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# **Cyclic Demand Advertisement boosts RPR MAC Performance**

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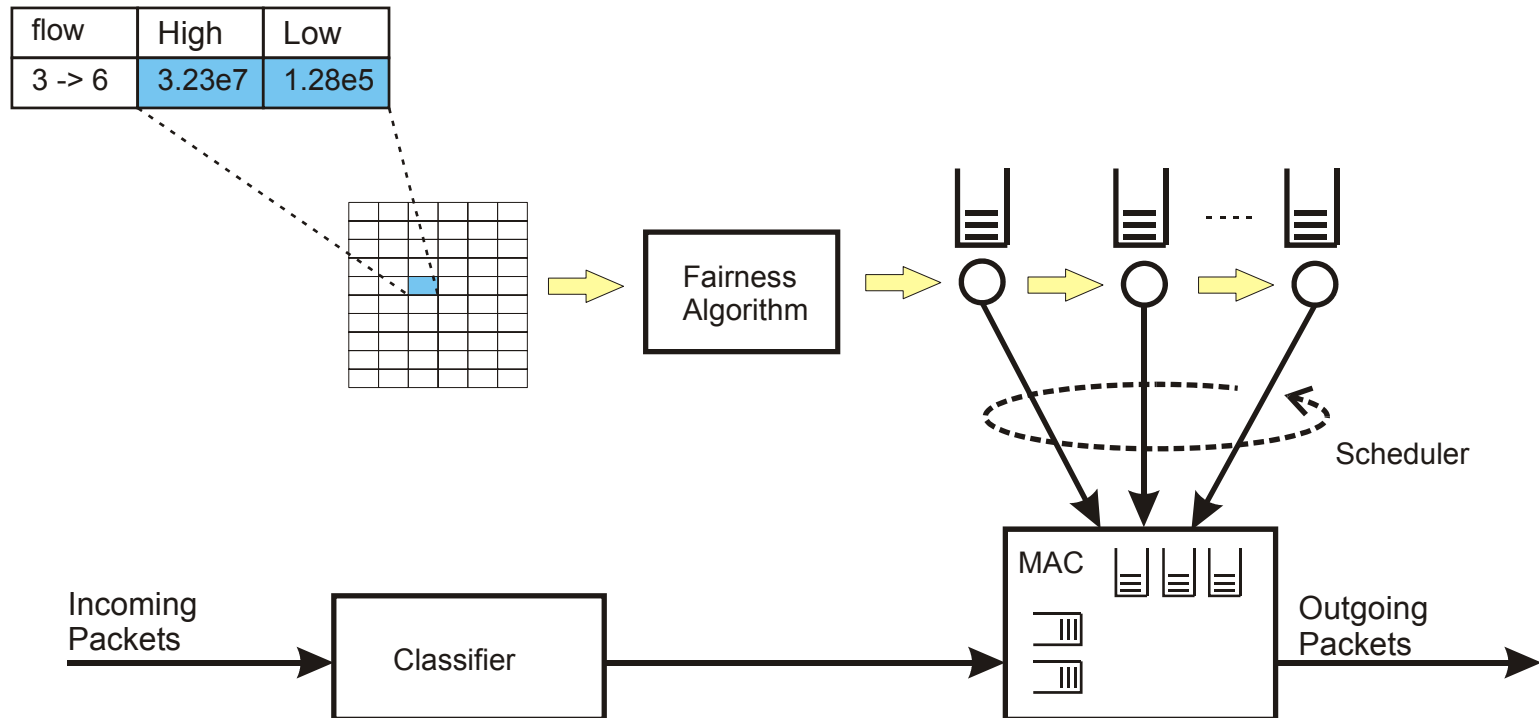
# Overview

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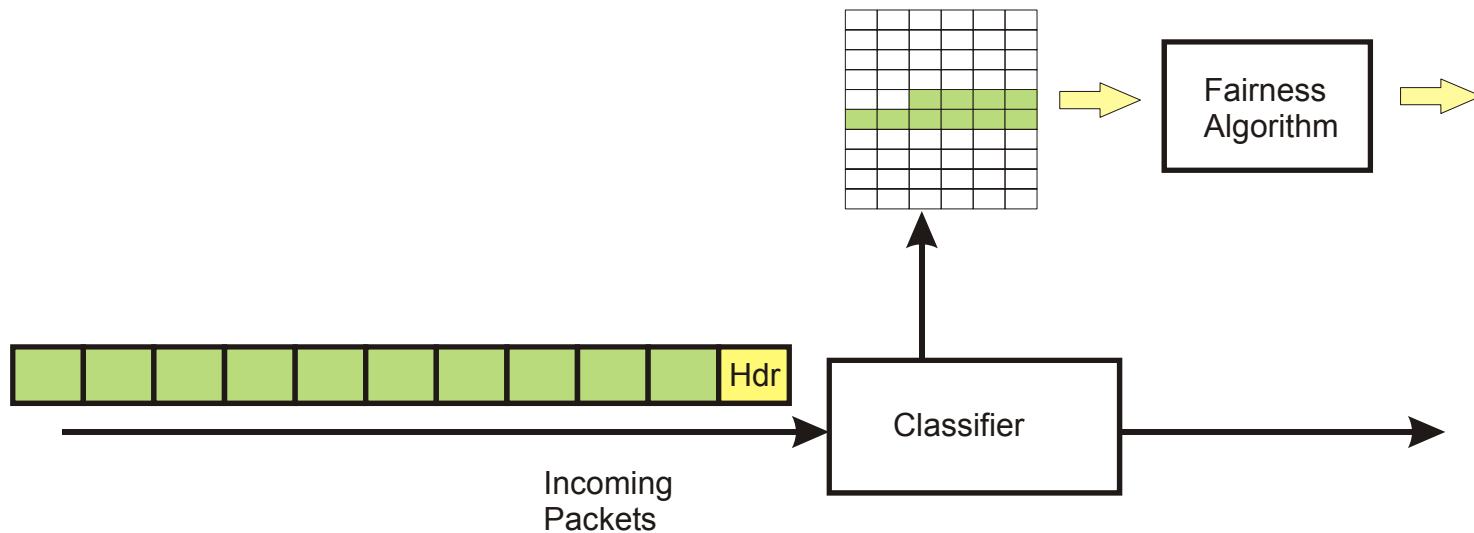
- Fairness Architecture
- Information Distribution
- Multiple Traffic Classes
- Performance
- Conclusions

