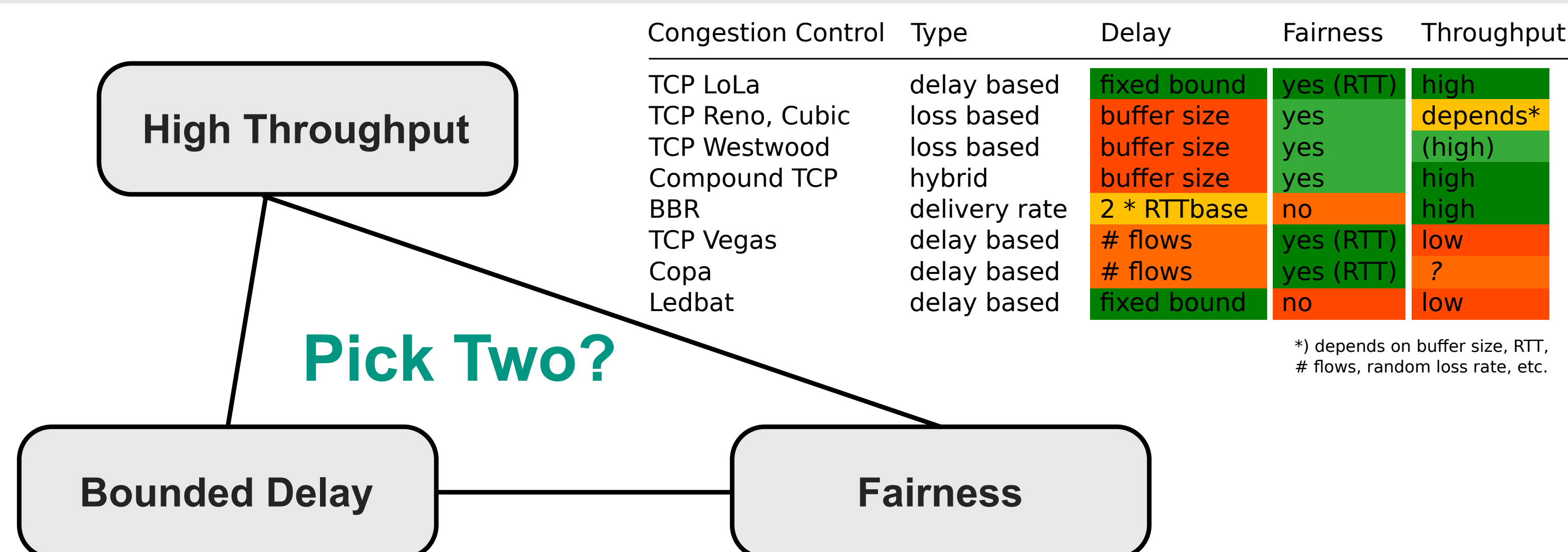


# FFBquick: Fast Convergence to Fairness for Delay-bounded Congestion Controls

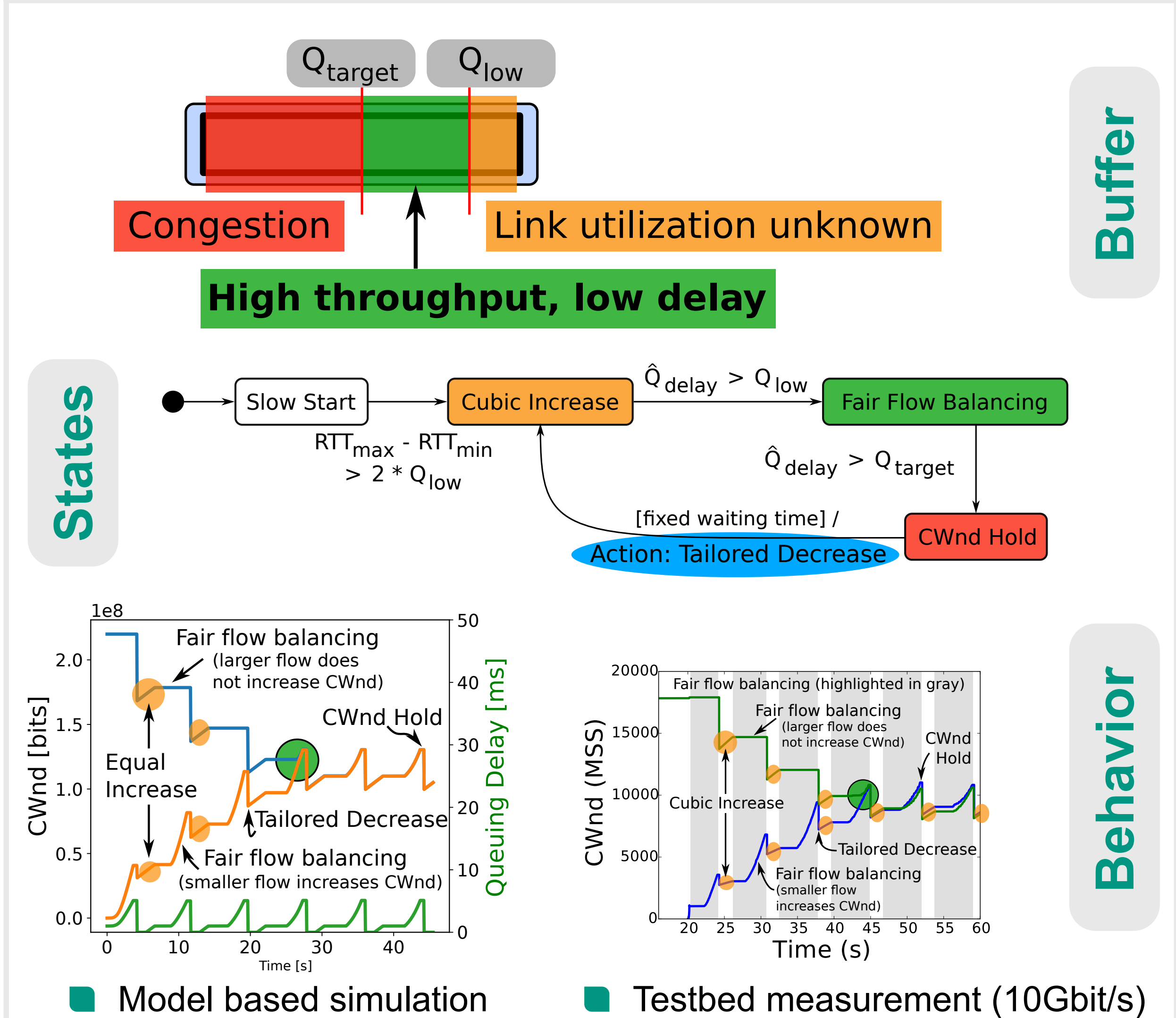
Mario Hock, Roland Bless, Felix Neumeister, Martina Zitterbart

## Challenge



- How is fairness typically achieved?
  - Fixed amount of packets allowed in buffer per flow
  - "AIMD" (or similar) dynamics
    - Additive Increase, Multiplicative Decrease
- What's new in Fair Flow Balancing?
  - Equal amount of packets allowed in buffer per flow
  - Dynamically scaled to maintain bounded delay!

