Traffic Shaping in ATM Networks

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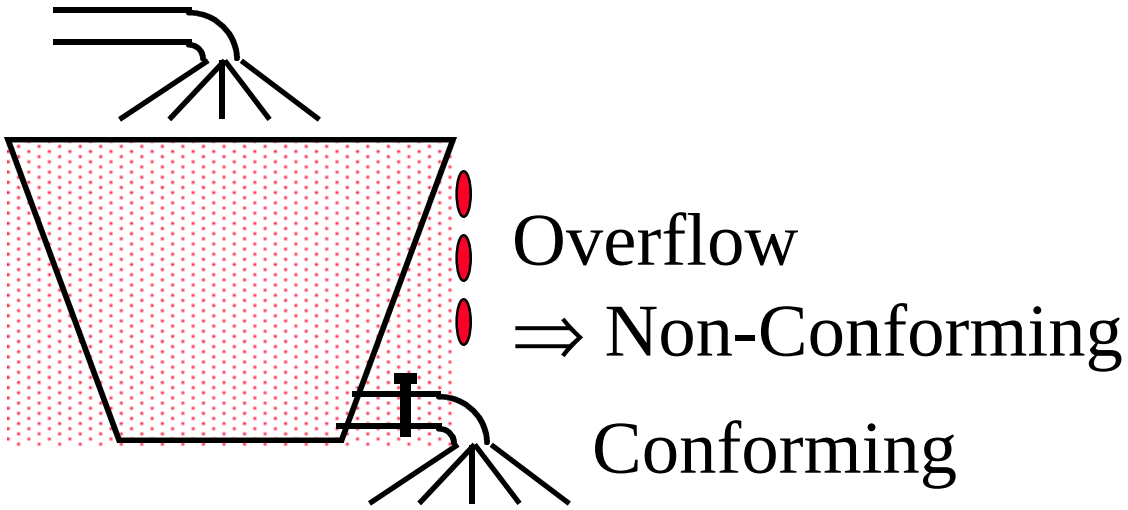
Overview

- Leaky bucket
- Generic Cell Rate Algorithm
- GCRA Implementations:
  - Virtual Scheduling Algorithm
  - Leaky bucket algorithm
- Examples