# Fairness Architecture

- Table holds all relevant source-destination flow information
- Table used as input for fairness algorithm



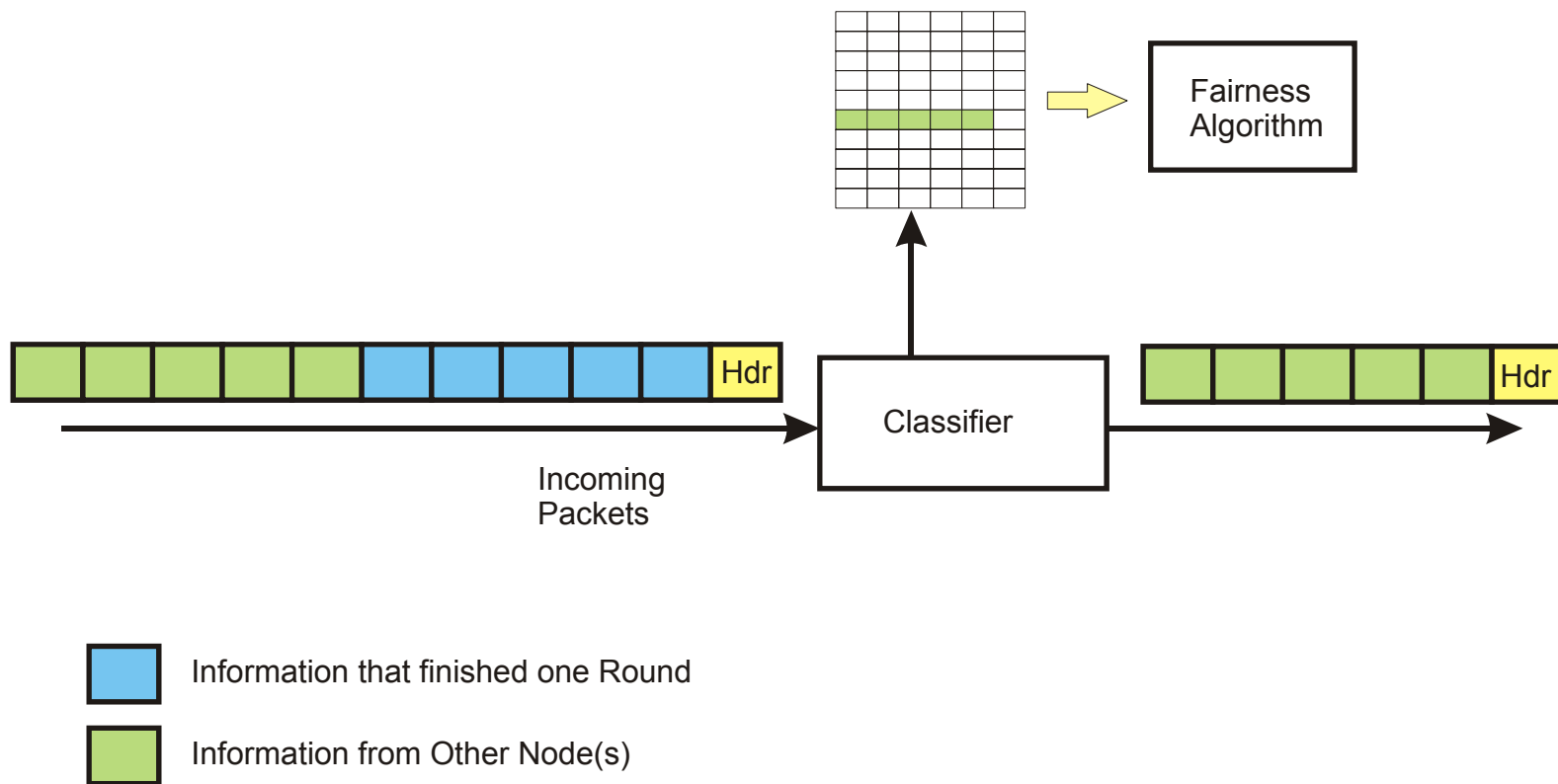
# Table Update



- New data is copied from control packet into local table
- Control packet header contains
  - Offset in table
  - Number of valid entries in packet

