



Performance Analysis of Darwin: Transient State with Reservation

Mark Joseph Francisco
Changcheng Huang

Advanced Optical Networks Laboratory
Carleton University
May 6, 2002



Agenda

- Objectives
- Darwin Scenarios and Simulation Settings
- Transient Simulation Results
- Conclusions

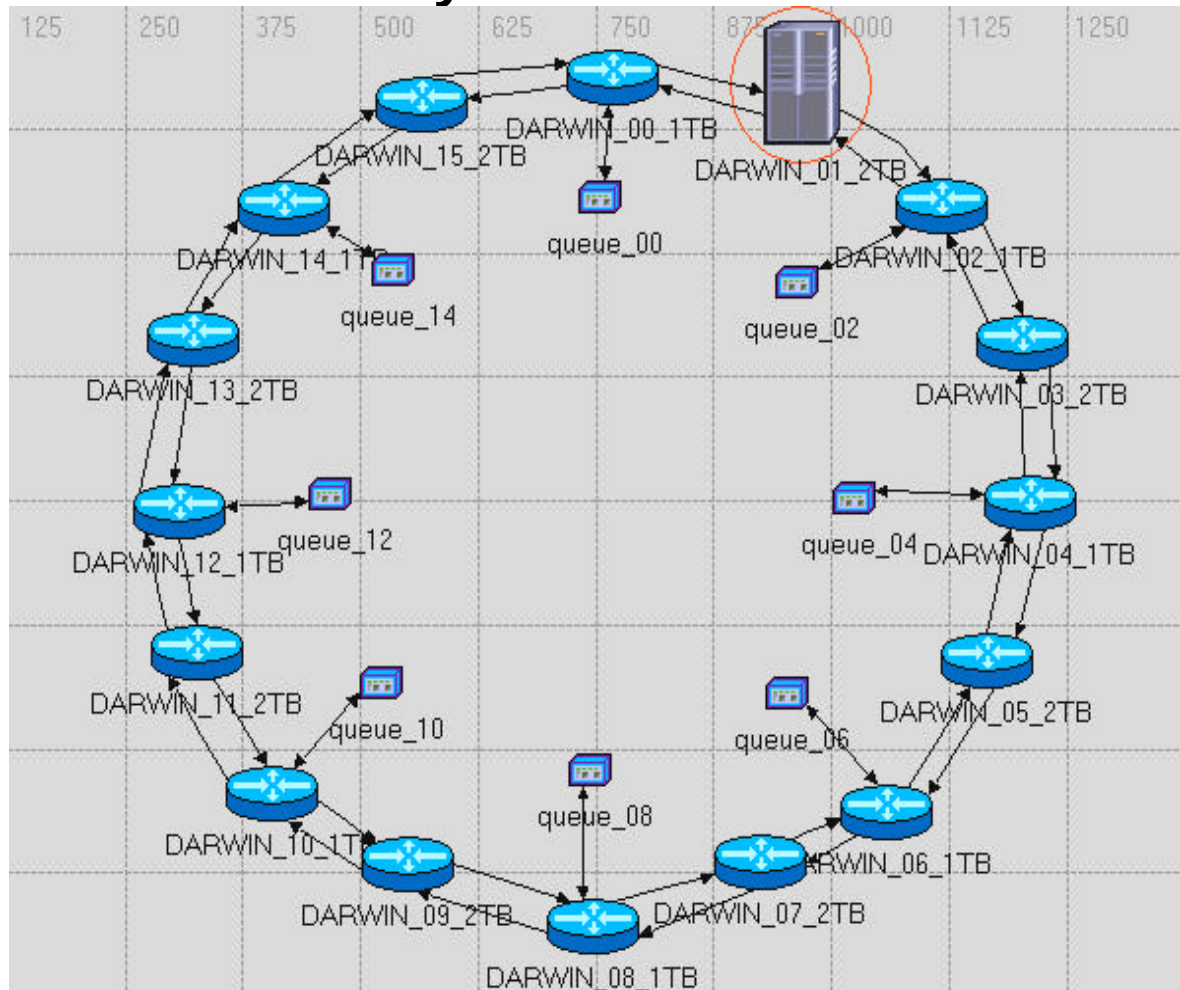
Objectives

- Examine the performance of Darwin
 - Mixed topology with Mono-queue nodes and Dual-queue architecture
 - Hub Scenario
 - Even load sourcing, equal weight
 - Step traffic increase
 - Capture Transient Response of
 - Mono-queue (1TB) as the congested station

