



# CN-SIM: BCN in a Large(r) Topology



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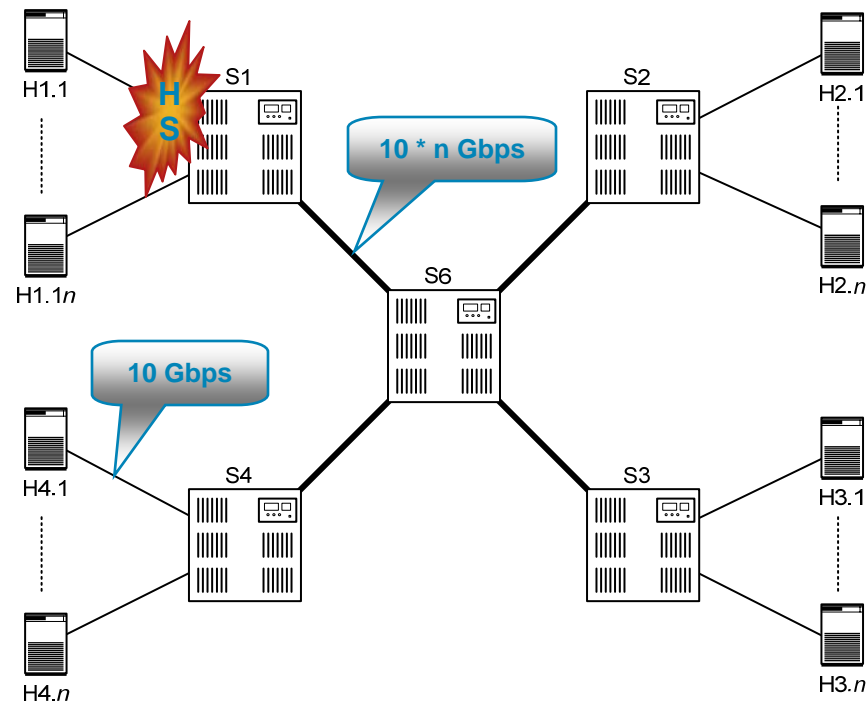
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# Goals

- Understand how BCN behaves when a large number of flows  $N$  collides in a HS
- Determine how robust BCN baseline parameters are with respect to  $N$  (HSD)

# Simulation Environment

- Topology & Workload



$n = 4 .. 64$   
 $N = 4 \cdot n = 16 .. 256$

- Traffic pattern

- Load: H1.1 -- H4.n  $\lambda = 85\%$
- Skewed Uniform
  - H1.1 is targeted with  $2\lambda$
  - All other nodes with  $\lambda \cdot (N-2)/(N-1)$

- Hotspot

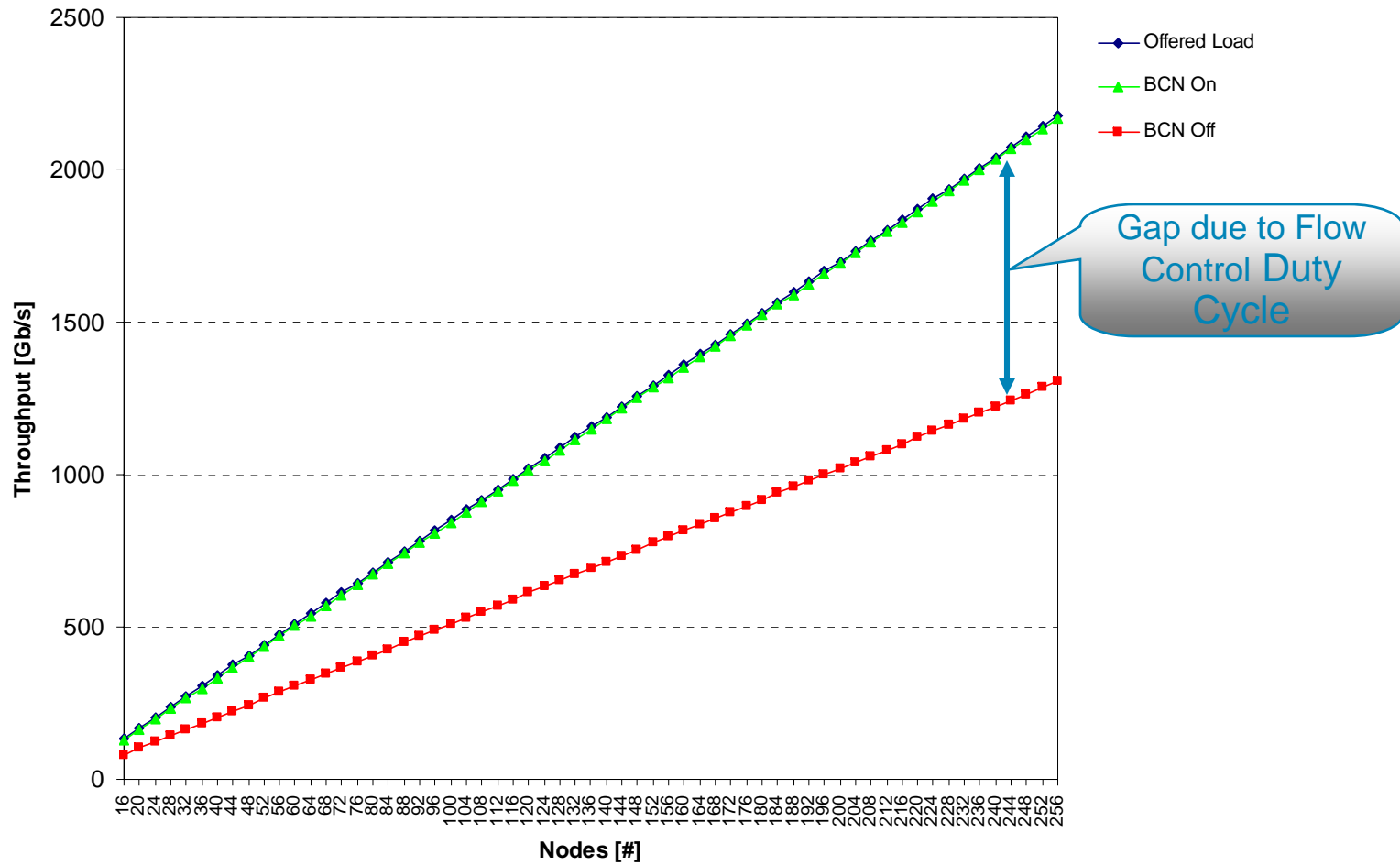
- Node H1.1
- HS degree =  $N$
- HS severity = 1.7 : 1

