Institut für
Kommunikationsnetze

# MAC Performance Comparison

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  - No fairness control
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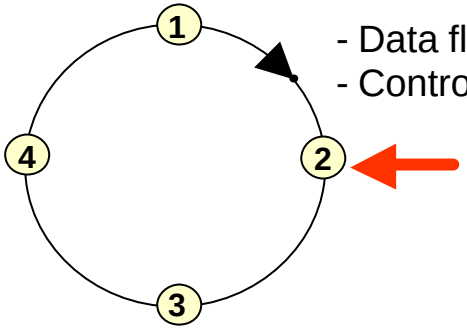
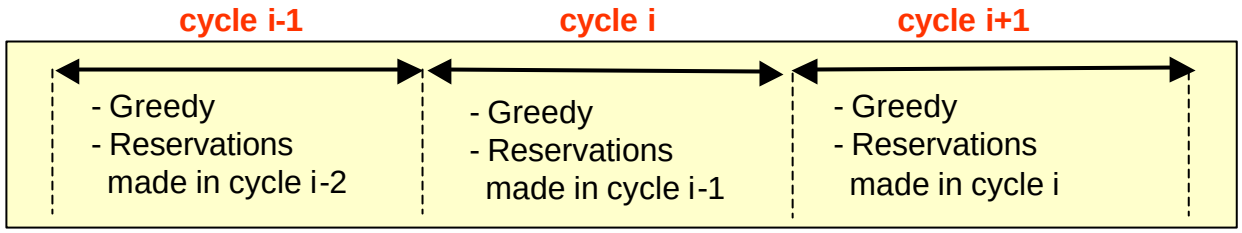
# IKN: Main Mechanisms




- Data flow
- Control packet

Cycles seen by node 2




**Transit buffers:**
Only used for collision avoidance and high-priority bypassing

**Proactive fairness control**
Control packet with traffic demand matrix is circulating

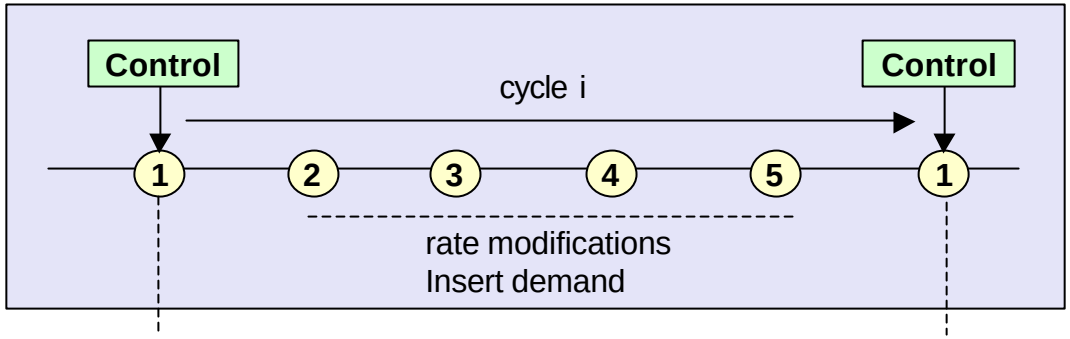
**Greedy access:** in same cycle i for flows over links which are no bottleneck
**Reservation access:** in next cycle i+1 for bottleneck flows

Maximal performance because rate scheduling is done on waiting traffic demand,
i.e., the mechanism also works when traffic pattern completely changes in every cycle

# IKN: Improvement of July 2001 Version

**IKNv1**
**July 2001**

**Control information is modified by all nodes**



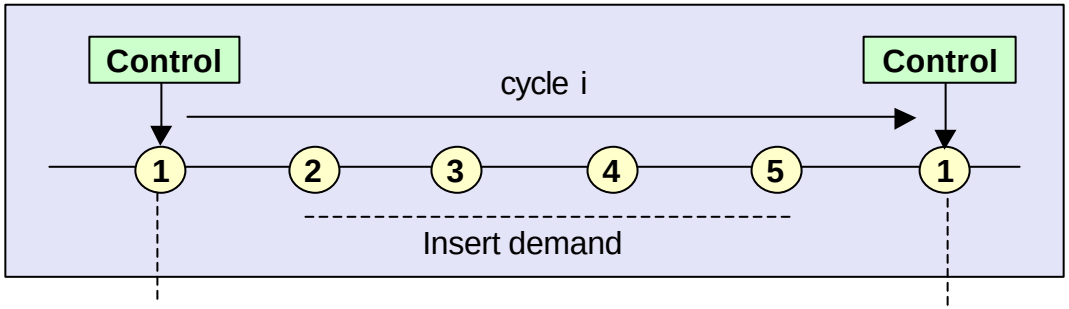

- **Receive:** new rates for cycle i
- **Send:** demand for cycle i+1

- **Receive:** new rates for cycle i+1
- **Send:** demand for cycle i+2

**IKNv2**
**Jan 2002**

**Control information is not modified**

**optimal scheduling possible**




- **Receive:** demand matrix for cycle i
- Rate calculation for cycle i
- **Send:** demand for cycle i+1