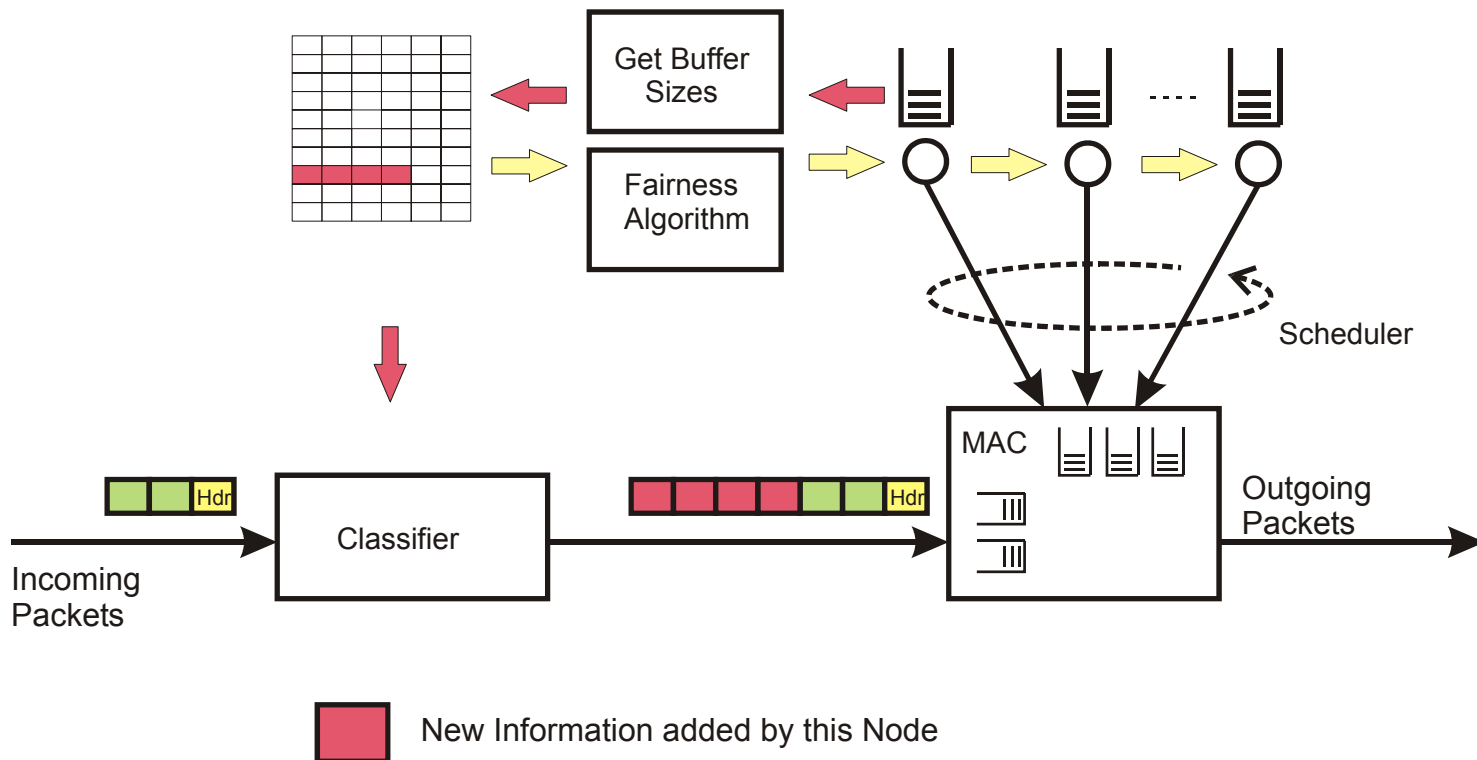
# Control Packet Update (1)

- Deleting Old Information



# Control Packet Update (2)

- Inserting New Information



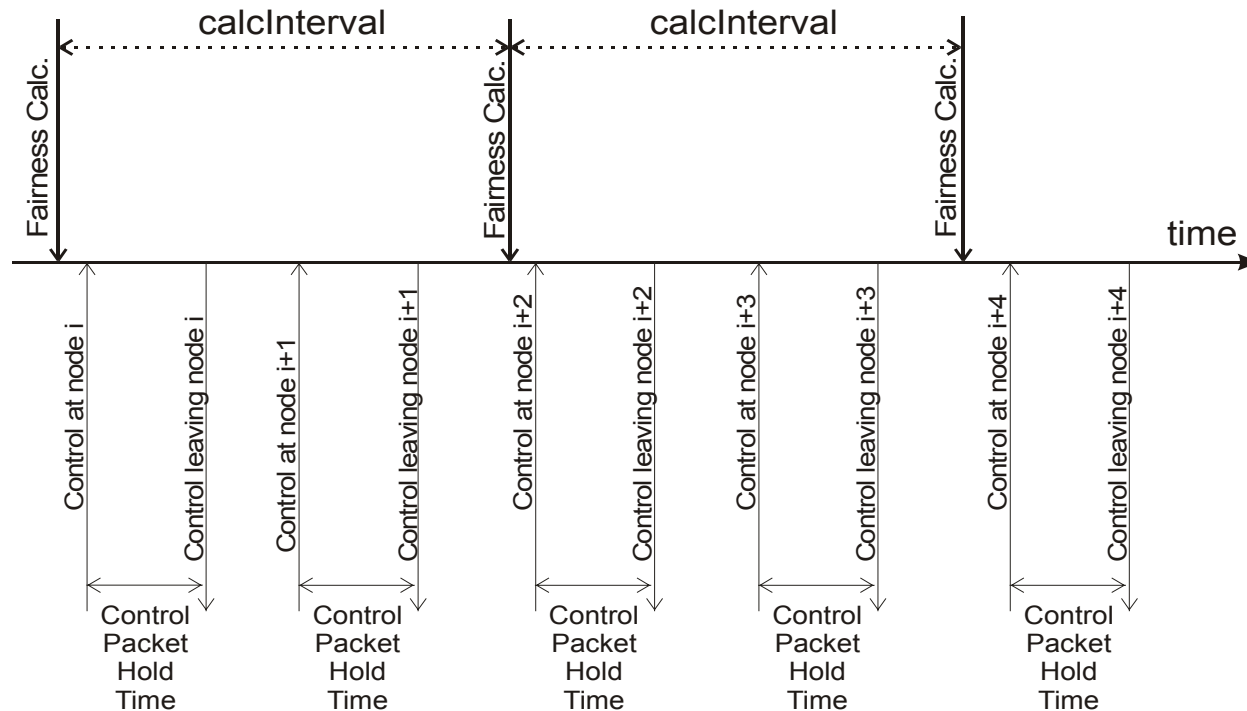
# Control Packet Update (3)