# Simulation Environment

- Switch output buffer partitioned per input port  
150 KB of space for each input → 9.6 MB for 64 ports
- Selective Pause enabled on each partition  
Assert threshold 140 KB  
De-assert threshold 130 KB
- BCN parameters as per Baseline Scenario  
Sampling rate = 2% (75KB)  
 $W = 2$   
Qeq = 750 64-byte pages (48 KB)  
 $G_i = 2.6667 \times 10^{-1}$   
 $G_d = 1.3333 \times 10^{-4}$   
BCN-Max  
No BCN(0,0)  
No Oversampling
- Simulation duration 500 ms
- Metrics  
Average Aggregate Throughput (quantitative)  
Hotspot Buffer Utilization (qualitative)  
Individual Throughput (qualitative)

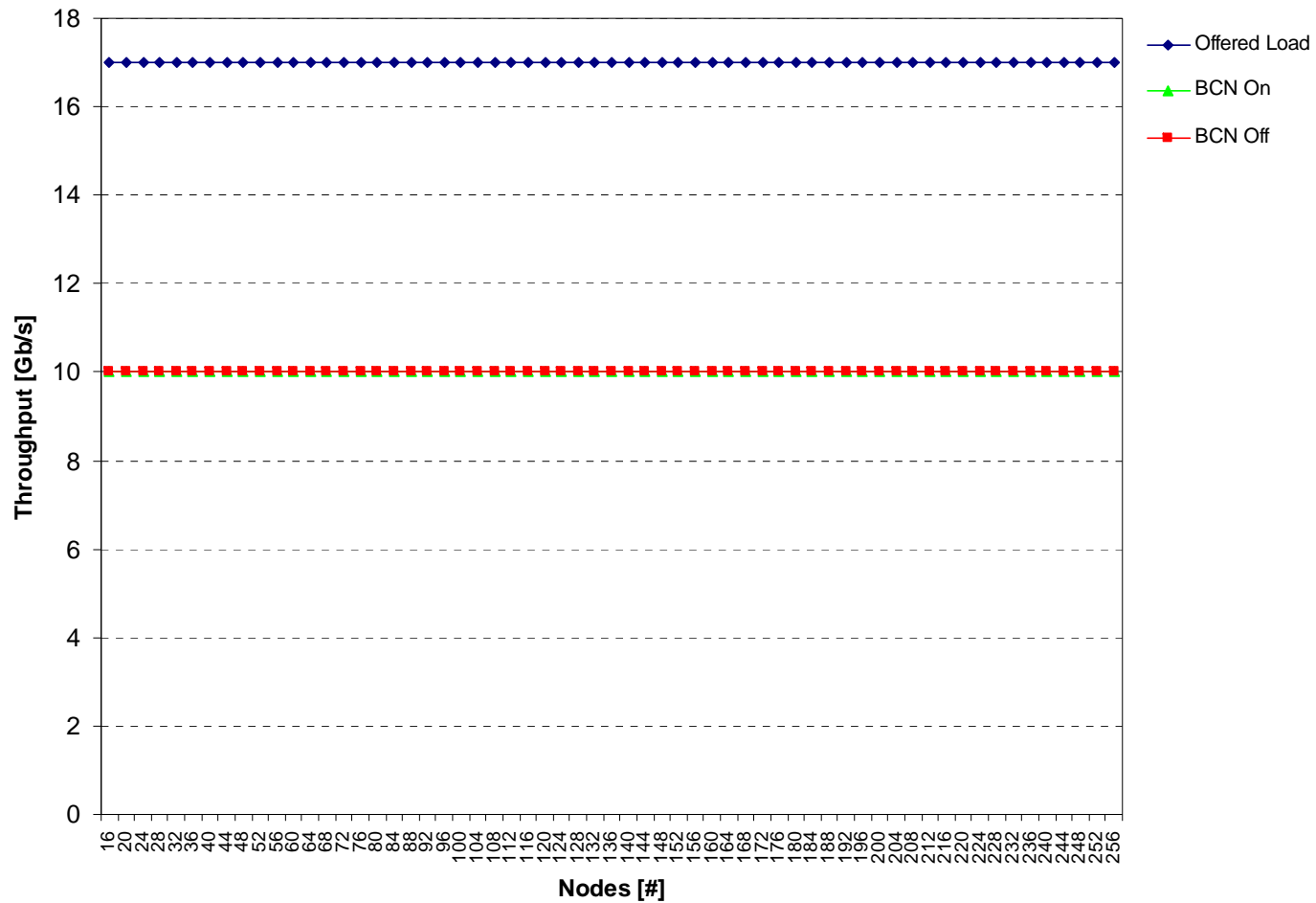
# Expected Results

## Aggregate Throughput vs. Number of Nodes



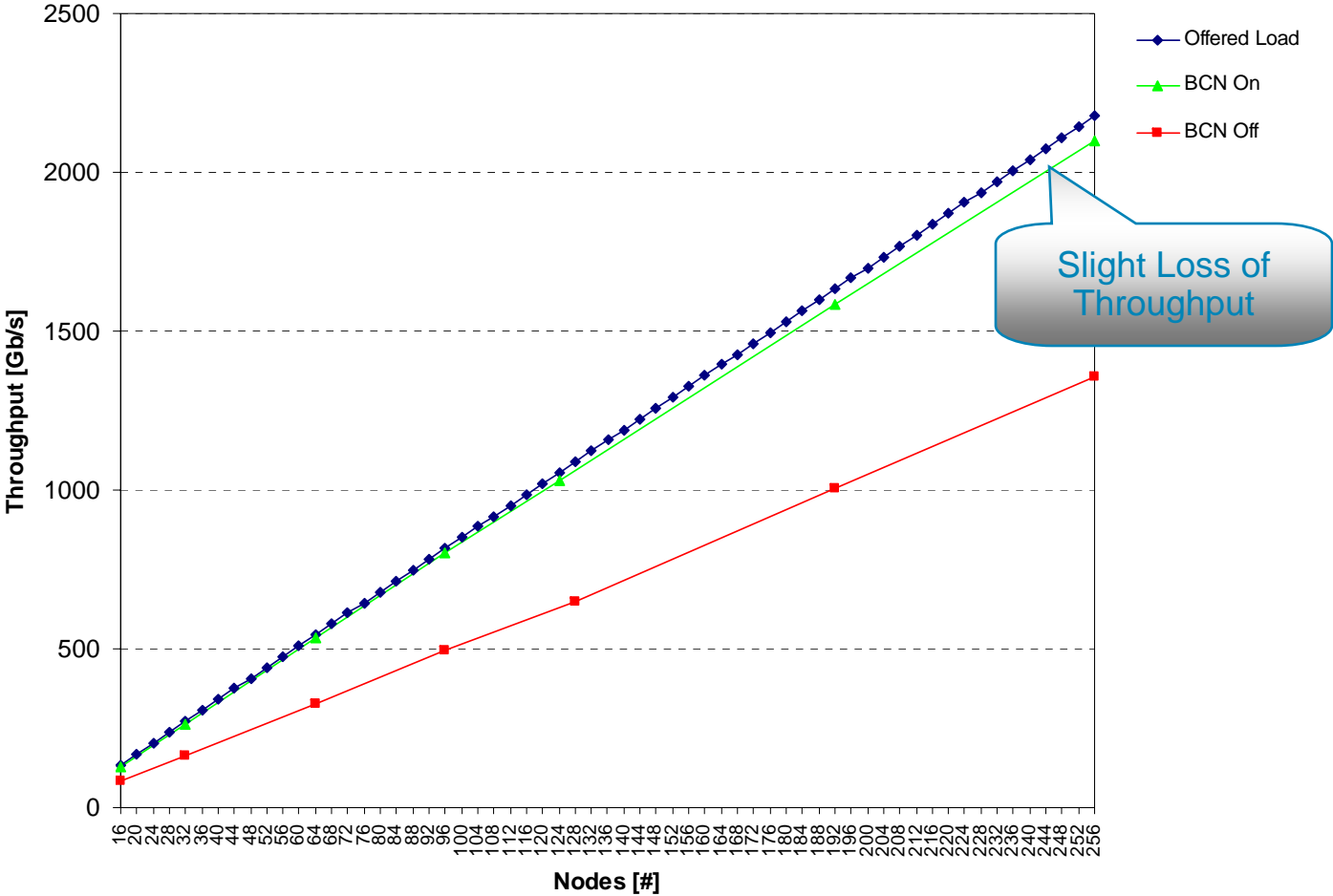
# Expected Results

## Hotspot Throughput vs. Number of Nodes



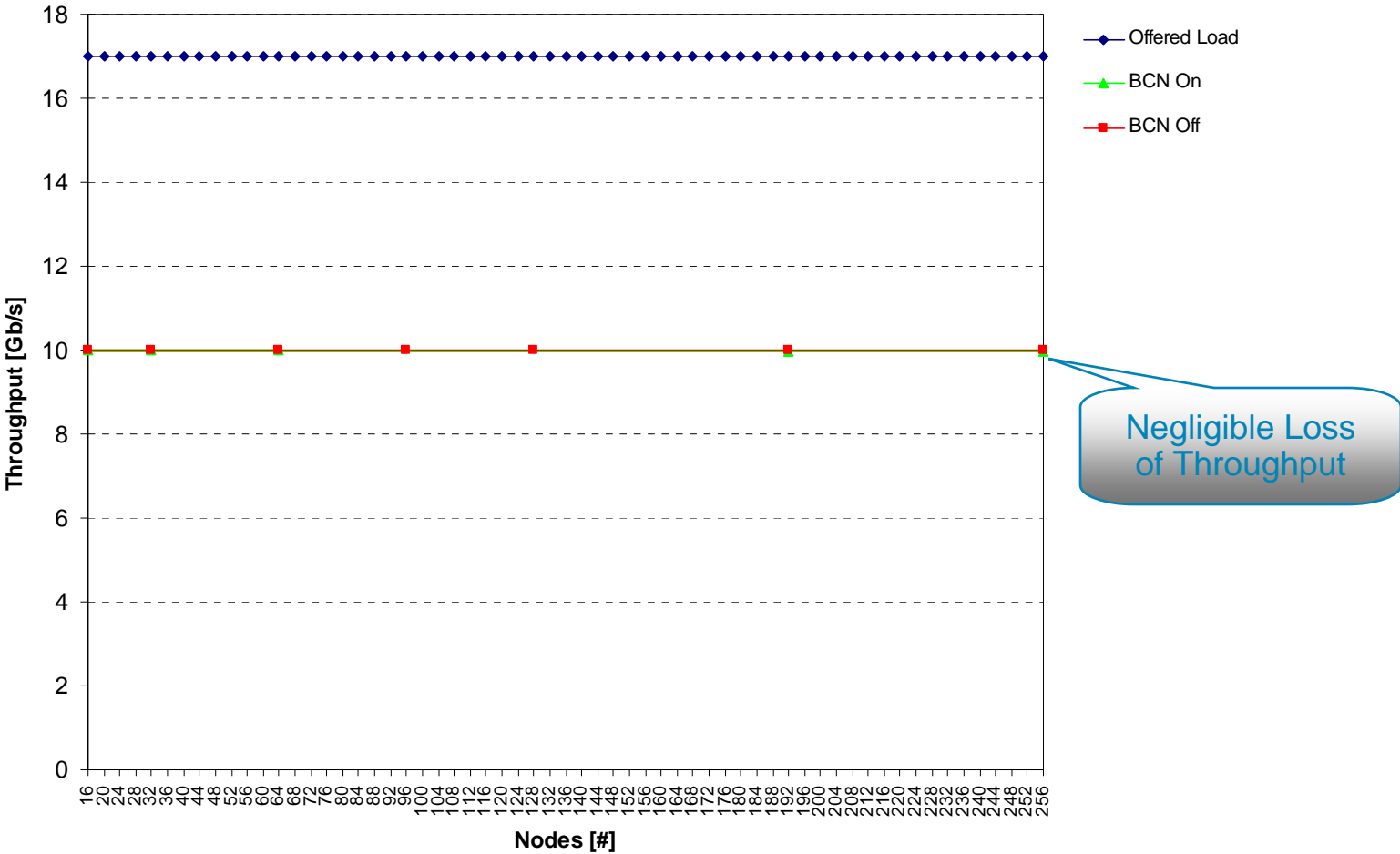