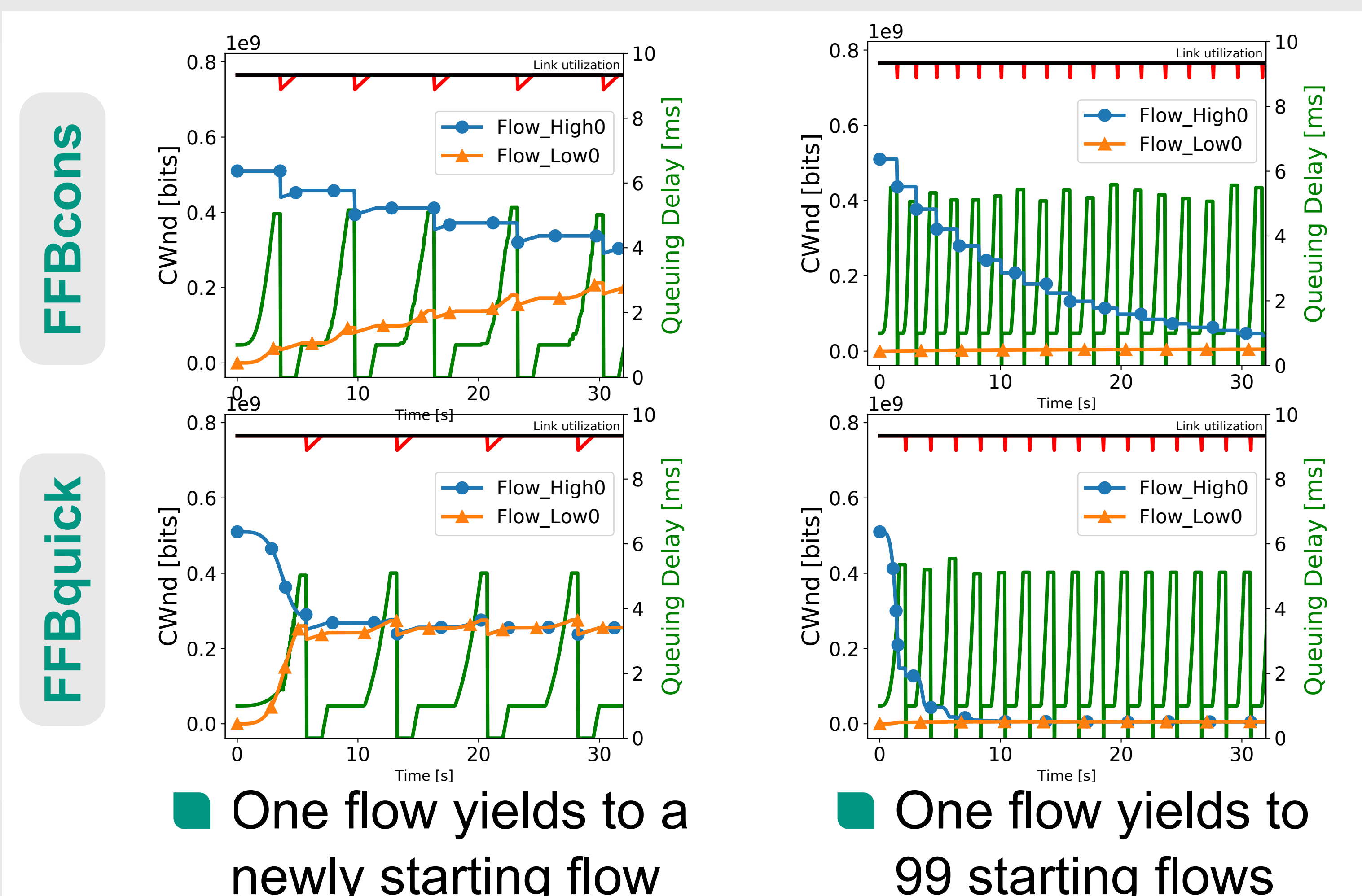
## TCP LoLa



## Evolution - Why is it done like this?

- $X(t) = (t \text{ [ms]} / \sigma)^3$ 
  - "Allowed" data in bottleneck queue
- $Q_{data}$ 
  - Amount of data in queue (estimated)
  - $Q_{delay} * CWnd / RTT$
  - $CWnd += X(t) - Q_{data}$
- Naive approach
  - Quick, but...
  - No safety margin
- FFBcons
  - Never decrease CWnd
  - $Q_{data}$  "explodes"!
- FFBquick
  - Keep  $Q_{data}$  up
  - Quick convergence!

## Significantly Improved Convergence Speed



## Robust against Non-ideal Readings

