

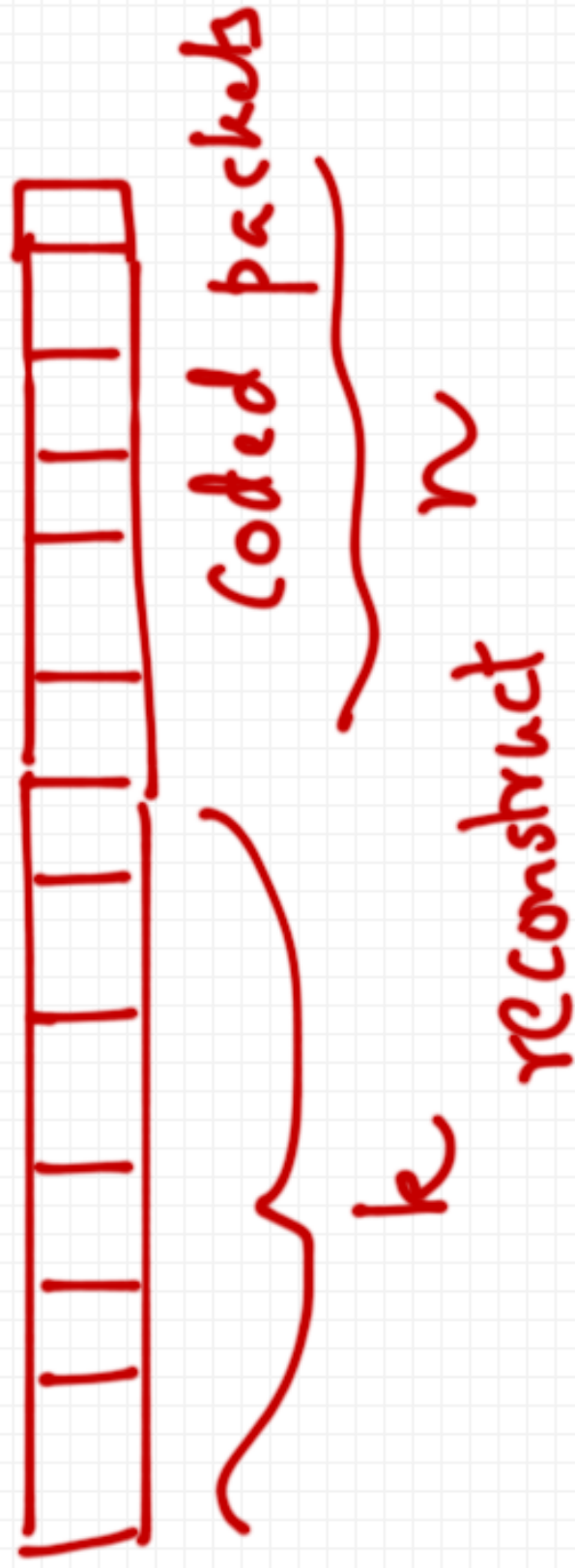
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— Digital Fountain

— Congestion Avoidance

— Project discussions (11:20 -
11:50)

Erasures Codes



reconstruct

$$S(n+k) \quad \swarrow \quad R(\text{any } k)$$

$n+k$

Data

Carousel

$G_1 G_2$

Fast

Slow

Hetero
genome

$k+$

$k+$

$k+$

$k+$

Reed-Solomon — High
Processing
times

Reed-Solomon Coding

$$\begin{matrix} & 1 & \dots & k \\ k=5 & x_1 & \dots & x_k \end{matrix} \quad \} k \quad \checkmark$$