Scenarios:

Congestion detected by 1TB station

- Darwin_01_2TB is the Hub
- Stations 02 to 00 send traffic counter clockwise on inner ring
- At 0s, reservations for **High Priority** are 30%, 20% and 10%
- At 0s, ring is overloaded with **Low Priority**
- At 0.1s, ring is loaded with **High Priority at 30%, 20% and 10%**



Traffic Settings

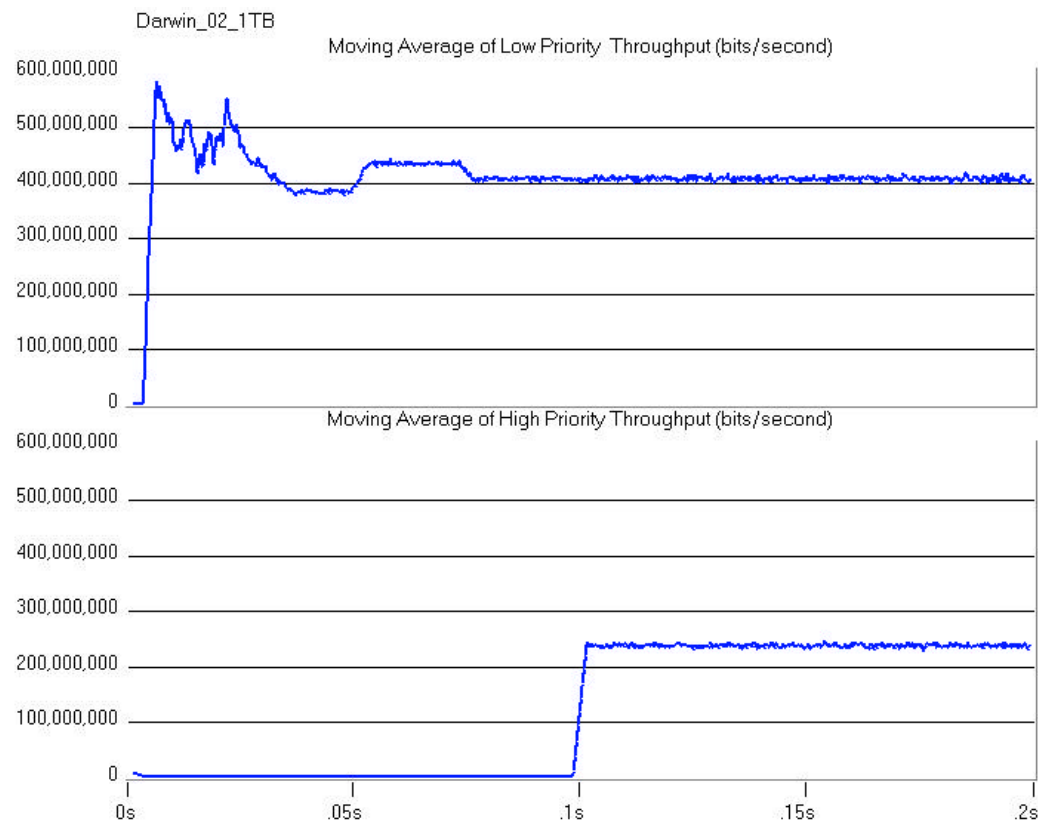
- Low priority is generated with Poisson Distribution
- High priority is generated with constant interarrival time
- Packet size is tri-modal
 - (60% 64B, 20% 512B, 20% 1518B)
 - MTU time = 1.2 us
- Mean packet size is 444.4B
- RTT ~ 2ms



Simulation Parameters

- Simulation Settings: 1TB Nodes
 - Ring Access Delay Threshold: 1ms
 - Tsample: 200us
 - Token Size: 1,000 bits
 - Leaky Bucket Size: 150,000 bits
 - Burst time ~ 15 us
 - Target utilization: 95%
- Simulation Settings: 2TB Nodes
 - Decay Interval: 100us
 - Low Transit Buffer Size: 4MB
 - Low threshold 900MB
 - High threshold 3.75MB
 - Low Transmit Buffer Size: 1MB
 - Leaky Bucket Size: 80,000 bits
 - Burst time ~ 8 us
 - Trigger Threshold for advertisement: 450KB
- Common Settings
 - Link Delay: 70us (15km)
 - Link Rate: 9.953 Gbps (OC-192)