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- Summary of actions upon arrival of control packet
  - Delete information that finished one round
  - Copy valid information into local table
  - Add local information to the control packet if:
    - There is place available
    - It is “my turn” to add

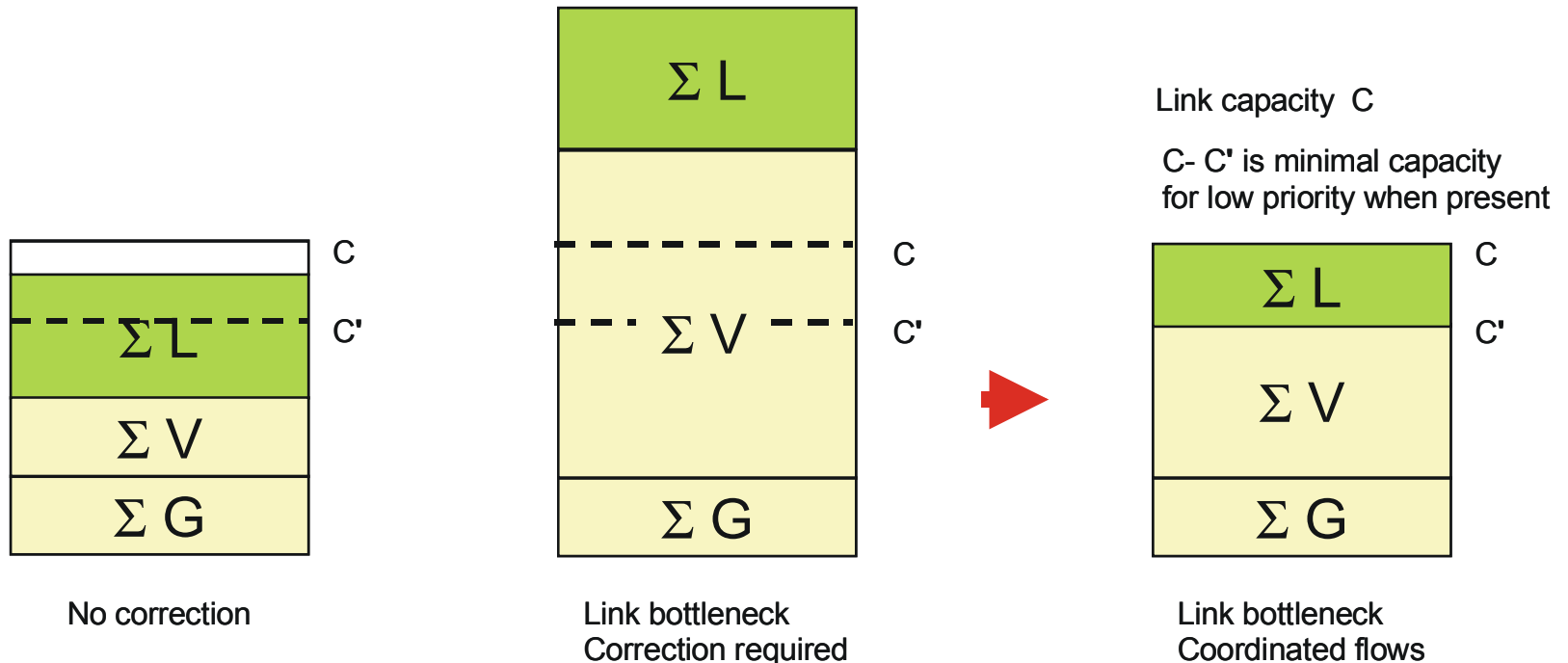
# Fairness Control Packet

- System parameters:
  - Calculation Interval
  - Control packet size
  - Control packet hold time