$$y_i = x_1 + x_2 \alpha^i + x_3 \alpha^{2i} + \dots$$

$$\left\{ \begin{matrix} y_1 \\ y_5 \\ y_n \end{matrix} \right.$$

$$\begin{matrix} k=5 \\ \hline x_1 x_3 x_5 \end{matrix} \quad y_1 y_5$$

100MB

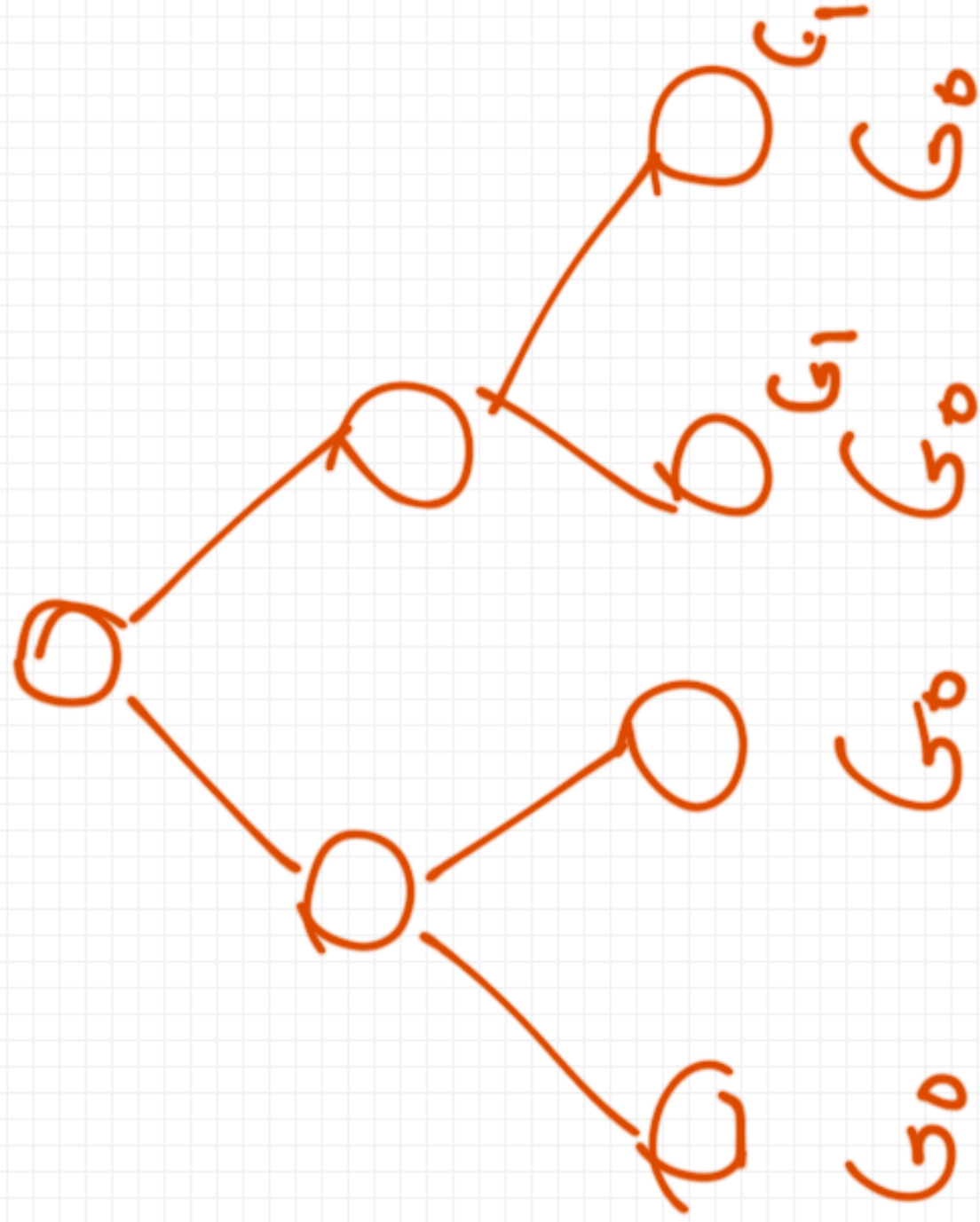


n

k



...



! ||||| (161)

201 . . .