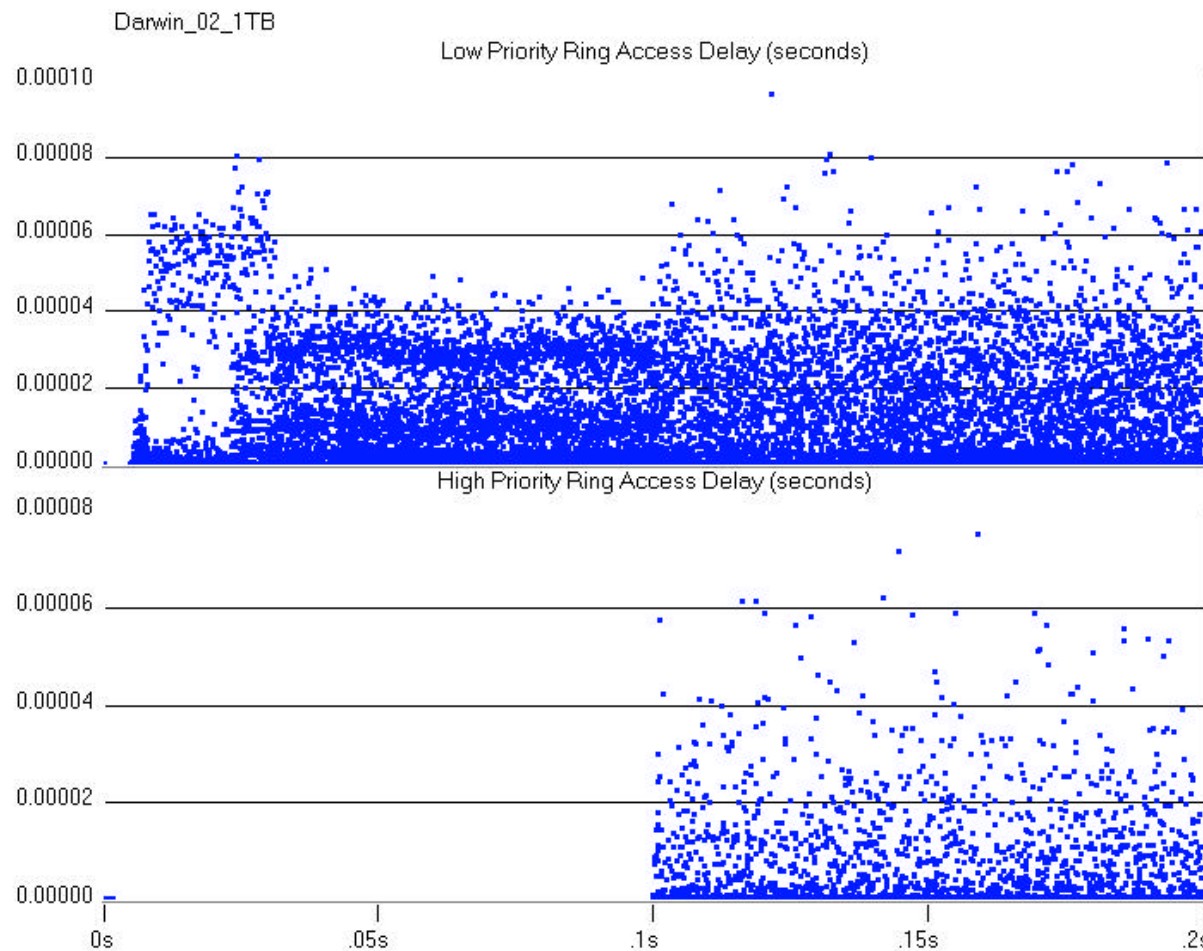
30% Reservation Transient Throughput



Class B,C