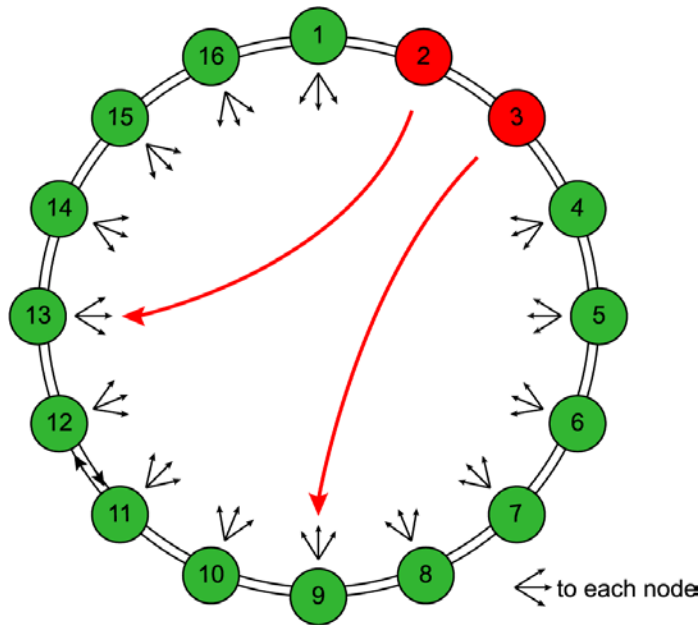


# Fairness and Traffic Classes (1)

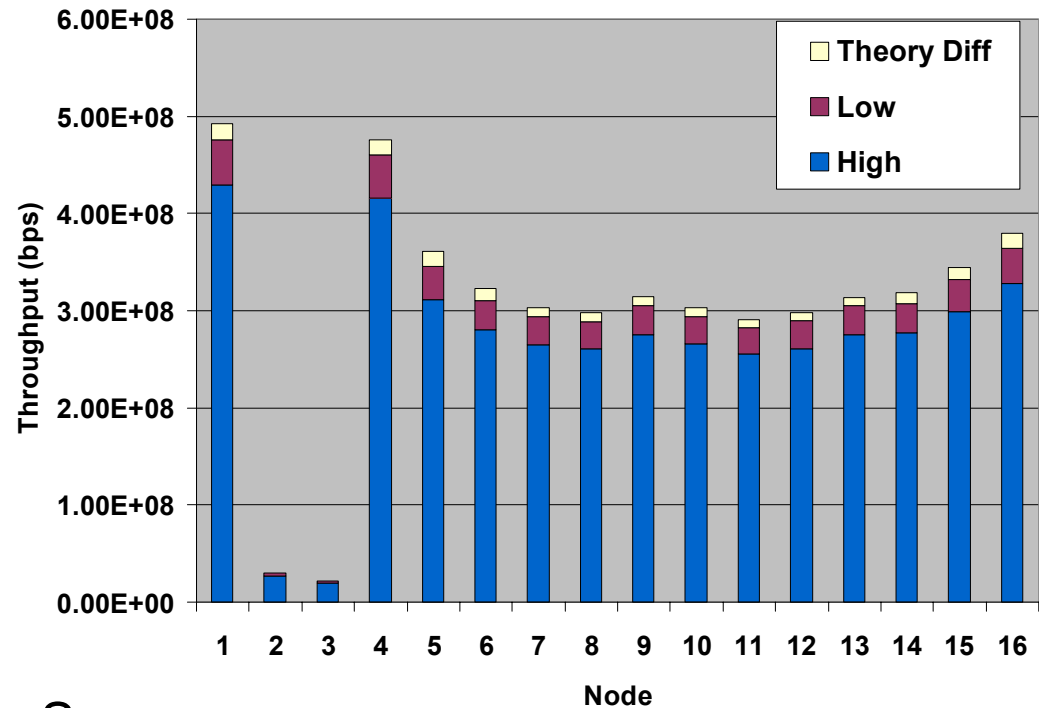


$\Sigma L$  : all low-traffic flows  
 $\Sigma V$  : all non-guaranteed high-traffic flows  
 $\Sigma G$  : all guaranteed high-traffic flows

# Fairness and Traffic Classes (2)



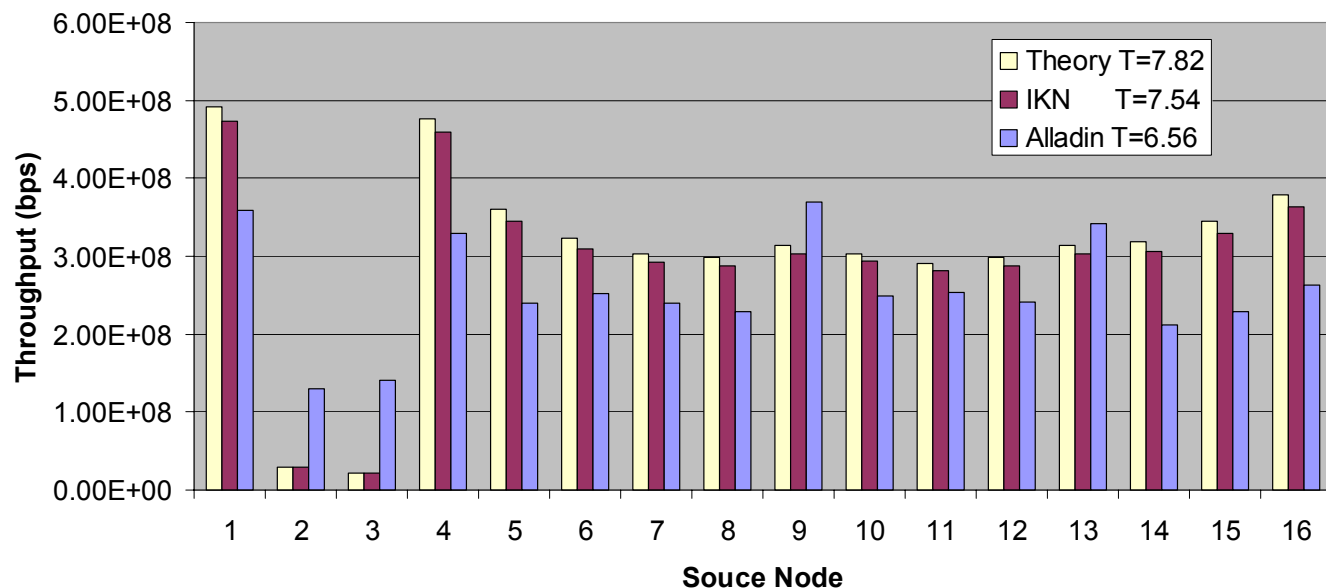
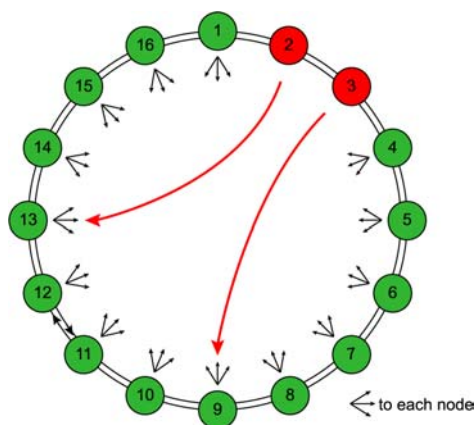
Throughput per Source Node