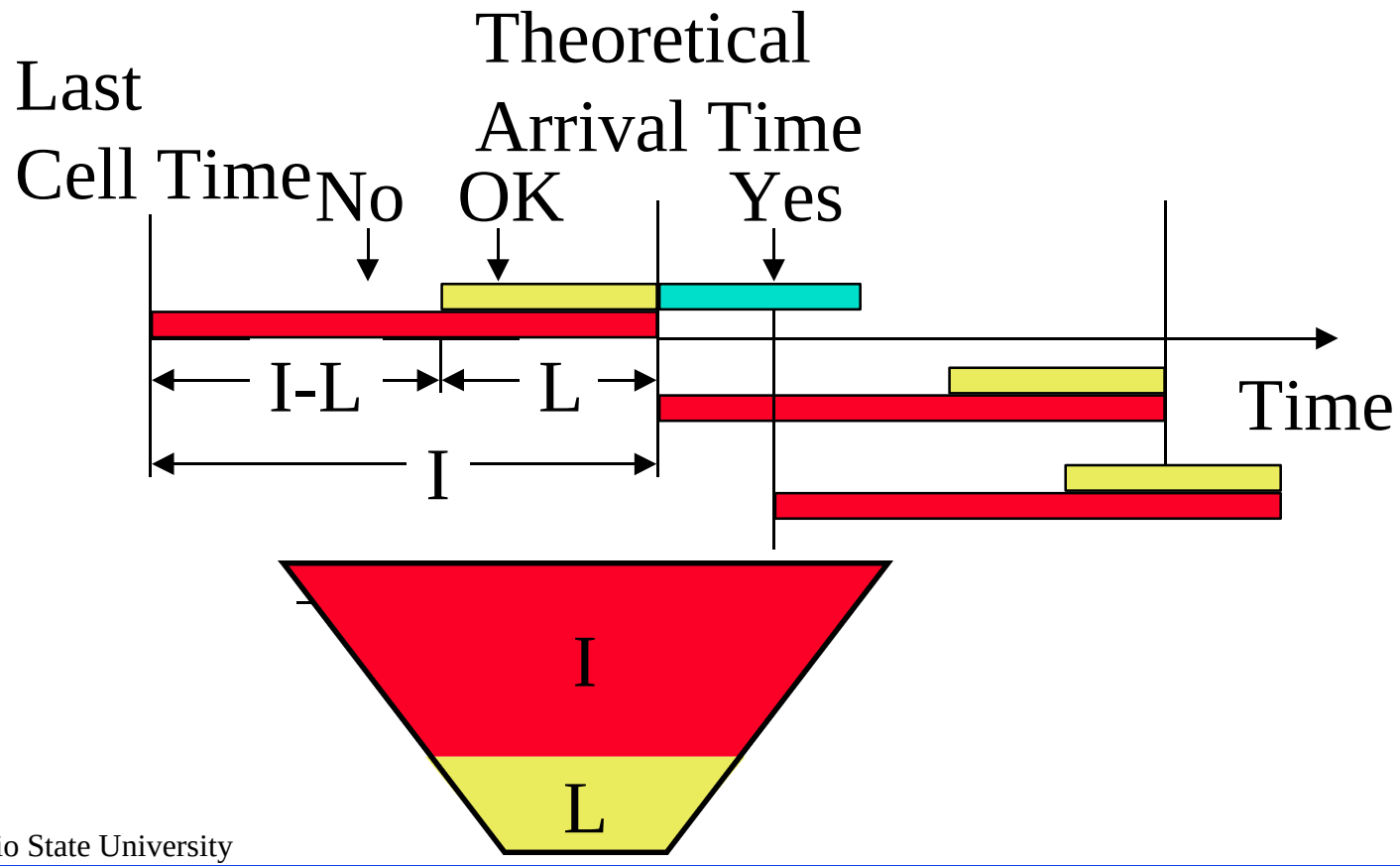
Leaky Bucket



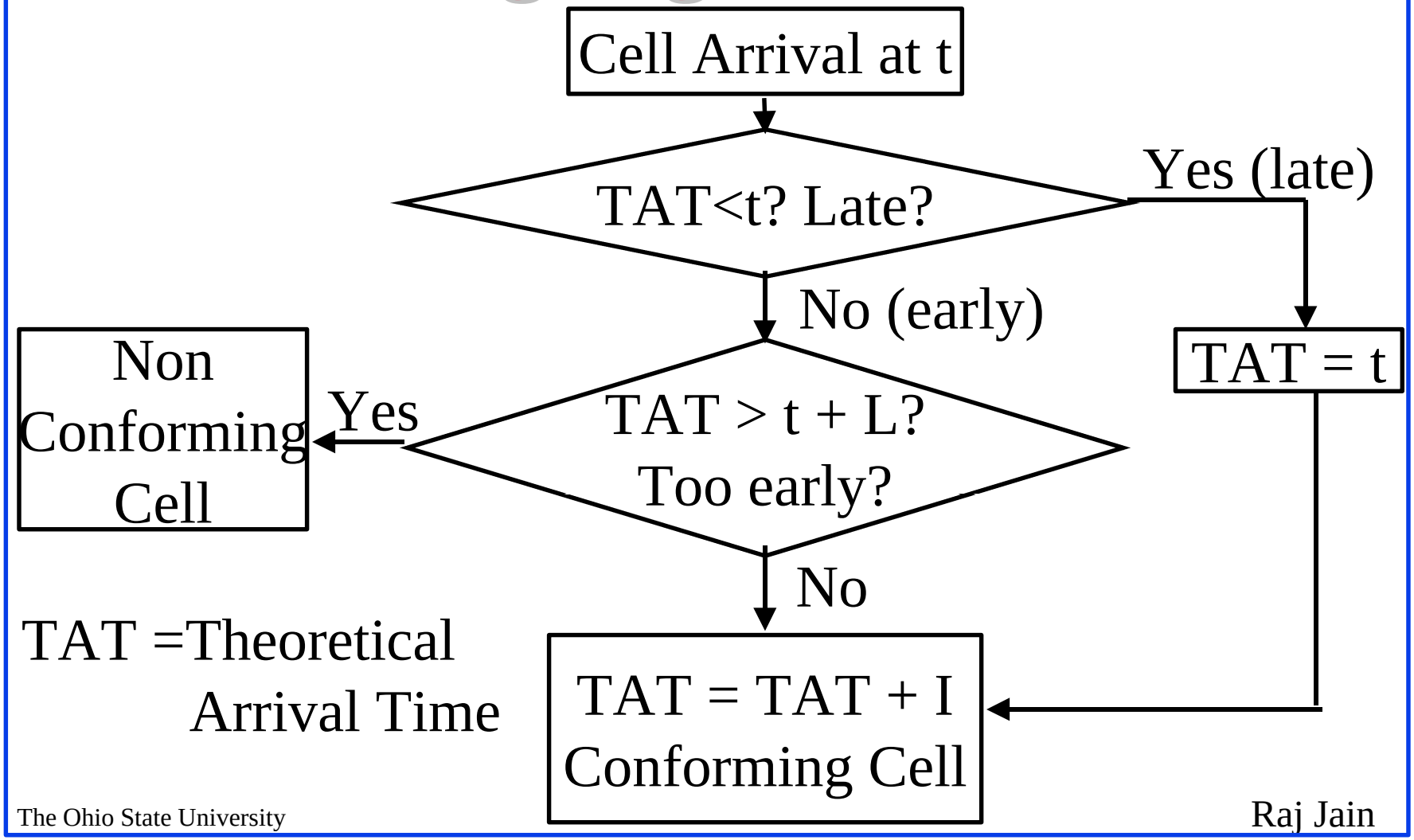
- Provides traffic shaping:
  Input bursty. Output rate controlled.
- Provides traffic policing: Ensure that users are sending traffic within specified limits
  Excess traffic discarded or admitted with CLP = 1