Class A0

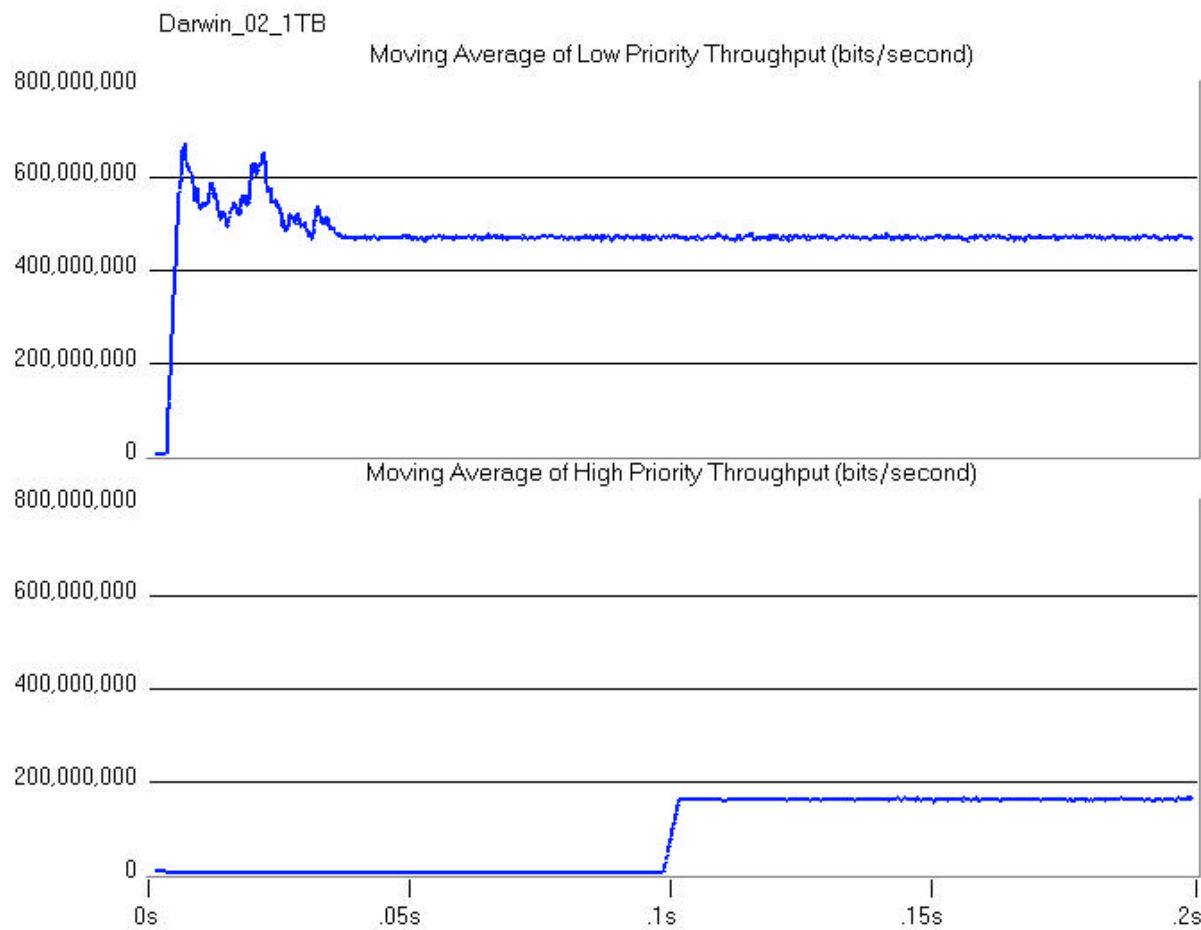
30% Reservation Transient Ring Access Delay