Multicast

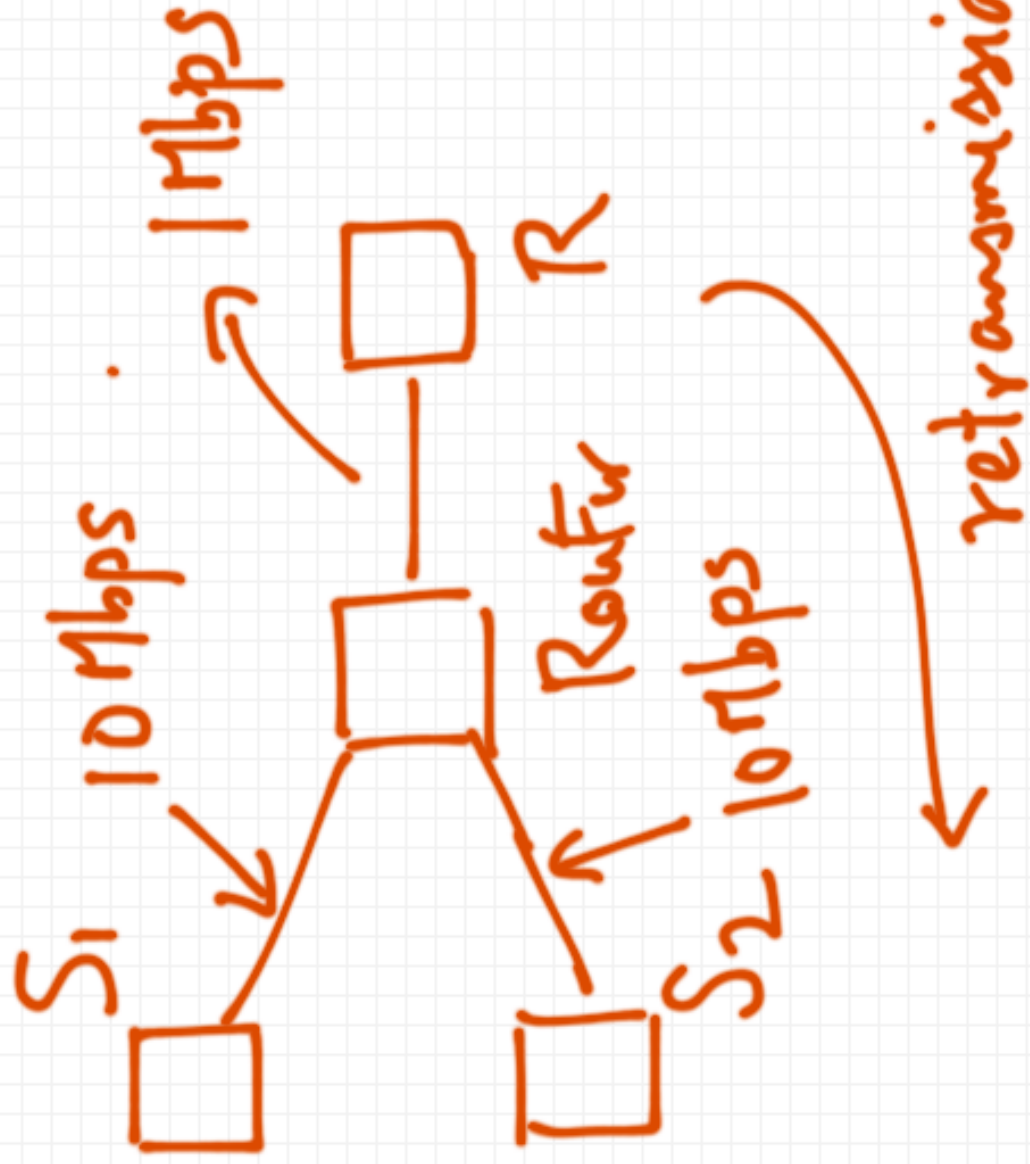
└ Routing (PIM/Expires)