- **Receive:** demand matrix for cycle i+1
- Rate calculation for cycle i+1
- **Send:** demand for cycle i+2

# IKN: Main Properties

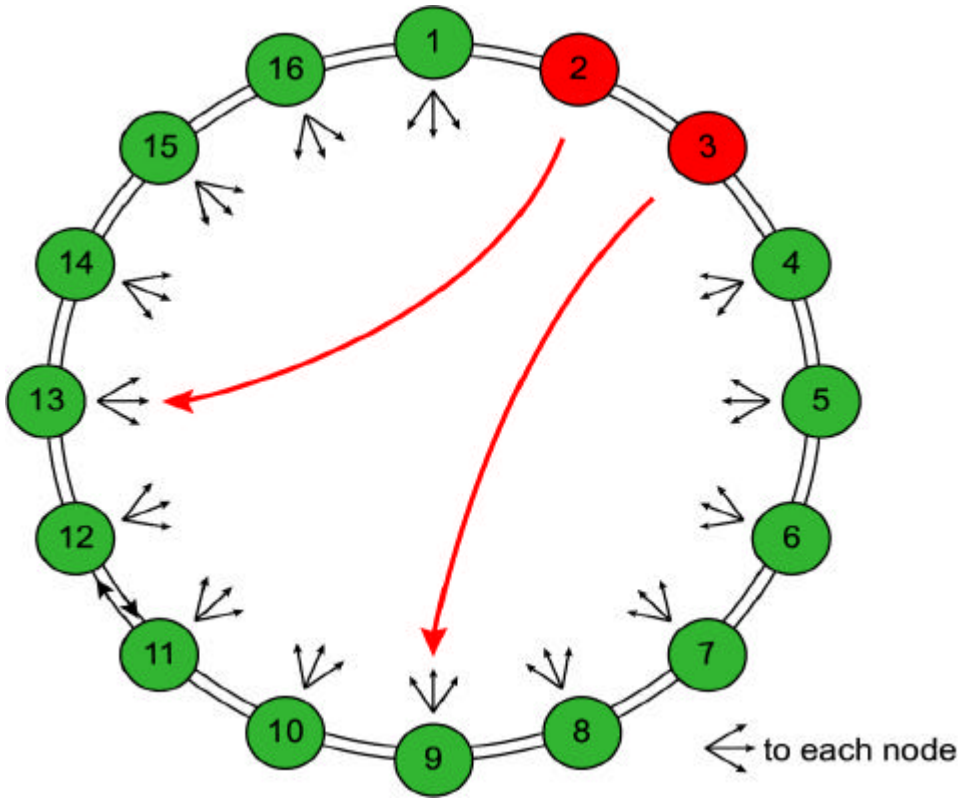
**Support of**
- Multiple traffic classes (real-time strict, real-time loose, best-effort)
- Service Level Agreements
- Heterogeneous link speeds on same ring

**Control flow and data flow in same direction**
(easy for single ring and any configuration of multiple rings)

**Simple and predictive operation**
- Simple and straightforward algorithm
- No heuristic thresholds
- No traffic measurements

**Best performance**
- Optimal bottleneck fairness
- Near to fair theoretical throughputs for each flow
- Guaranteed delays
- Very dynamic traffic adaptation