# Simulation Results

Aggregate Throughput vs. Number of Nodes



# Simulation Results

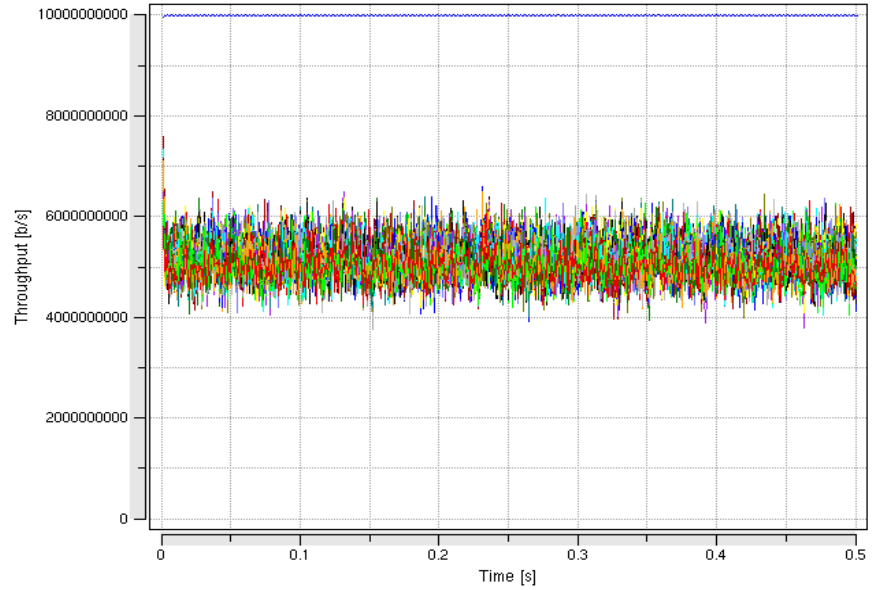
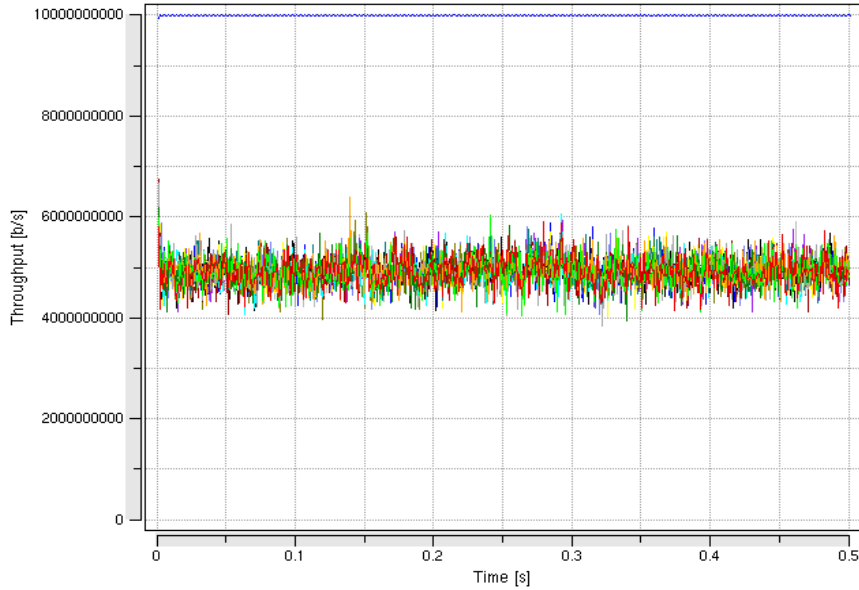
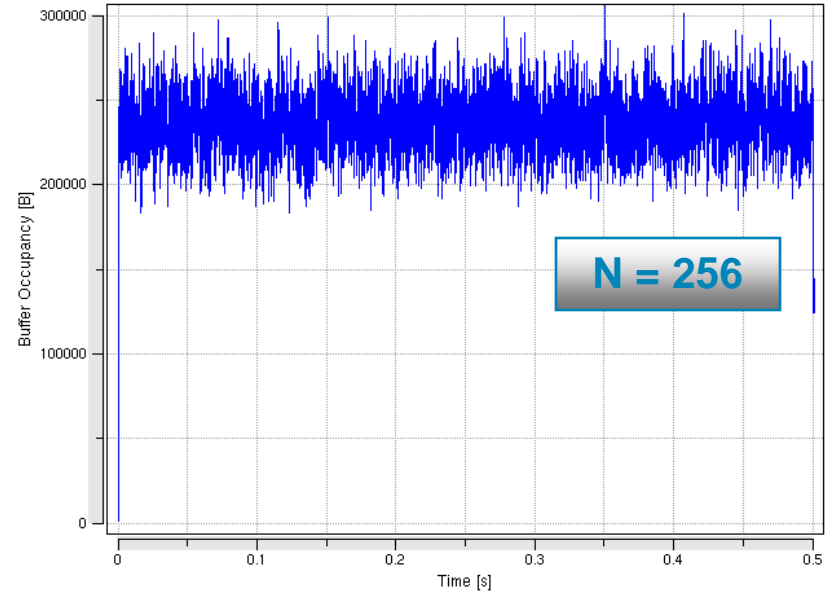
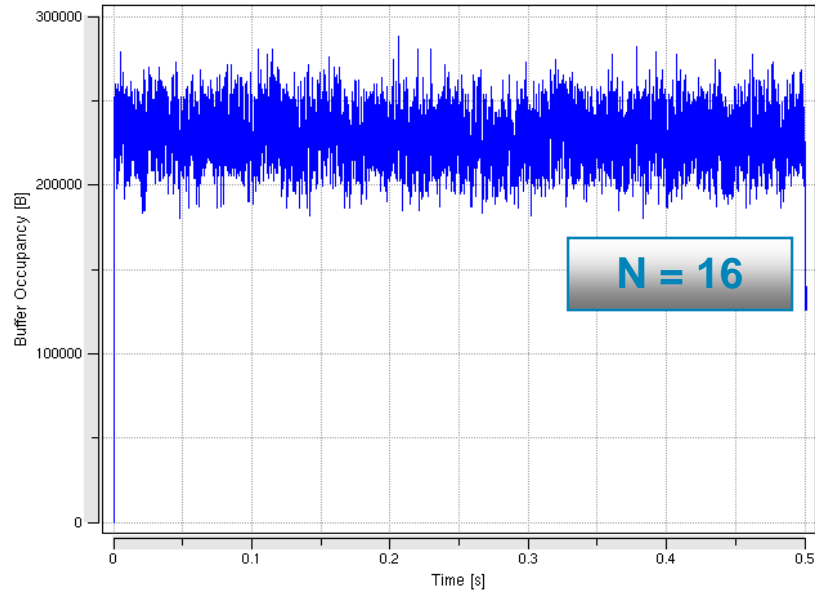
### Hotspot Throughput vs. Number of Nodes