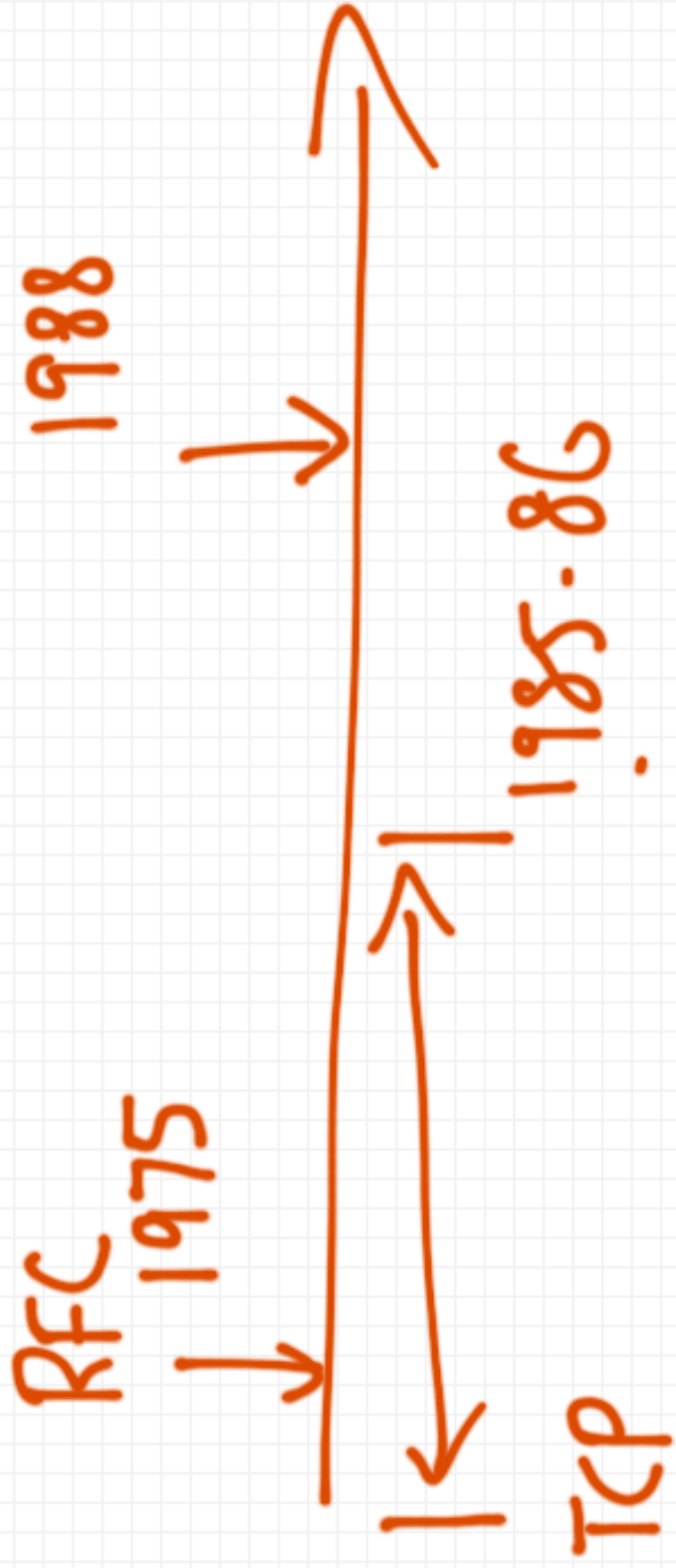
└ Digital Fountain.