# Dual-Ring – Traffic scenario 1




**Uniform traffic**
**Saturated sources**
**16 nodes**

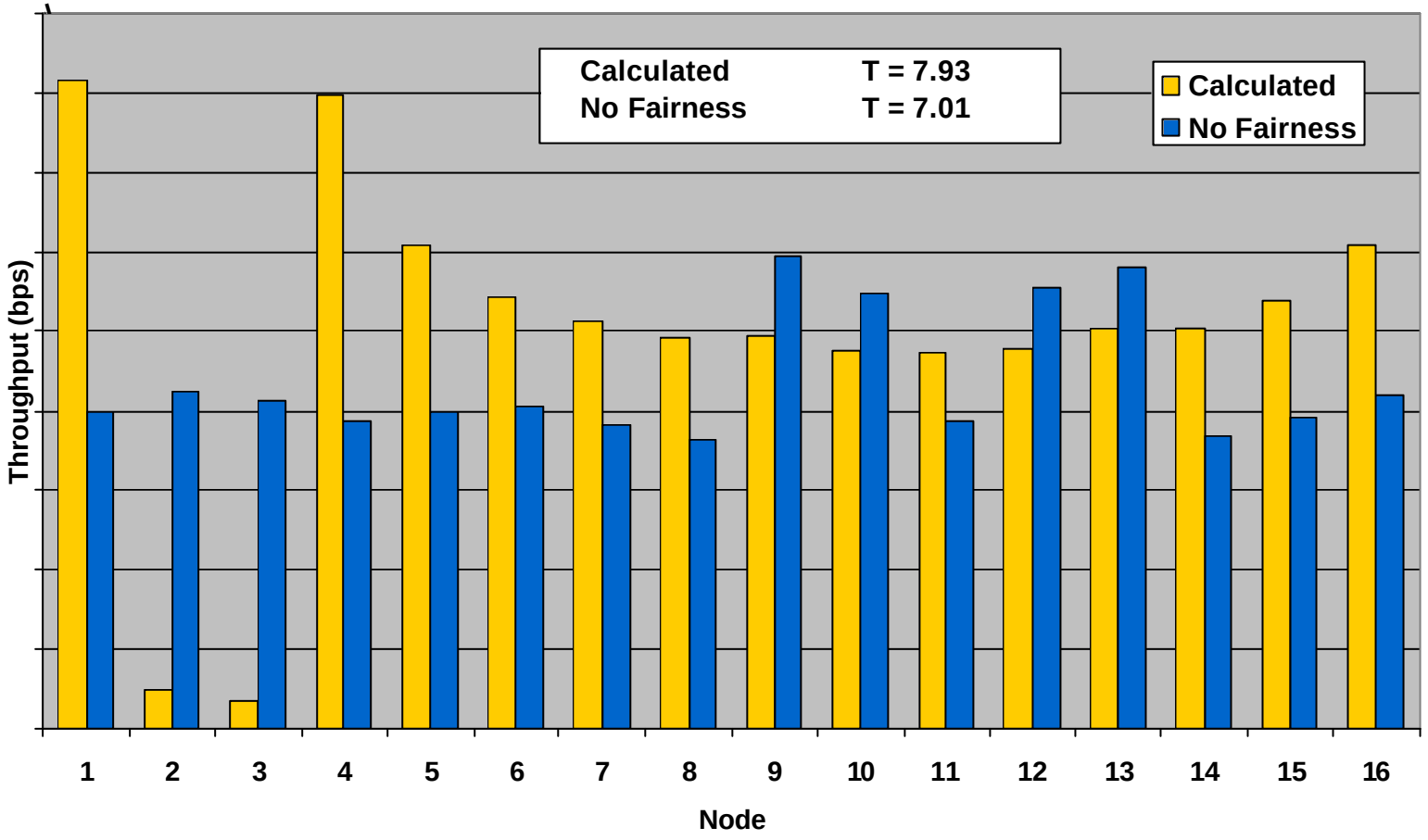
**Only low priority traffic**