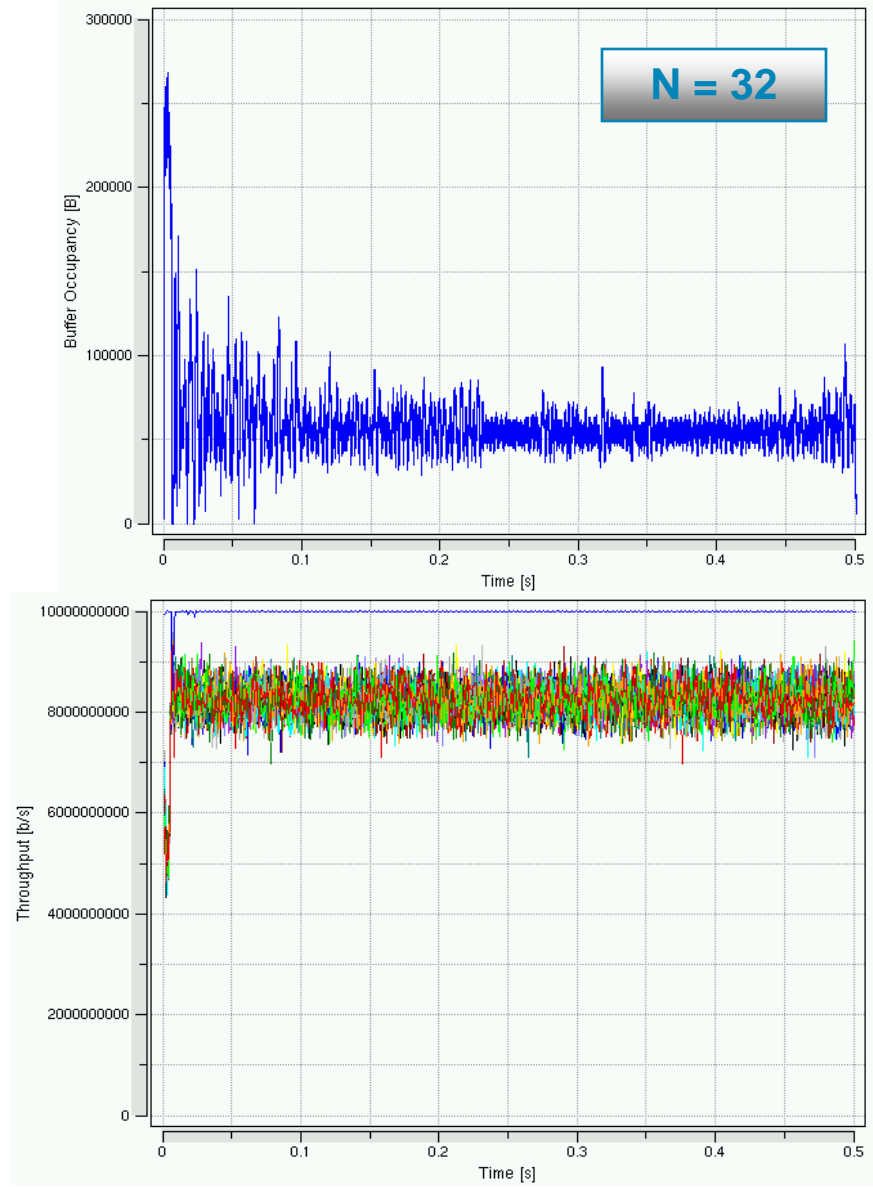
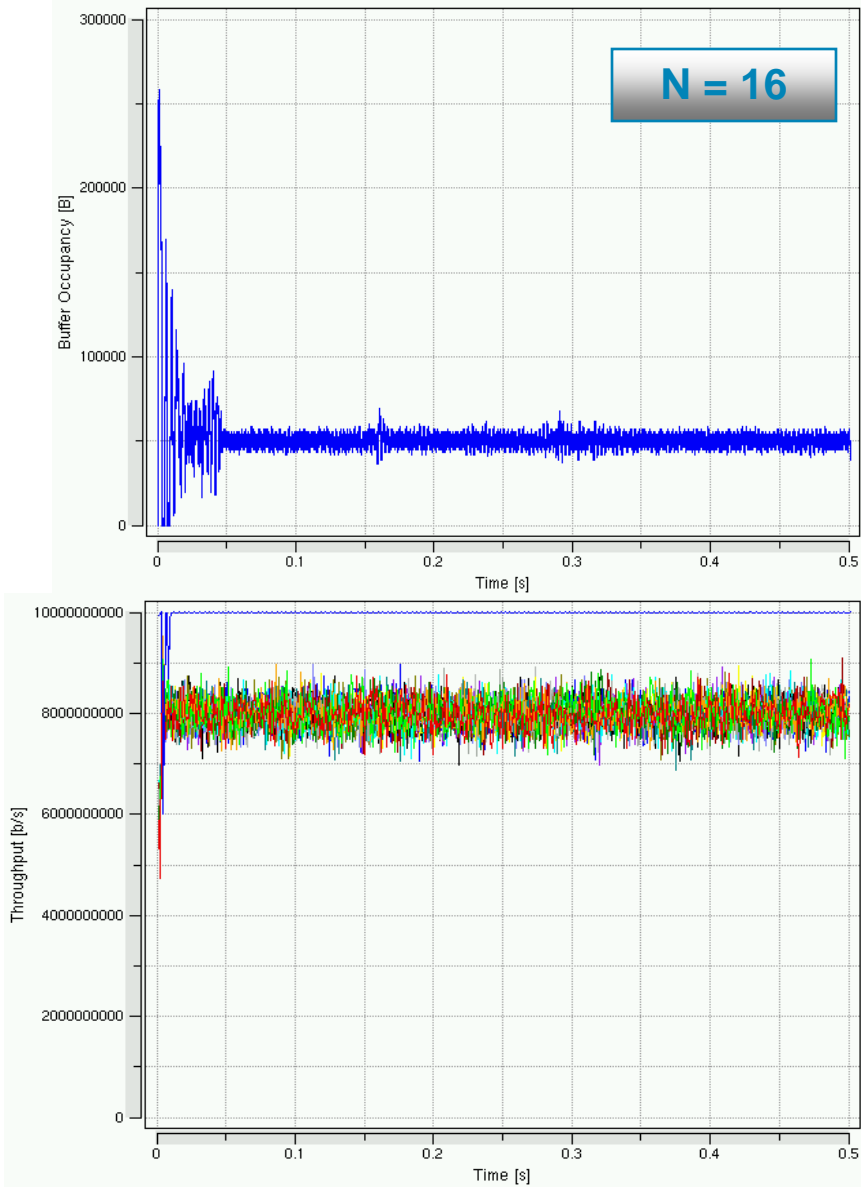
Negligible Loss of Throughput



