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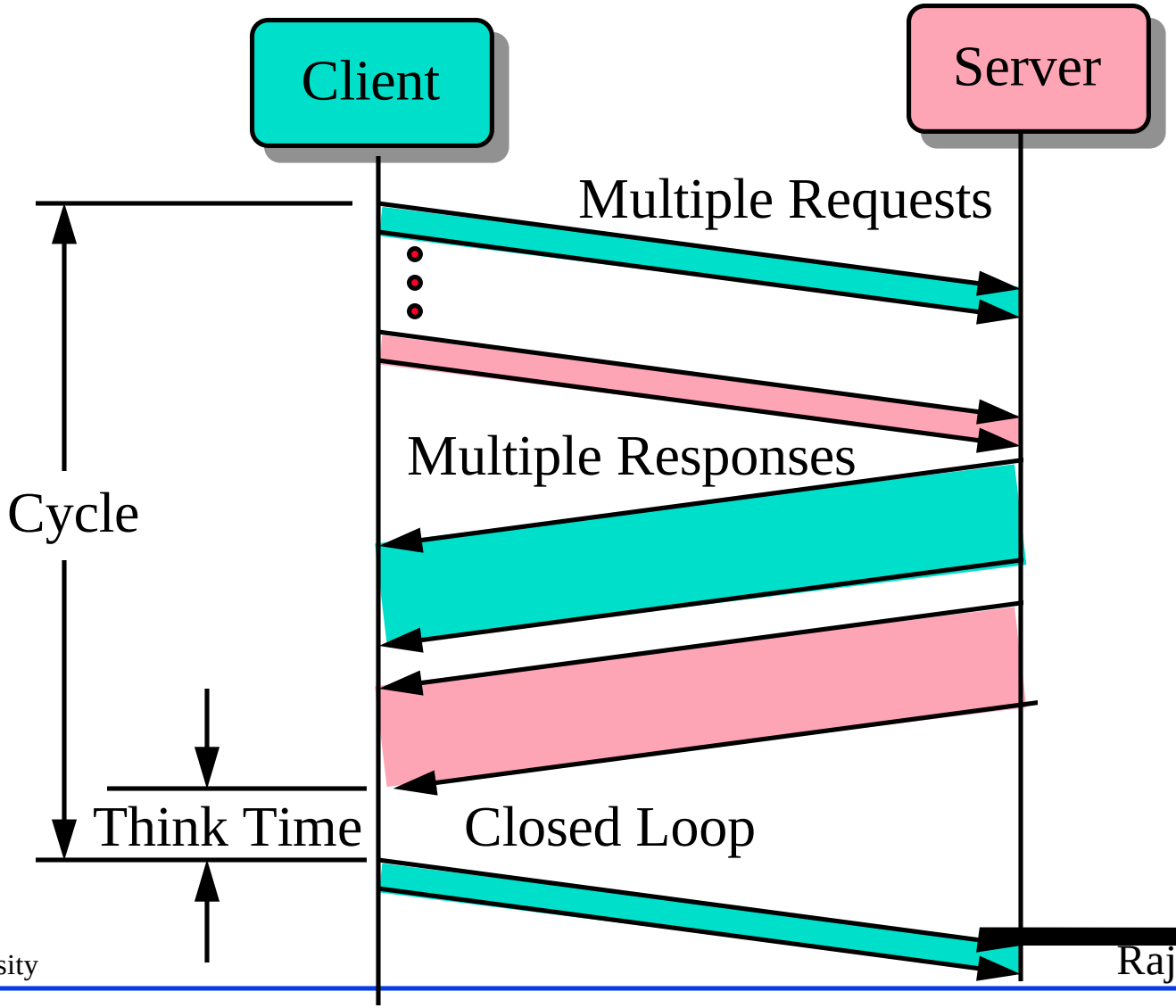
Bursty ABR Sources

Raj Jain, Shiv Kalyanaraman, Sonia Fahmy, Fang Lu
The Ohio State University
Department of CIS
Columbus, OH 43210