Saturated High and Low Traffic Sources  
100km 1Gbps Ring

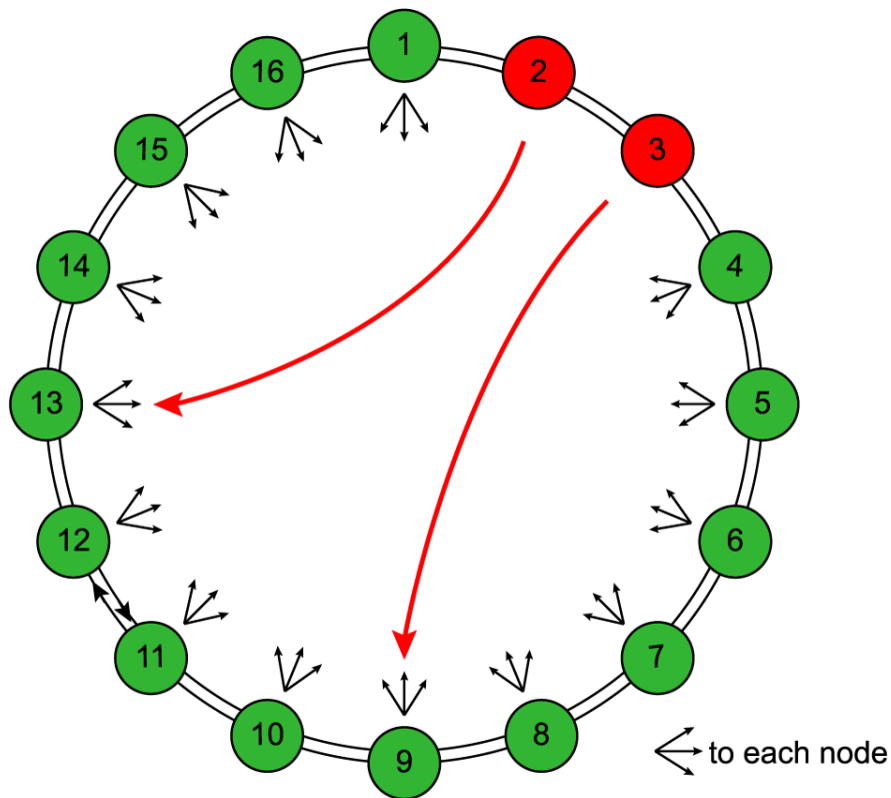
$$C' = 0.9 * C$$

# Performance Comparison



Saturated Low Traffic Sources  
100km OC-12 Ring

# Dual-Ring – Traffic scenario



Uniform traffic  
Saturated sources  
16 nodes

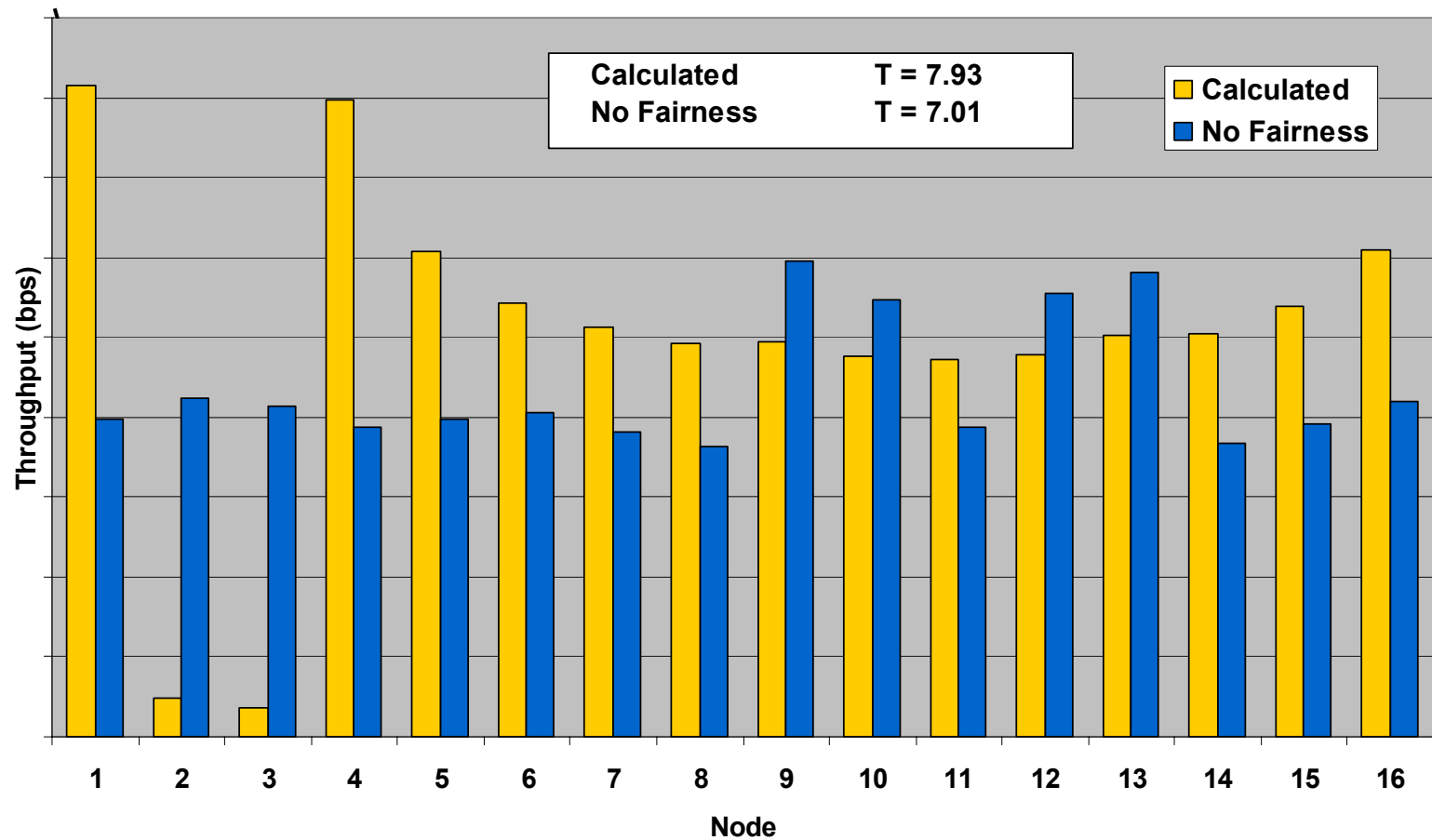
Only low priority traffic