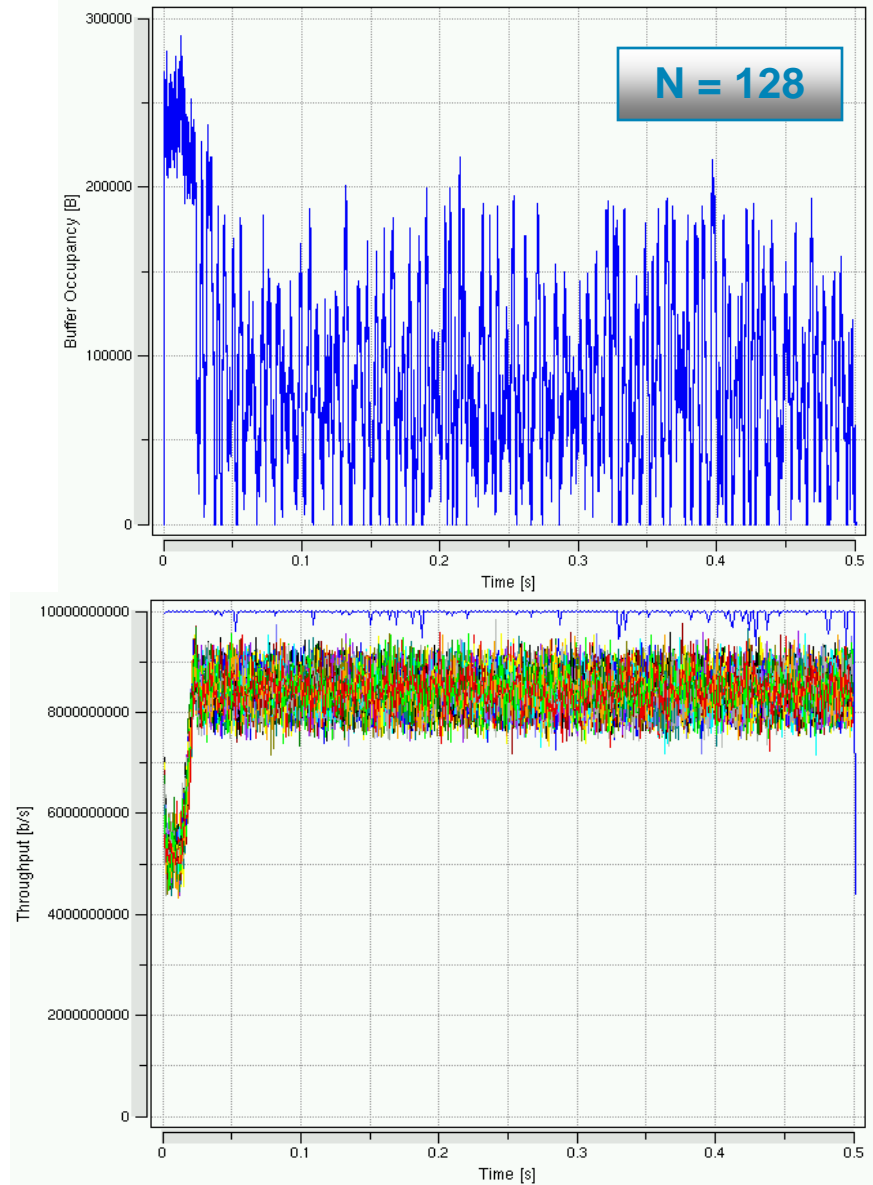
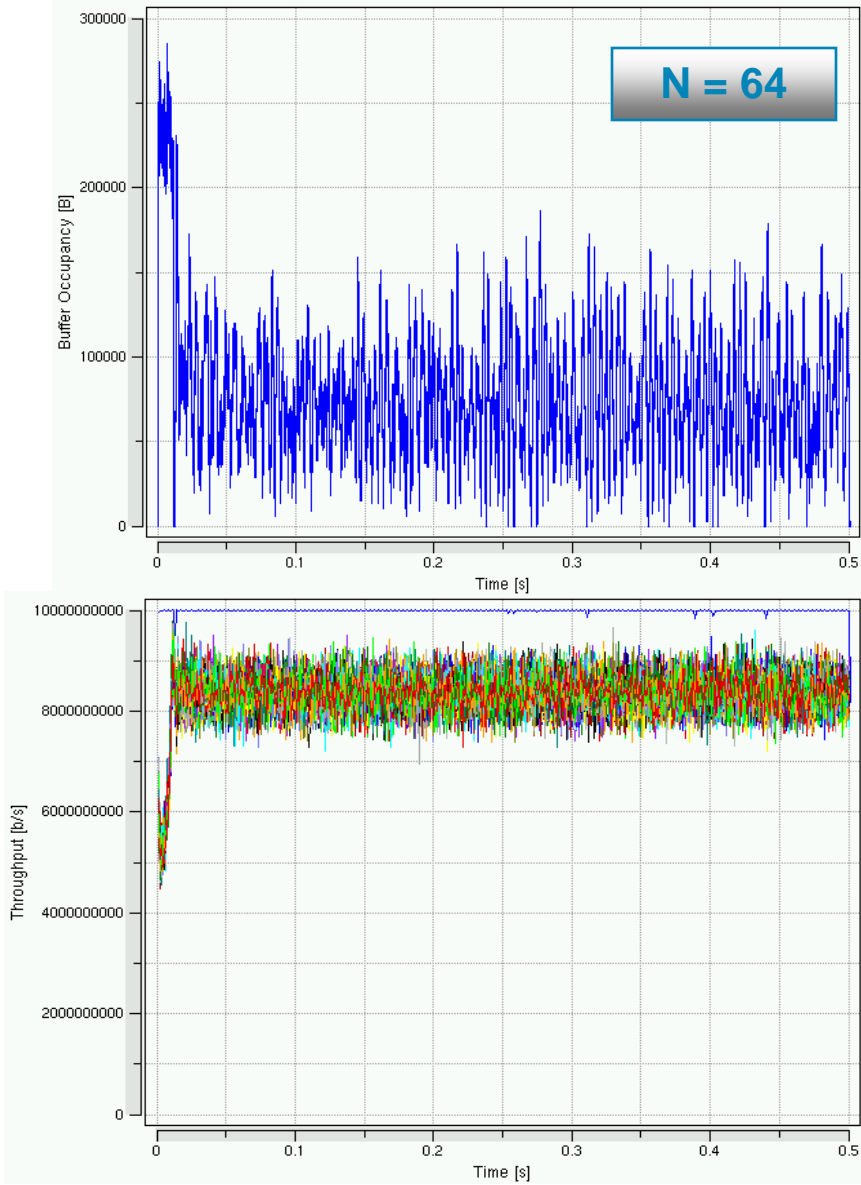
# BCN Off



