

Congestion Control

E2E

Network

Link

Reliability

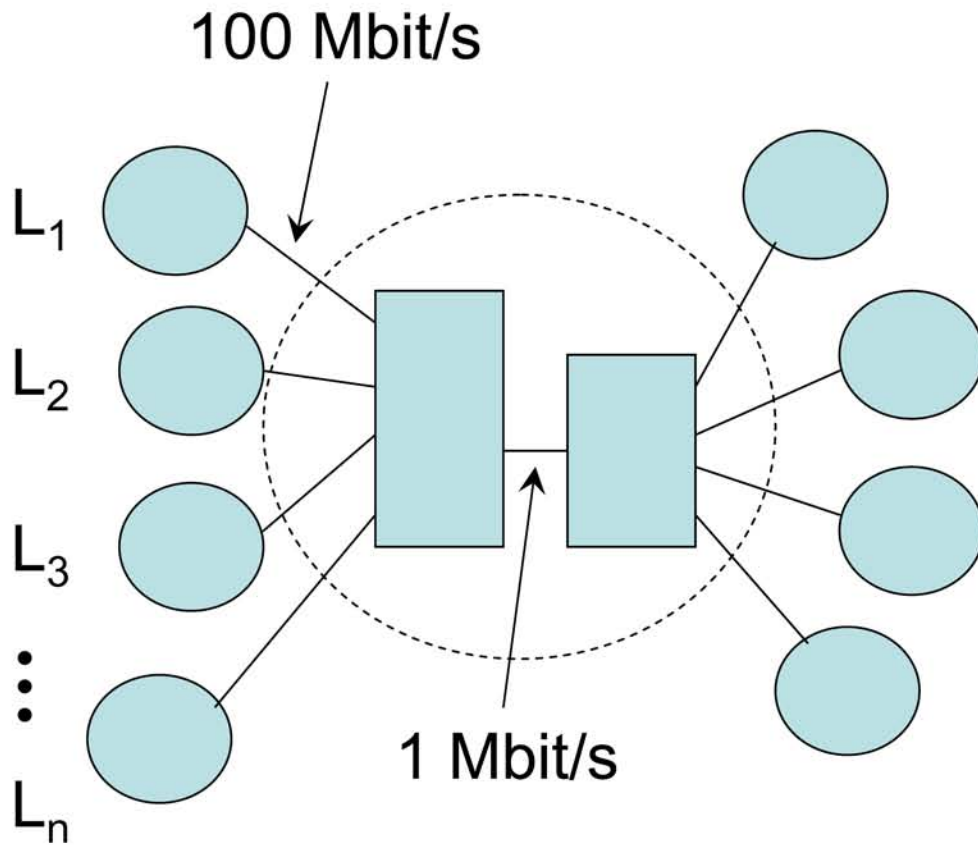
Timers

Sliding window

Flow control



Sharing



Problem

$$\sum_{i=1}^N L_i \leq C$$

- Scalable
 - N varies
 - Resource far from ctrl.
- large nets
large N

Cross-layer

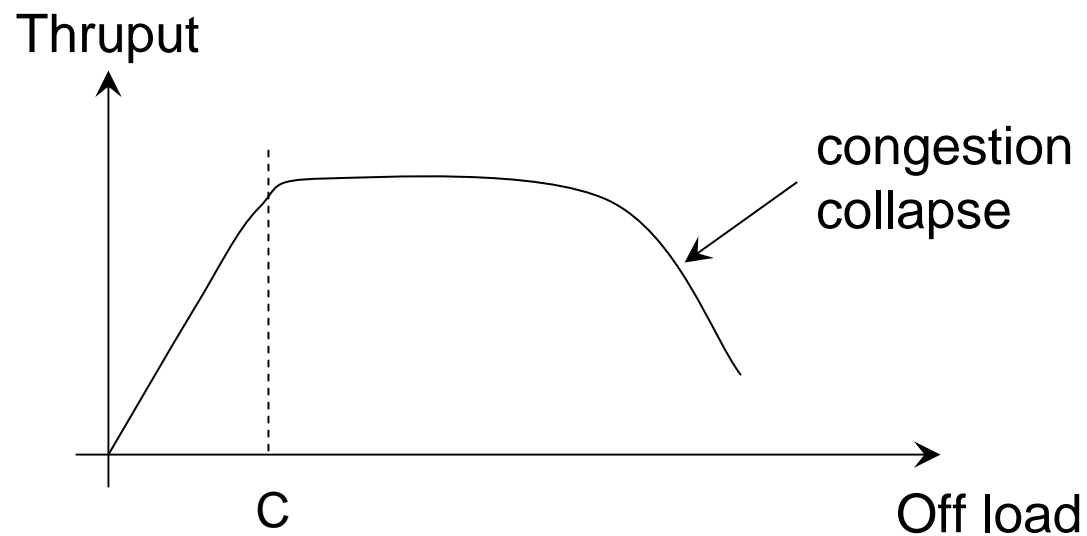
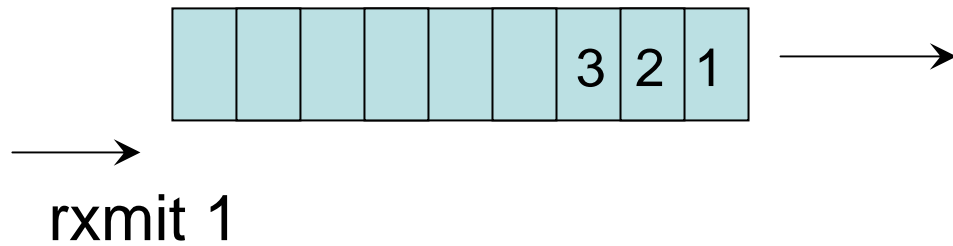
Plan: Sender i sends @ rate r_i .

Too fast → slow down

Too slow → speed up

Buffering

- How much?
 - Too little? → DROP
 - Too much? → Potential for congestion collapse



Want: $\sum_{i=1}^N L_i \leq C$

- No congestion collapse
- Reasonable utiliz'n
- Equitable allocation

$$\sum L_i \leq C :$$

< 1 RTTs → } Buffering
1-100 RTTs → }
> 100 RTTs

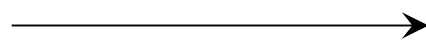
Solutions

- Some buffering $\rightarrow < 1$ RTT
- Congestion \rightarrow feedback \rightarrow DROP
- Get feedback \rightarrow adapt \rightarrow change speed

Congestion Control

Self-pacing

- ACKs strobe data
- Packet drop



$$\text{cong. Window} \leftarrow \frac{\text{cong. Window}}{2}$$