**Exponential packet sizes**
**500 bytes**

**1Gb Links**

**Cyclic reservation protocol**
**Table round trip: 0.01 sec.**

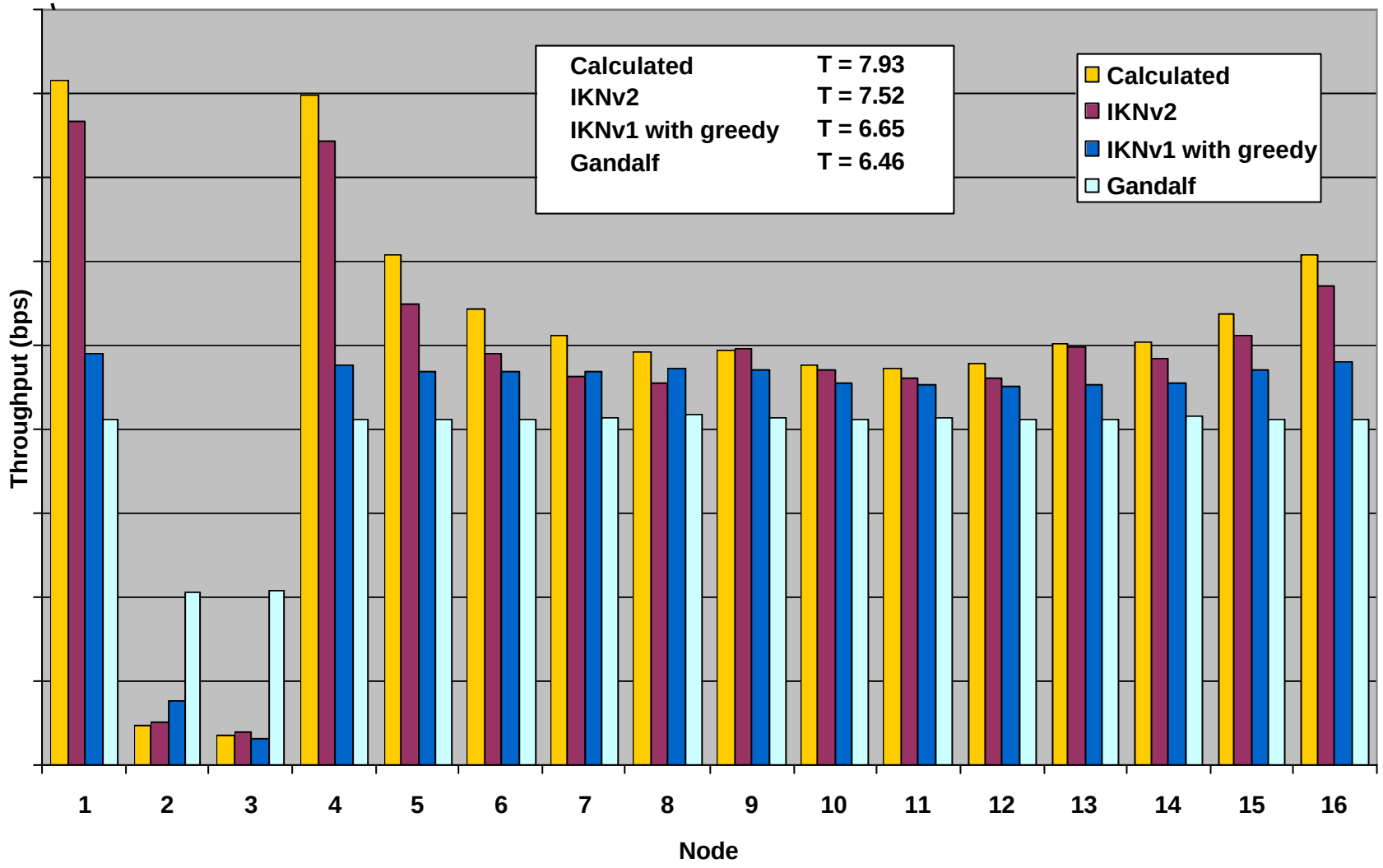