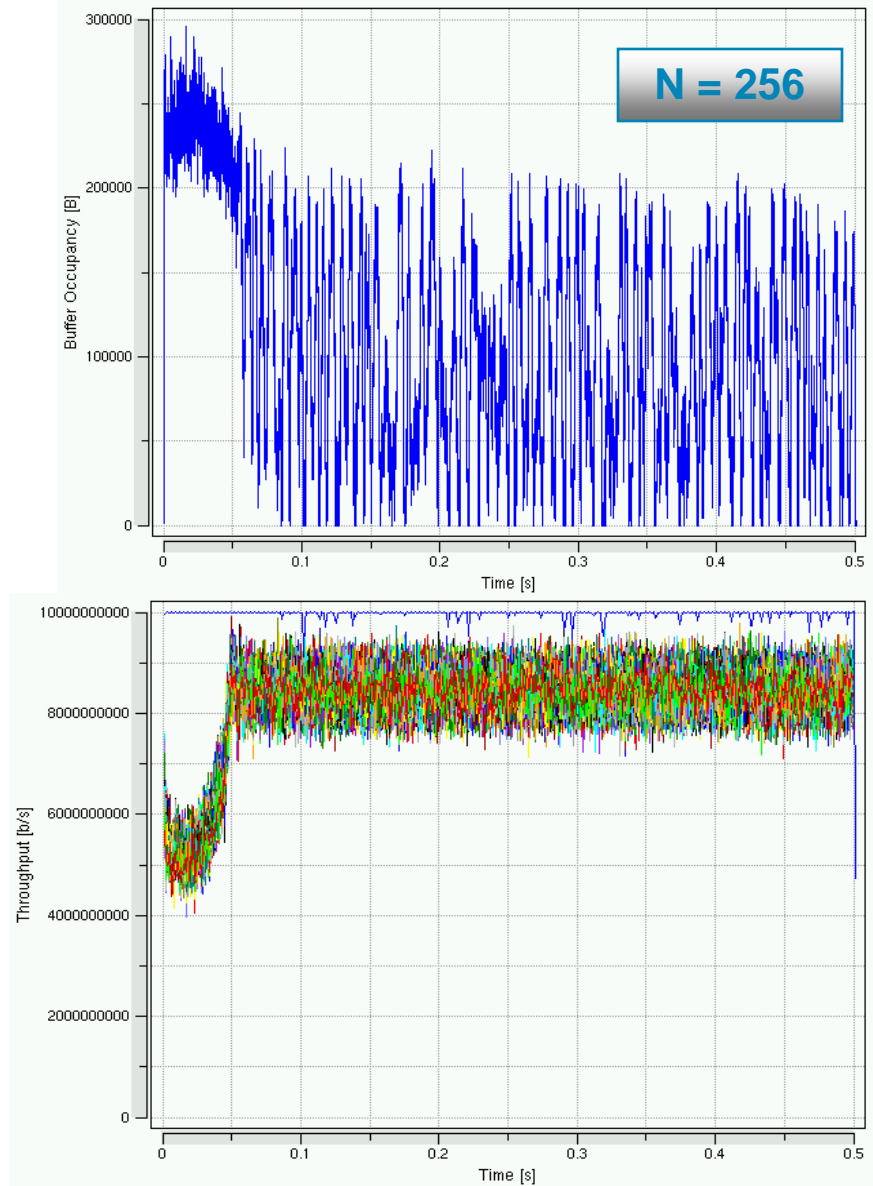
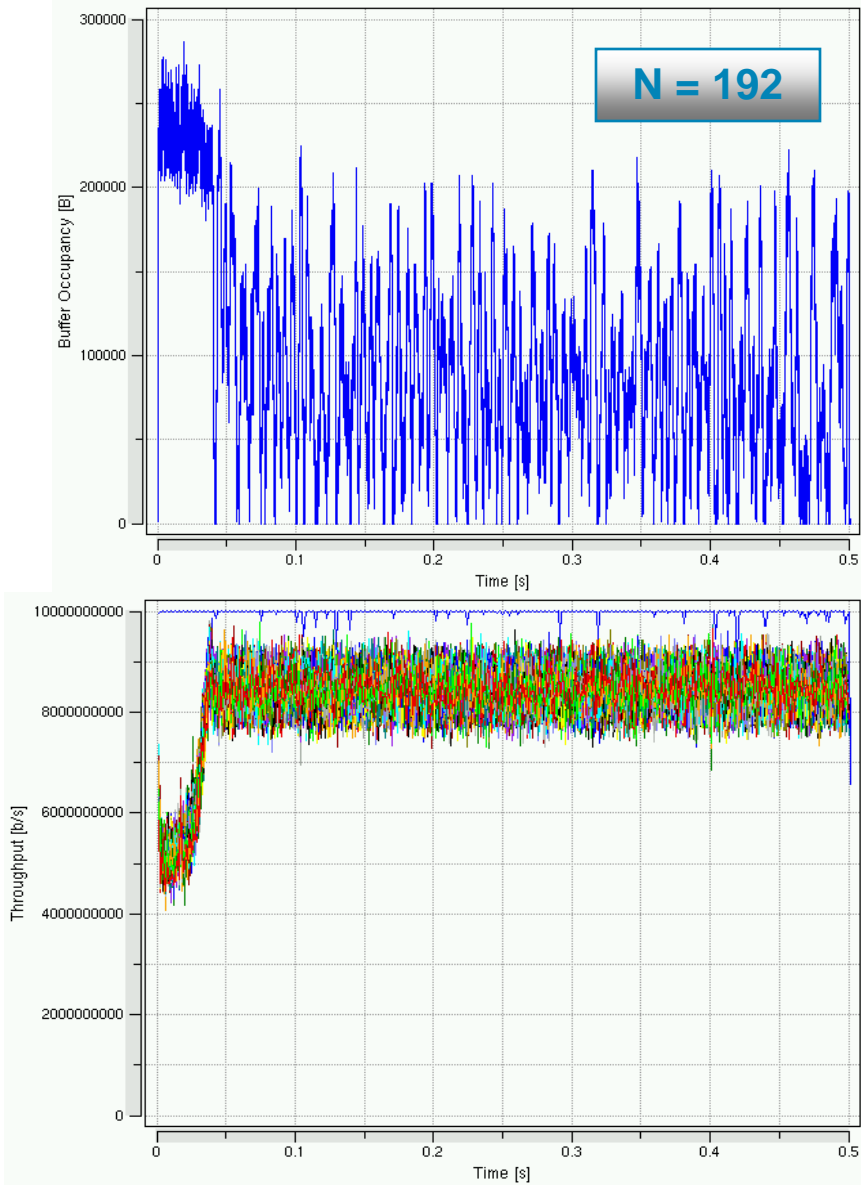
# BCN On



# BCN On



# BCN On



# Conclusions

- Baseline parameters continue to work unexpectedly well even in this stress-test scenario
- Apparently, BCN seems quite resilient with respect to dramatic changes (20x) in the bottleneck capacity  $C$  ...
- ... and also with respect to equally dramatic changes in the HSD ( $M$ )
- Next steps
  - Find a breaking point (if any) and fix it (if possible)
  - Study simultaneous changes in the two network conditions ( $C$  and  $M$ )
- Suggestions / Feedback Appreciated!