Generic Cell Rate Algorithm: GCRA(I, L)

- I = Increment = Inter-cell Time = Cell size/PCR
- L = Limit ⇒ Leaky bucket of size I + L and rate 1

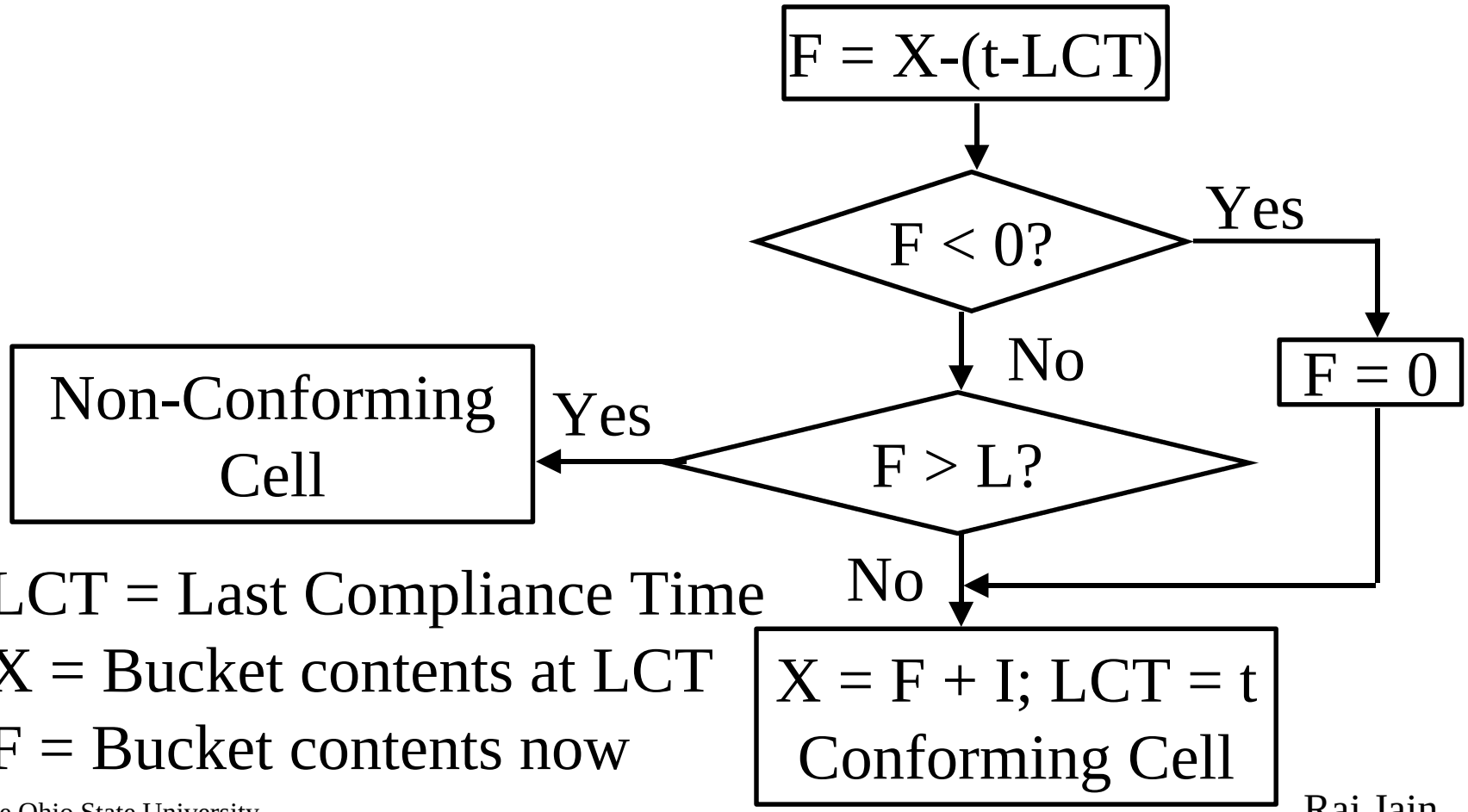


GCRA: Virtual Scheduling Algorithm



TAT =Theoretical Arrival Time

GCRA: Leaky Bucket Algorithm



LCT = Last Compliance Time

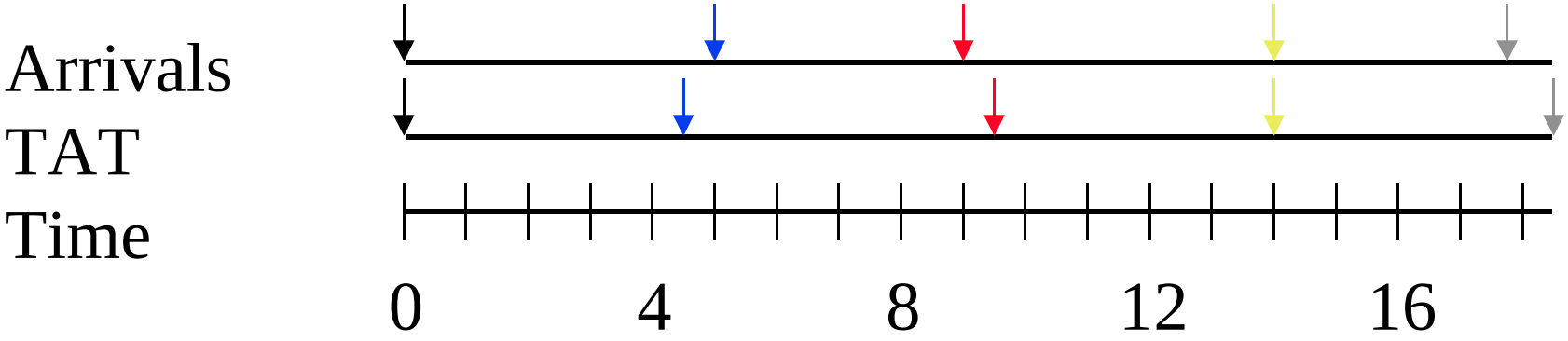
X = Bucket contents at LCT

F = Bucket contents now

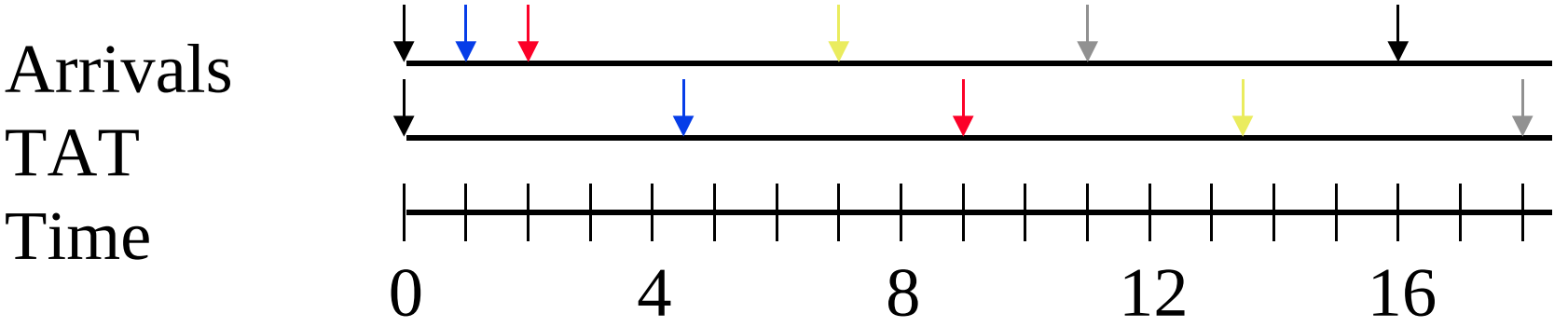
GCRA Examples

δ = cell time = 2.73 μs at 155 Mbps

- GCRA(4.5 δ, 0.5 δ):