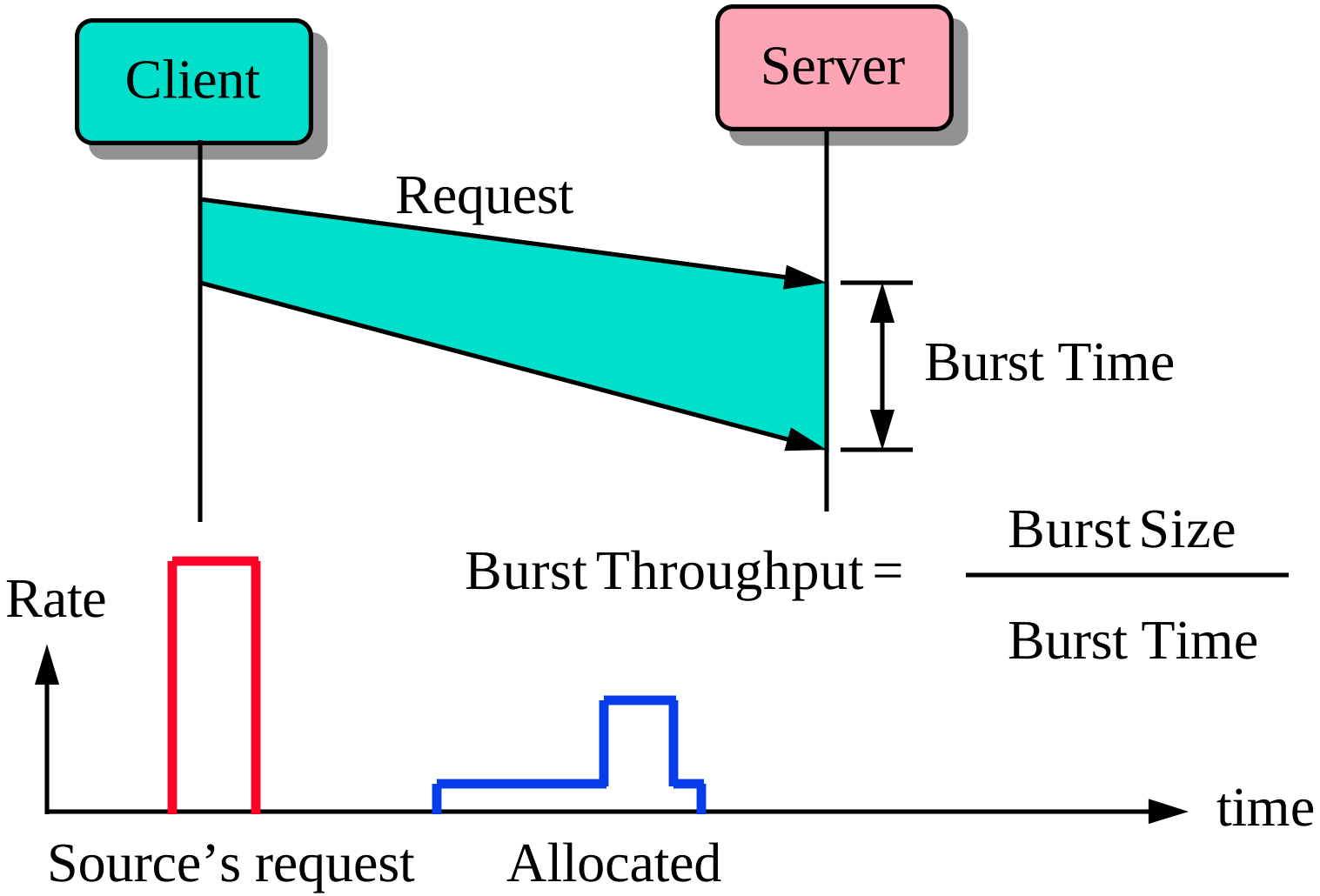
Contact: Jain@CIS.Ohio-State.Edu
http://www.cis.ohio-state.edu/~Jain/

- Bursty traffic model
- Bursty traffic performance metrics
- Bursty traffic performance with ABR