Congestion Control and Avoidance

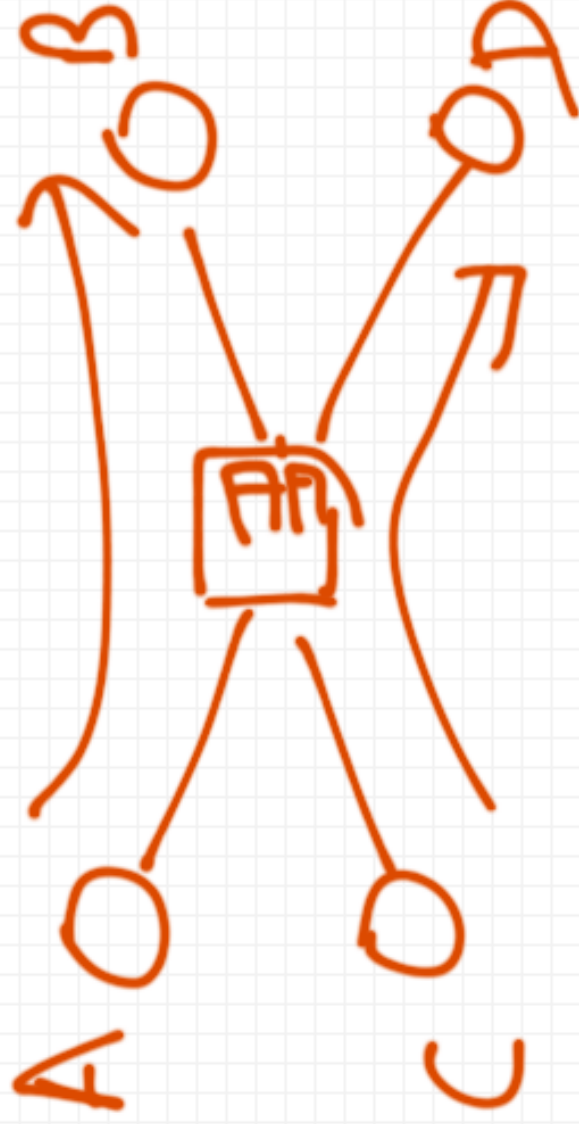
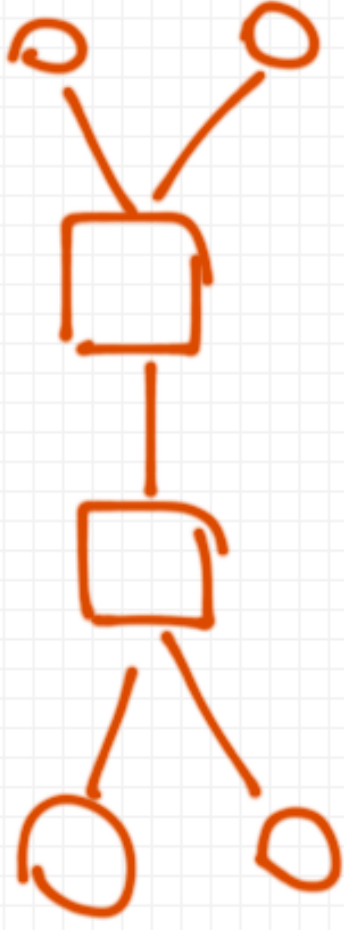
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- ① Jain / Ramakrishnan
- Principles
 - ② Jacobson - TCP
 - ③ Padhye et al - Model

Congestion Collapse





Project



1, A, B

300, A, B

Open()