- GCRA(4.5 δ, 7 δ):

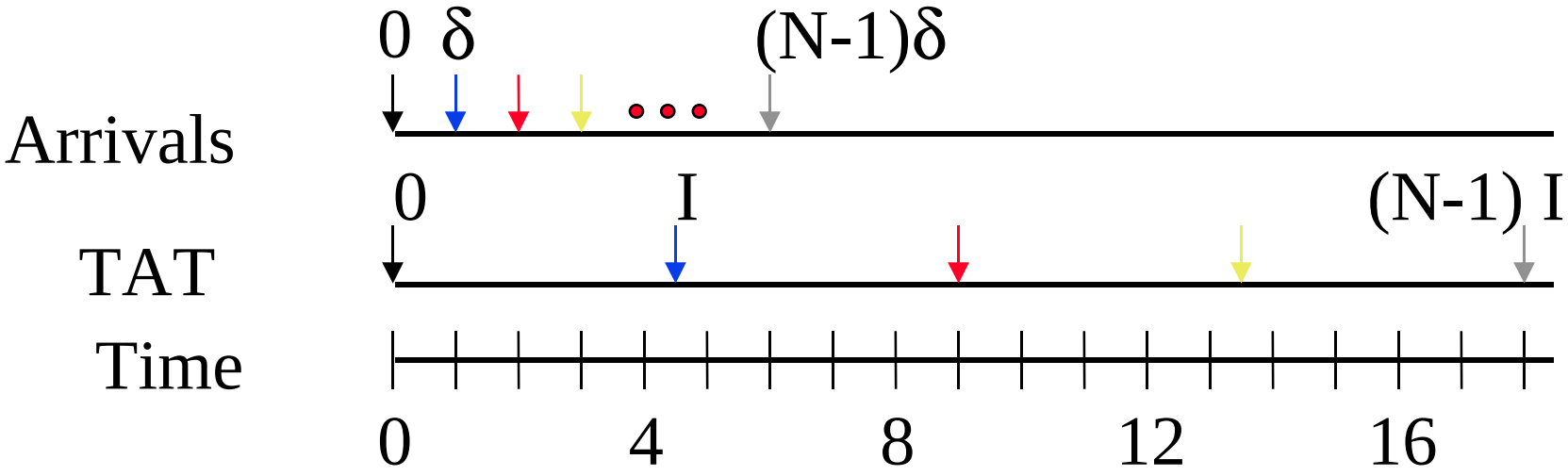


Maximum Burst Size

δ = cell time at PCR, I = cell time at SCR, L=Limit

N = Maximum burst size

GCRA(I , L):

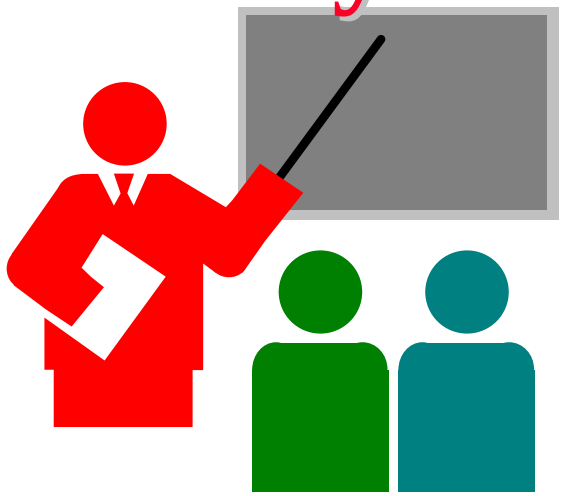


$$(N-1)\,I - (N-1)\delta < L$$

$$MBS = N = Int[1 + L/(I-\delta)]$$

$$L = (MBS-1)(I-\delta)$$

Summary



- Leaky bucket is used to smooth bursty arrivals
- GCRA requires increment (inter-cell arrival time) and limit (on earlyness)
- Two implementations: Virtual scheduling and leaky bucket

Homework

- Read pages 240-243 of Black's Emerging Technologies book 2nd edition.
  (Or Read pages 505-513 of Stallings' ISDN and Broadband ISDN with Frame Relay and ATM)
- Conduct Lab exercise 1