Bursty Traffic Model: WWW

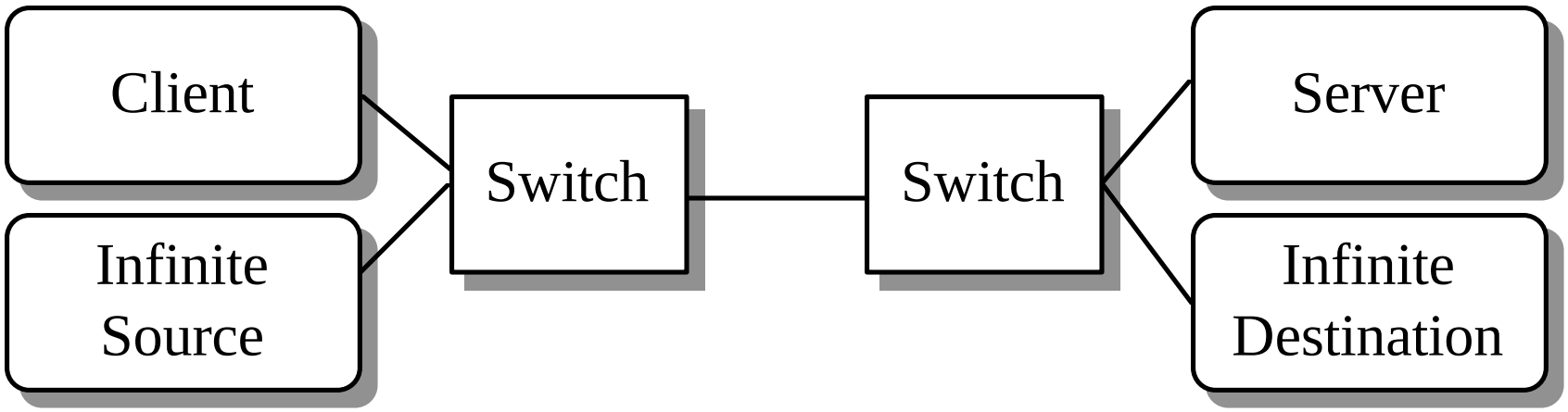


Burst Throughput



$$\text{Burst Throughput} = \frac{\text{Burst Size}}{\text{Burst Time}}$$

Single-Client Configuration



- All links 155 Mbps
- Infinite source as the background traffic
- Goal: If the scheme has problem with single-source, it will have problems with more complex configurations

Simulation Parameters

- Source: Parameters selected to maximize ACR
  Nrm = 32
  AIRF = 1 ⇒ AIR = PCR/Nrm ⇒ ACR is not limited by AIR
  RDF= 512 cells
  {TDFF, PNI} = {1/8, 0} or {0, 1} ⇒ Rule 5 on or off
  CIF = 512, 4096
  RTT = Propagation delay × multipliers of 1, 10
  XDF = 1/2
- Traffic: Bi-directional
- Switch:
  Target Utilization = 90%
  Averaging interval = min{30 cells, 200 μs}