# Throughput



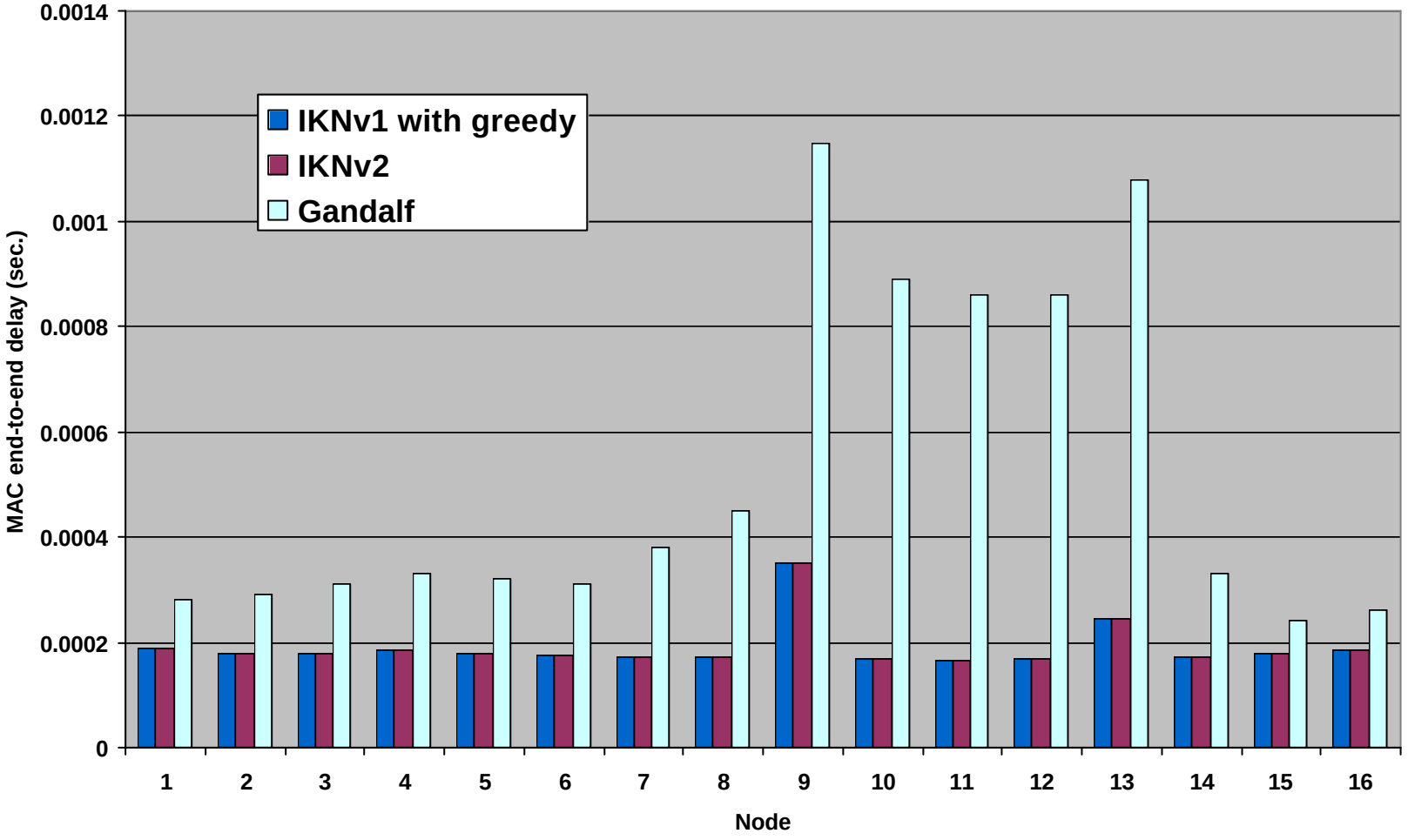


# Throughput (cont.)



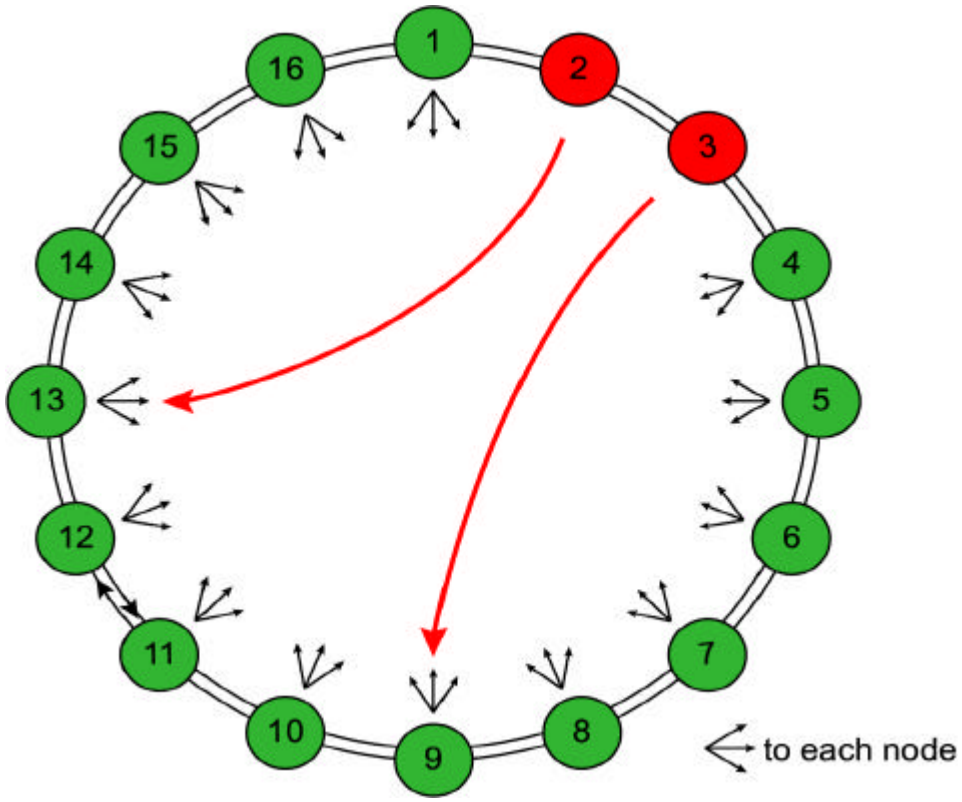
# MAC End-to-End Delay





# Dual-Ring – Traffic scenario 2




**Uniform traffic**
**16 nodes**

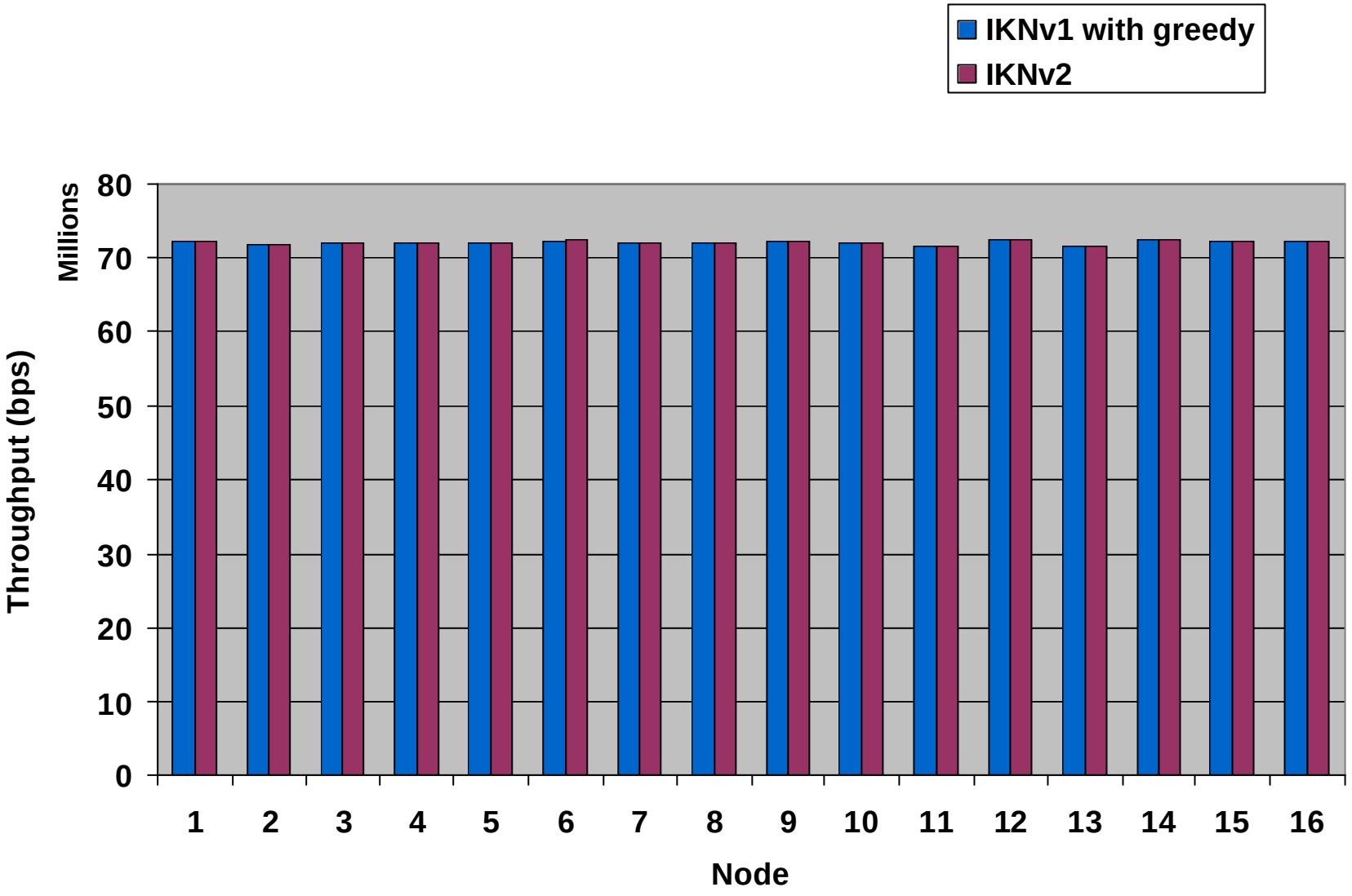
**Low & high priority traffic**
**(more low than high)**