Connect() → establishment

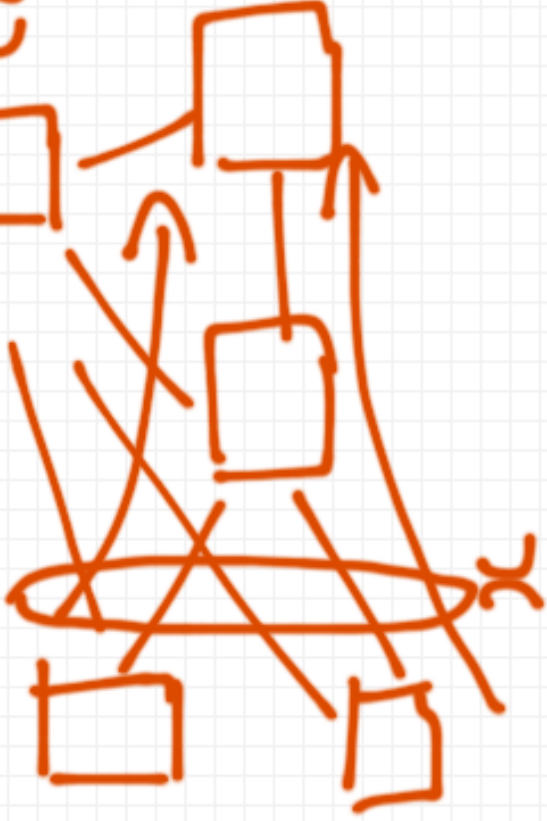
close() → teardown

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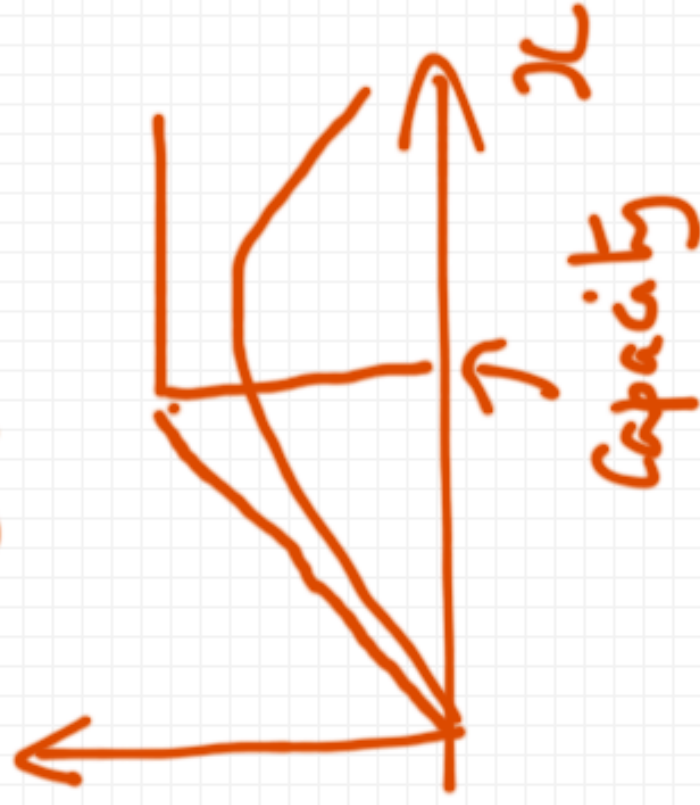
Congestion Control

Exam 2 (11:20-11:50)