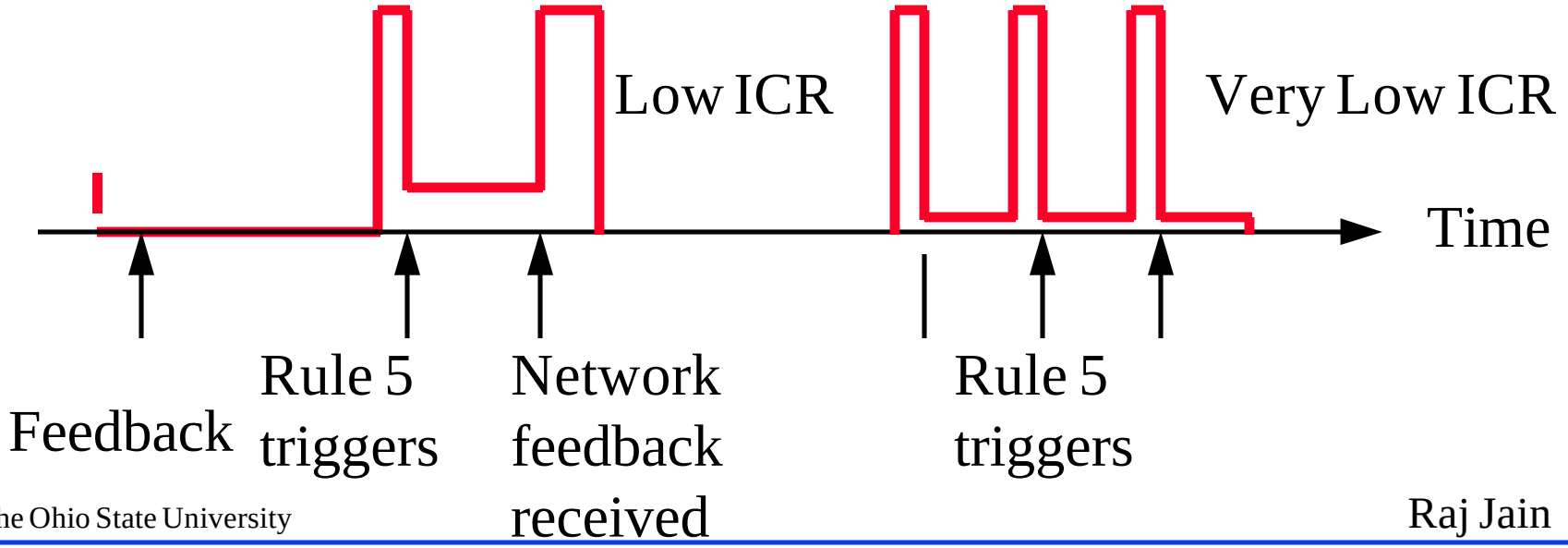
Rule 5 and 6

XRM \ ICR	Low	High
Low	Rule 5, 6	Rule 6
High	Rule 6	

- ICR = Min{PCR, a*CIF/RTT}
- XRM = Min{CIF/Nrm, PCR * RTT/Nrm}
- Small RTT ⇒ Small XRM
- Large RTT ⇒ Small ICR

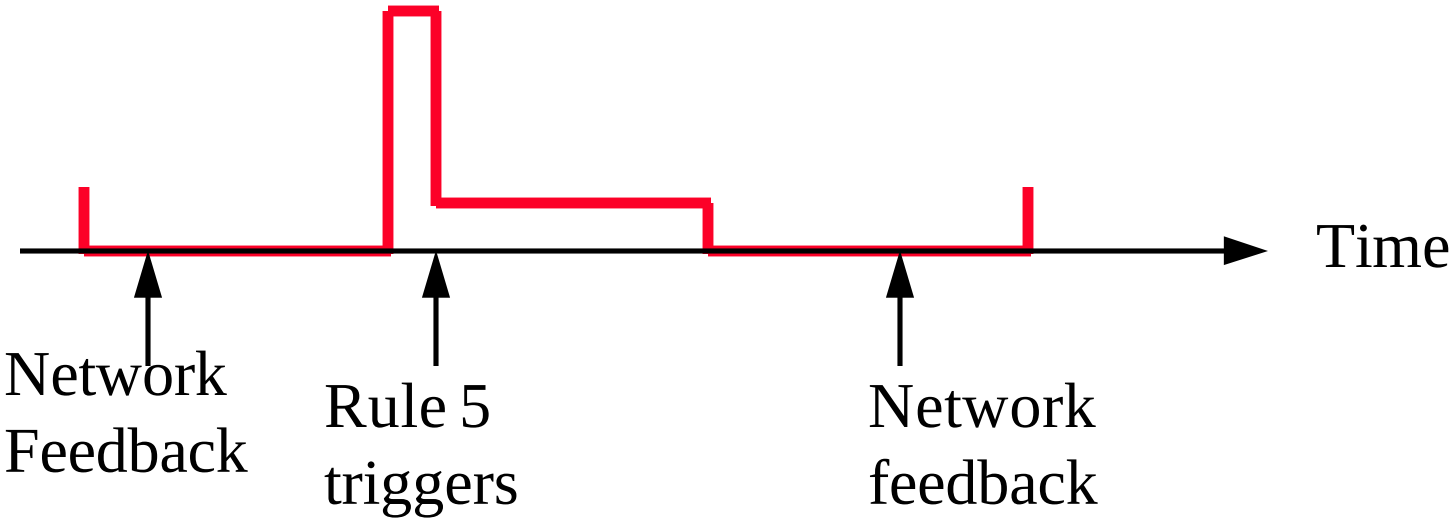
Large Bursts

- Large Bursts: Burst Time > RTT and Burst Size > Nrm
- Burst Time = fn(ACR)
- Gap ⇒ Rule 5 triggers and brings the rate down to ICR
- Some part of the burst transmitted at low rate
- Very low ICR ⇒ The process is repeated