**Exponential packet sizes**
**500 bytes**

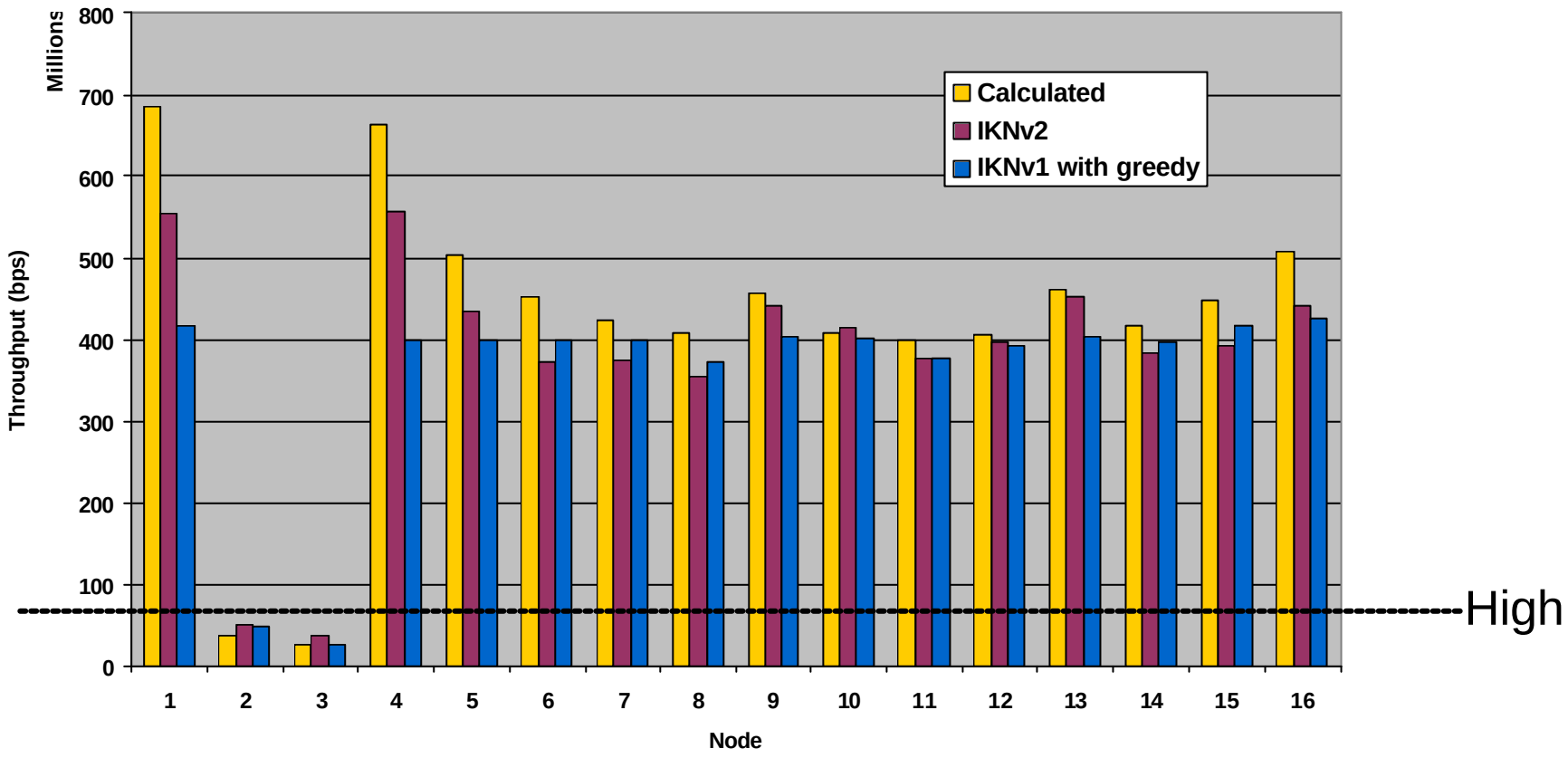
**1Gb Links**

**Cyclic reservation protocol**
**Table round trip: 0.01 sec.**

# Throughput (High Priority)



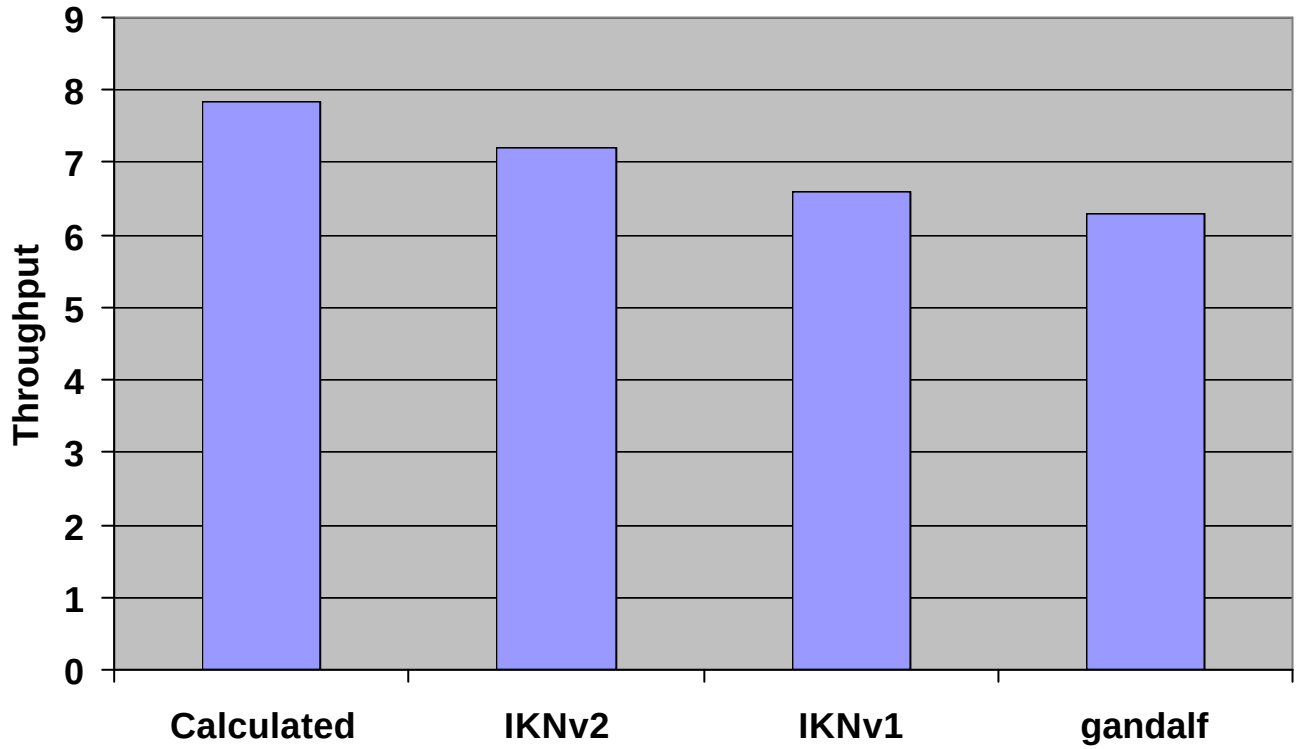
# Throughput (Low Priority)