Class B,C
Max 100us

Class A0
Max 80us

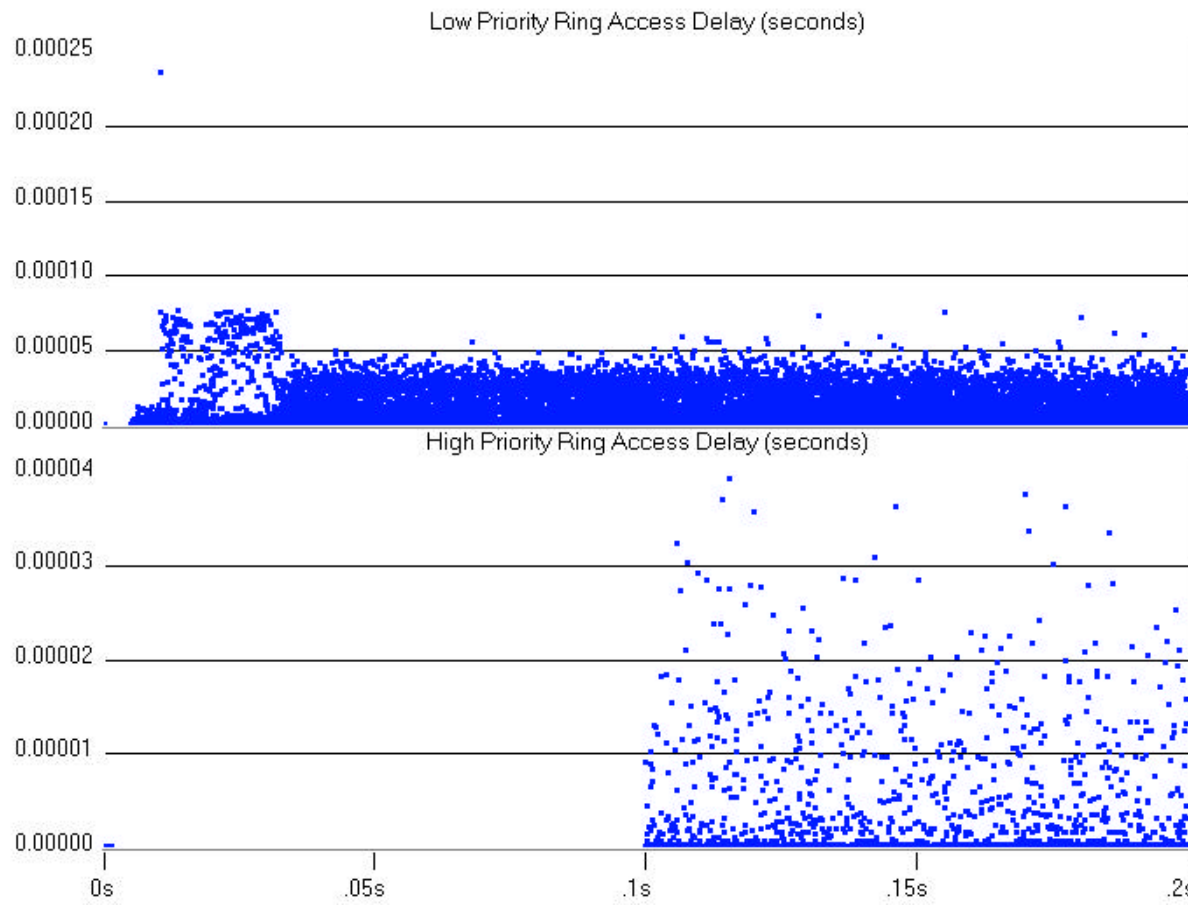
20% Reservation Transient Throughput



Class B,C

Class A0

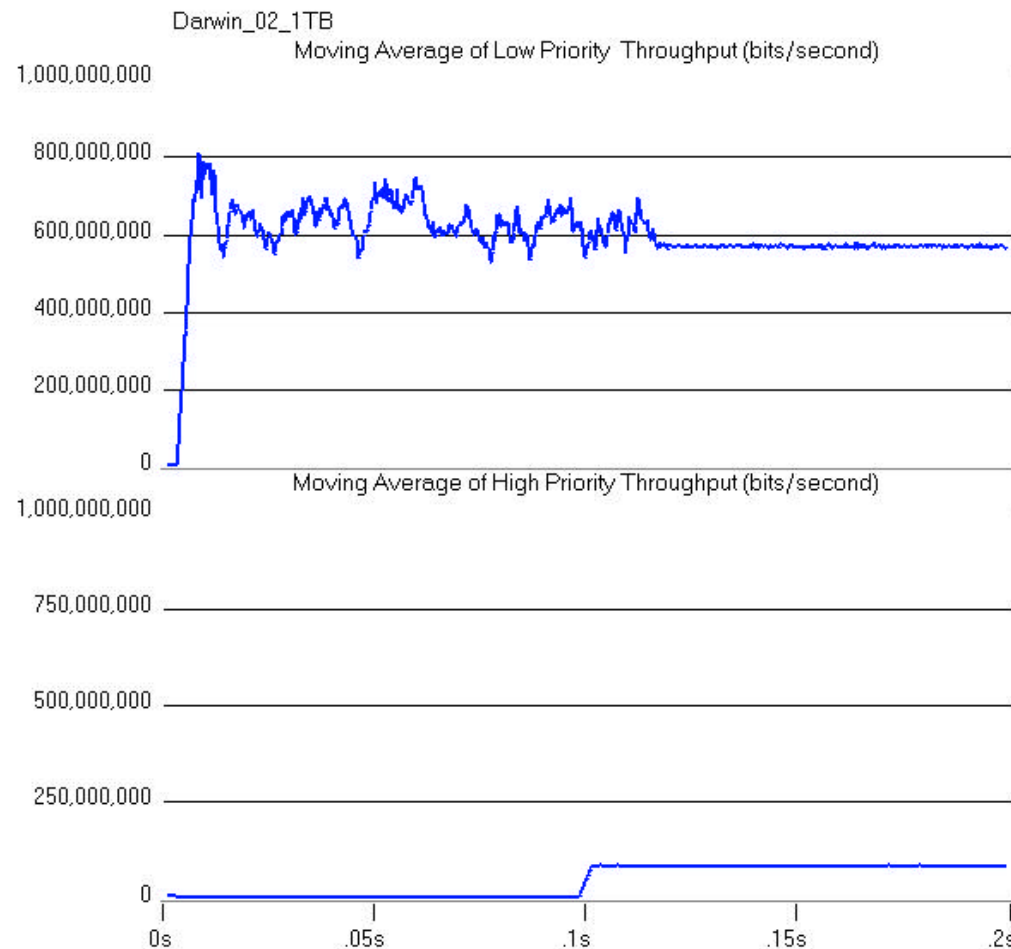
20% Reservation Transient Ring Access Delay