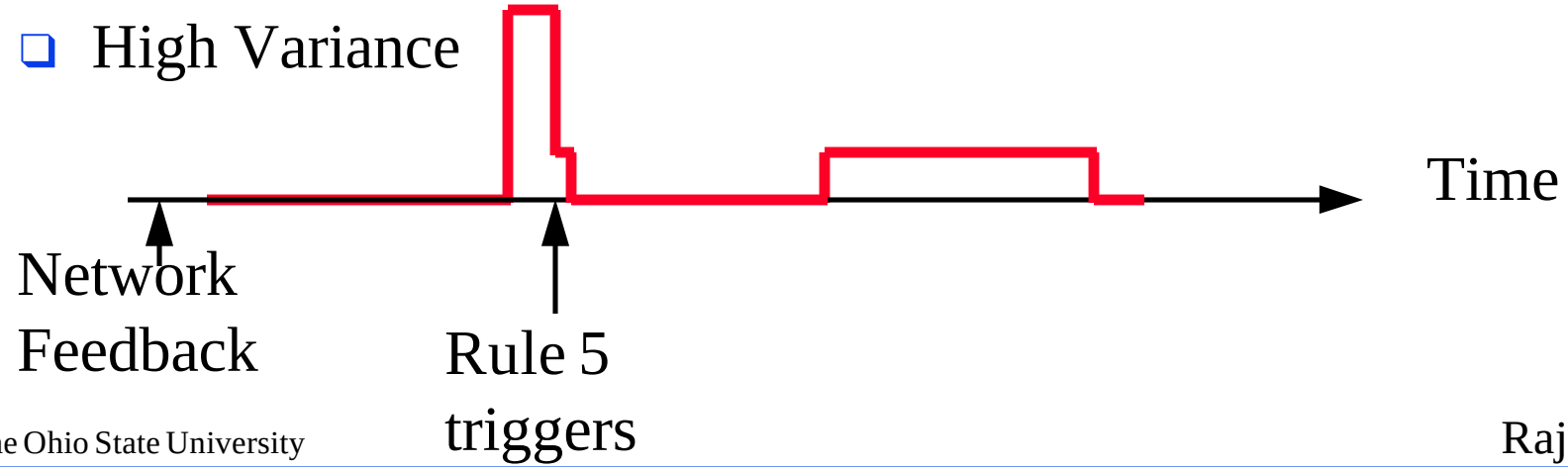
Medium Bursts

- Medium Bursts: Nrm < Burst Size and
  Burst Time < Round trip delay w queueing RTTq
- Network feedback comes after the burst is gone.
- Rule 5 triggers and brings the rate down to ICR
- Entire burst transmitted at low rate

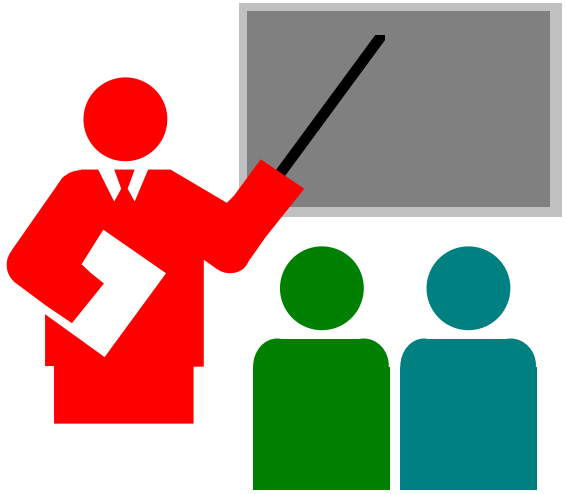


Small Bursts

- Small Bursts: Burst Size < Nrm
- No RM cells transmitted during some bursts
  No source rules triggered during these bursts
  Entire burst transmitted at one rate
- RM Cells transmitted during some bursts
  Rule 5 triggers and brings the rate down to ICR
  Burst transmitted at low rate
- High Variance



Summary



- Round trip delay with queueing is highly random
  Network performance unpredictable.
- Rule 5 is not "burst-friendly."
- Small burst throughput highly variable.
- Medium burst throughput equal to ICR
- Large burst throughput depends upon ICR (and rule 5)