Exponential packet sizes  
500 bytes

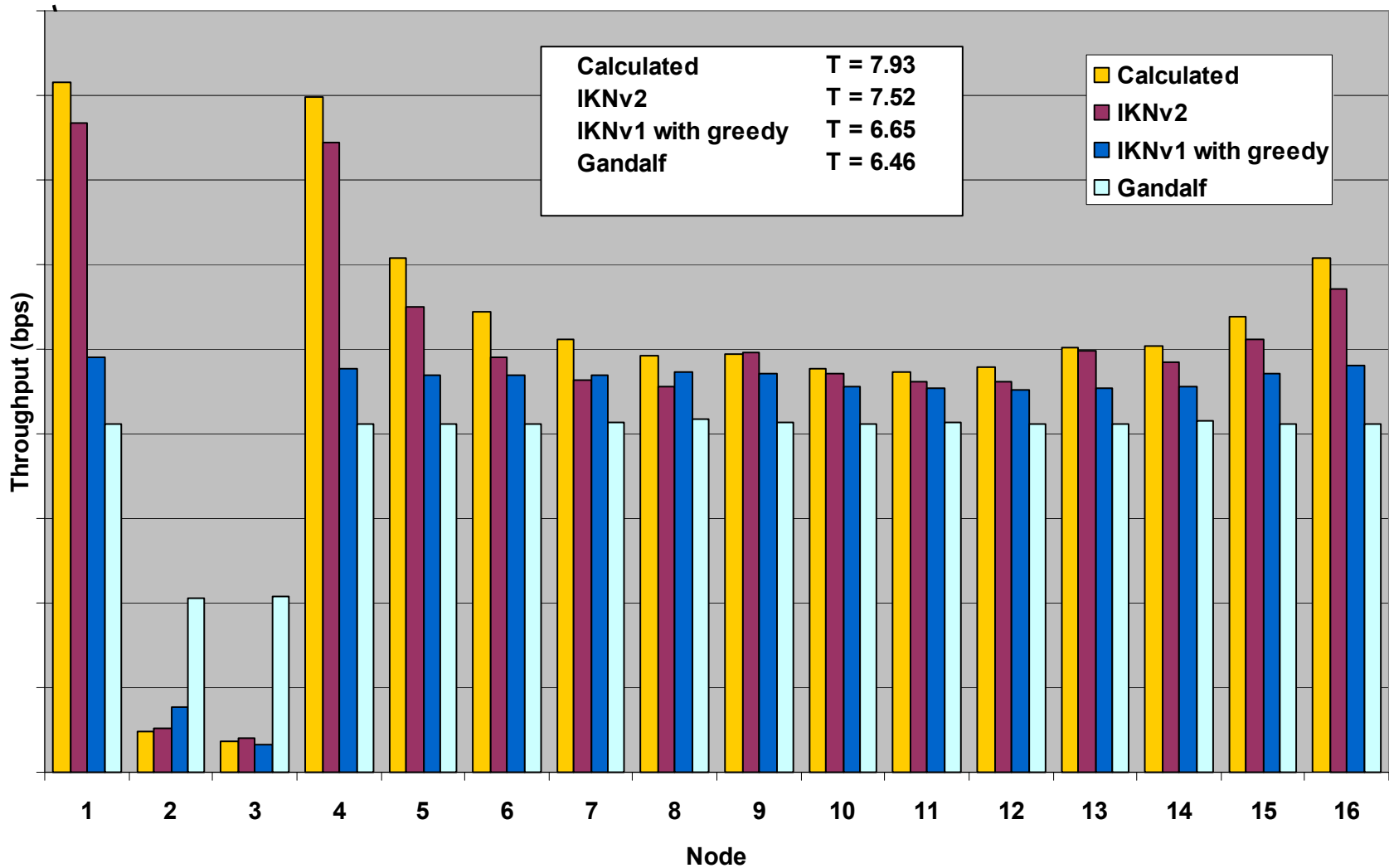
1Gb Links

Cyclic reservation protocol  
Table round trip: 0.01 sec.

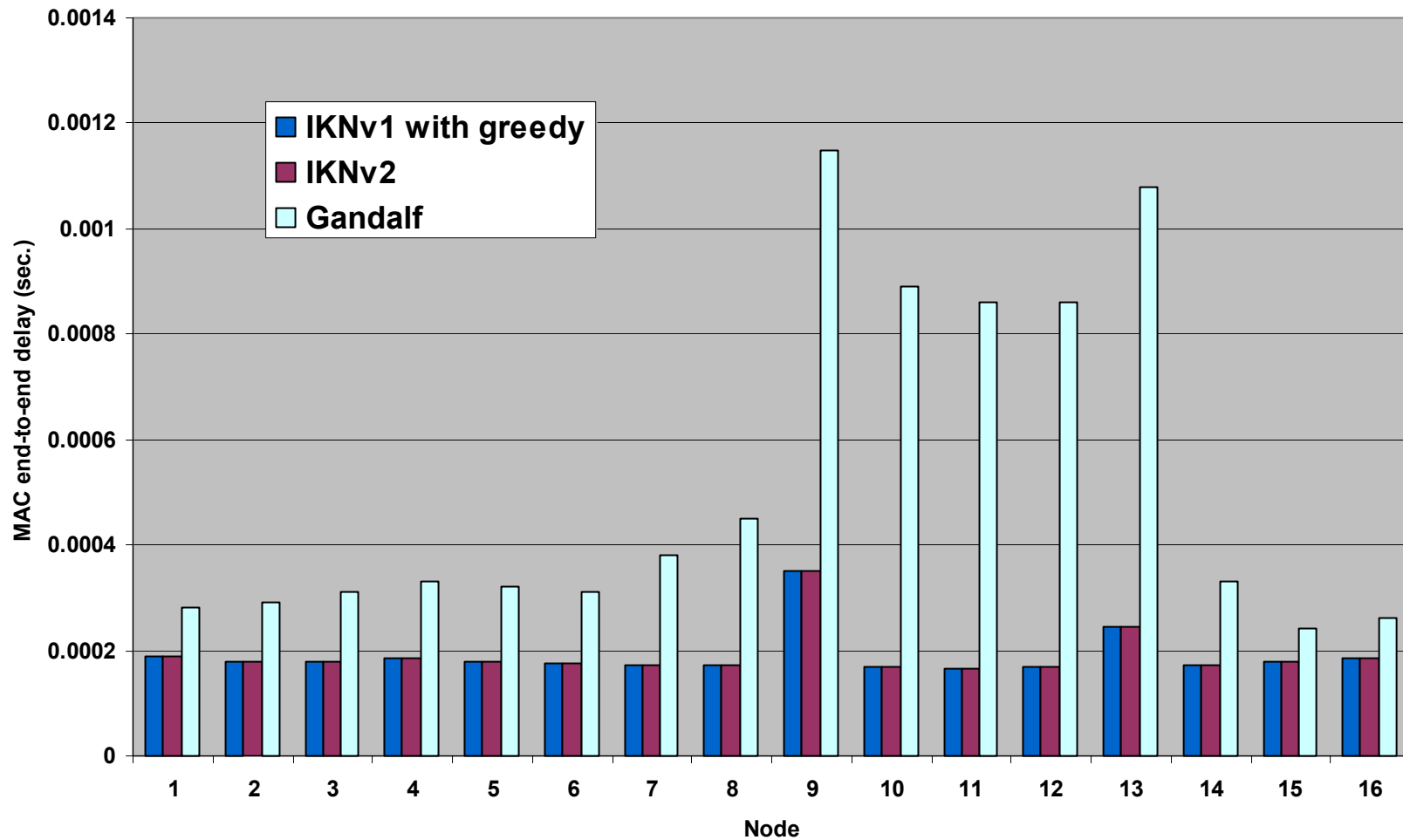
# Throughput



# Throughput (cont.)



# MAC End-to-End Delay



# Conclusions

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- The fairness algorithm assigns fair rates to all source-destination flows close to the maximum theoretical limit
- Fair rates for all traffic classes
- Supports multiple link capacities on a single ringlet
- Pro-active mechanism
  - System parameters must be set according to the number of nodes and ring length, can be done automatically
- Excellent throughput and delay performance