Controller



Throughput



Offered Load

, -

Throughput

Power

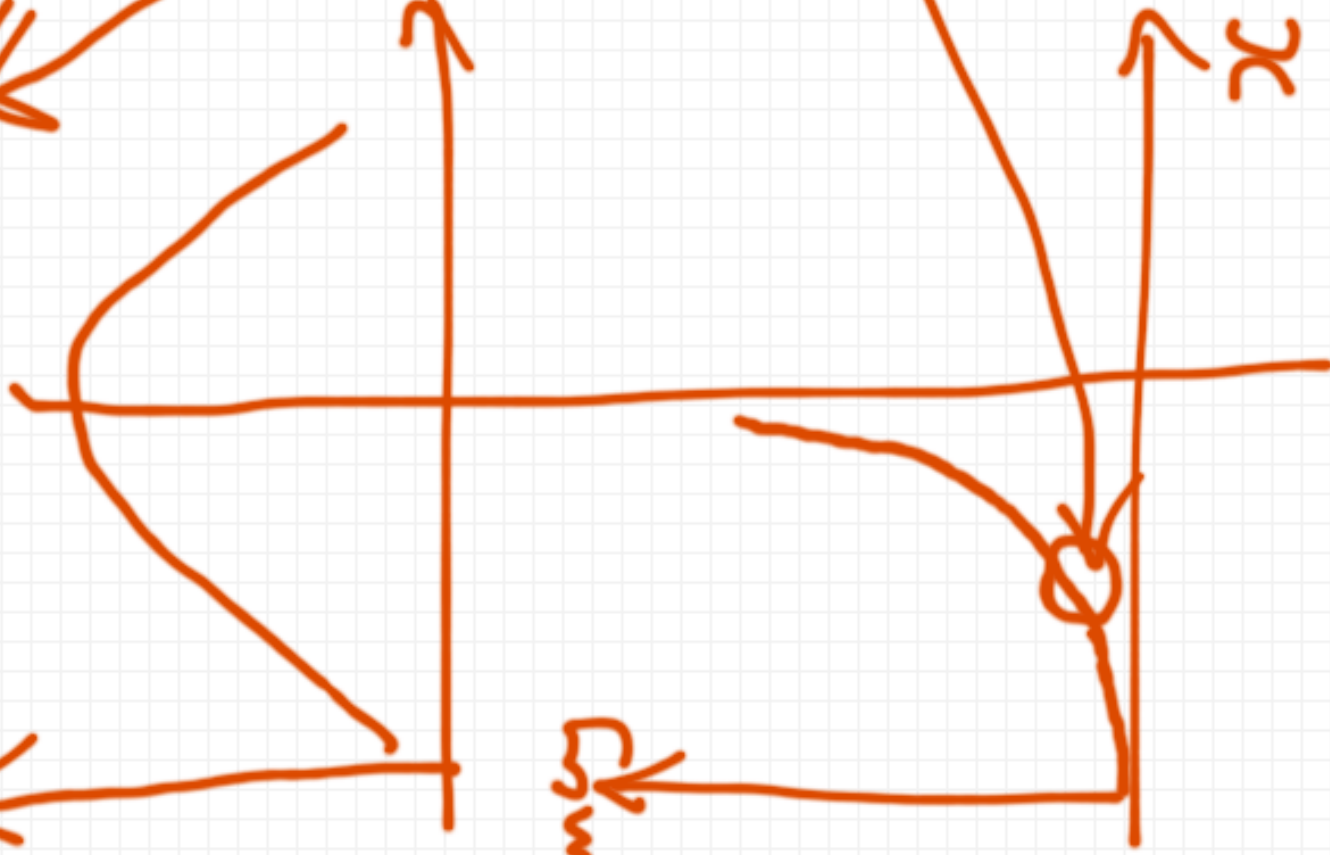
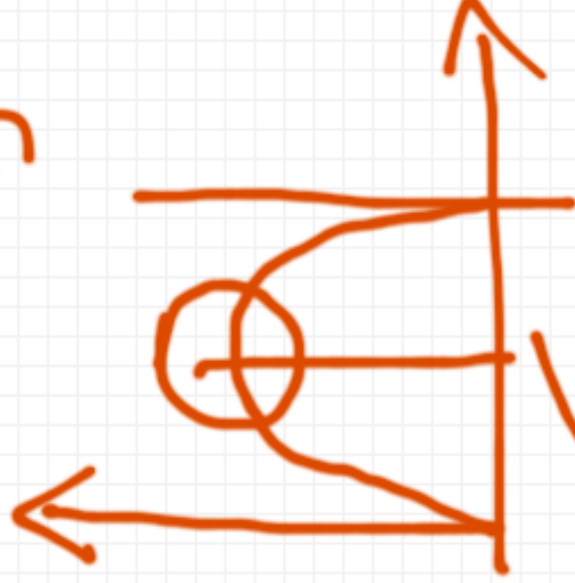
Throughput
Latency

Latency

Efficiency

↓ ISPs

x



Fairness

Jain fairness index

Stability, Speed of convergence



- | — Packet-switched network
 - Distributed congestion control
 - Router feedback
 - Sender rate adaptation
- Binary ↙ Window-Based

Queue size

function?

instantaneous
 q

avg.

$T?$

Signal?

threshold

Hysteresis

\textcircled{T}

$T_2 \rightarrow \uparrow$
 $\{ T_1 \rightarrow \downarrow$

Increase - Decrease

Algorithms

No Congestion

Congestion

A:

$$W += \alpha$$

$$W -= \alpha$$

M:

$$W *= \beta$$

$$W += \frac{1}{\beta}$$

$$\alpha > 0, \beta > 1$$

AIMD, AIMD, ...