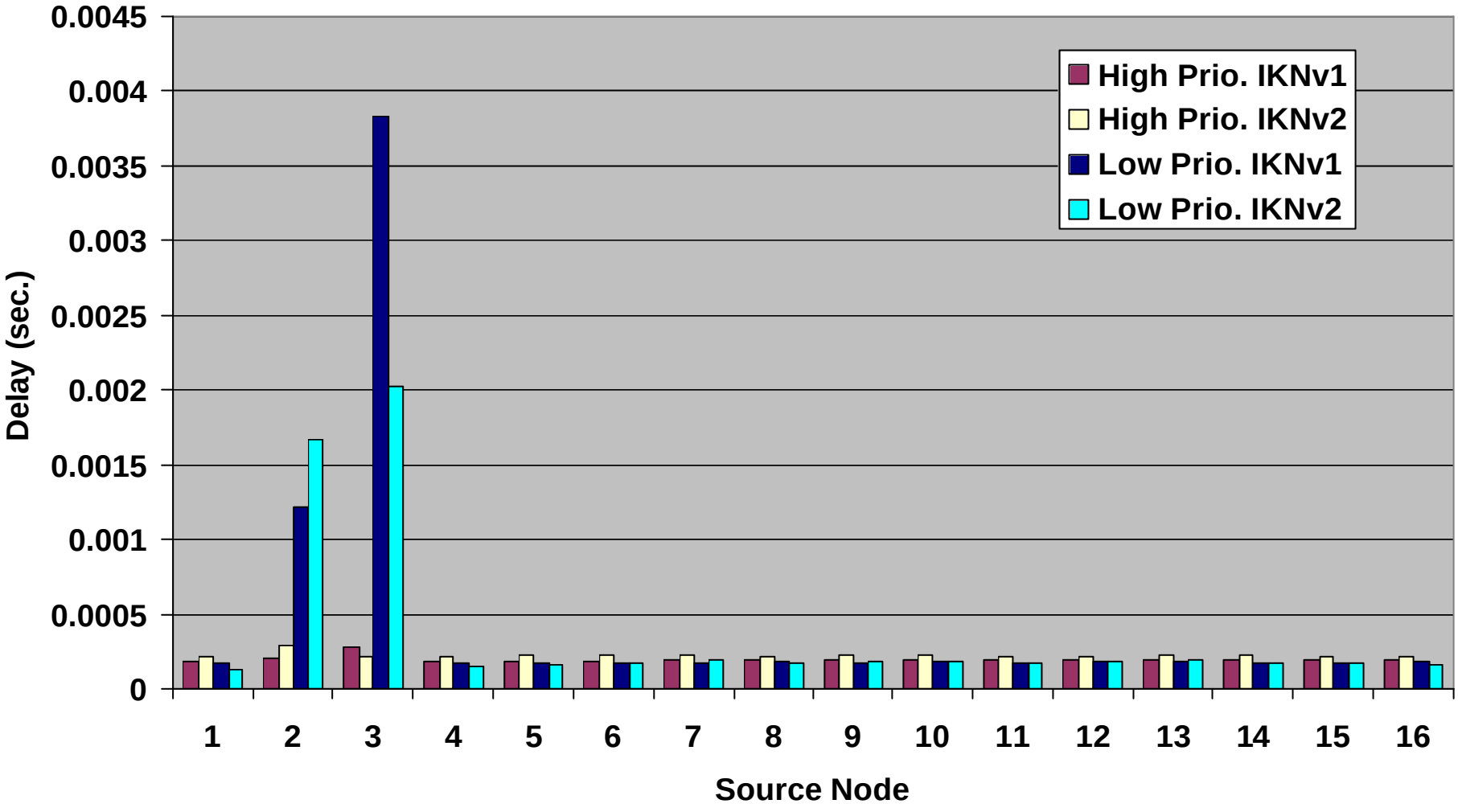


# Total Throughput



# MAC End-to-End Delay



# Conclusion

**Combined greedy and cyclic reservation access performs at the theoretical fair limits**

**Excellent performance in terms of**
- Throughput
- MAC end-to-end delay