Class B,C
Max ~250 us

Class A0
Max 40 us

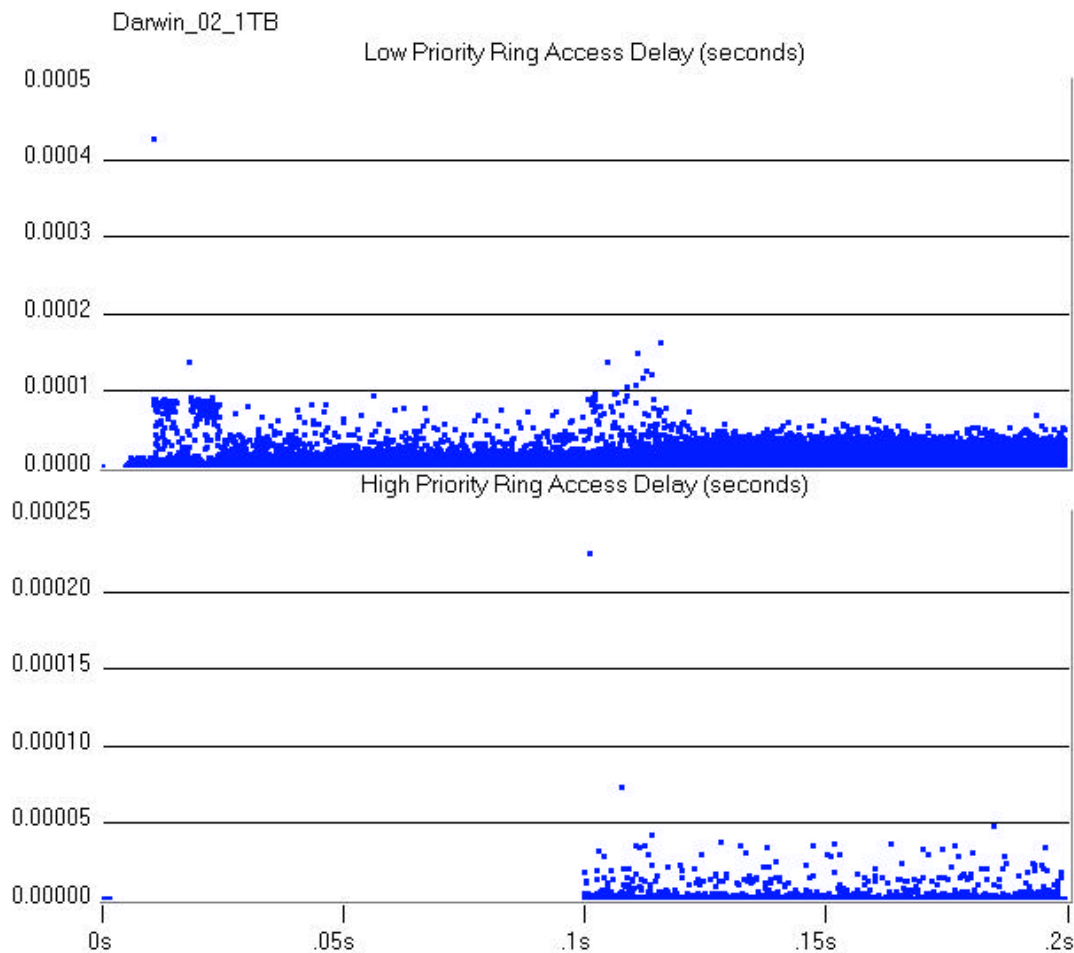
10% Reservation Transient Throughput



Class B, C

Class A0

10% Reservation Transient Ring Access Delay



Class B, C
Max 450us

Class A0
Max 250us

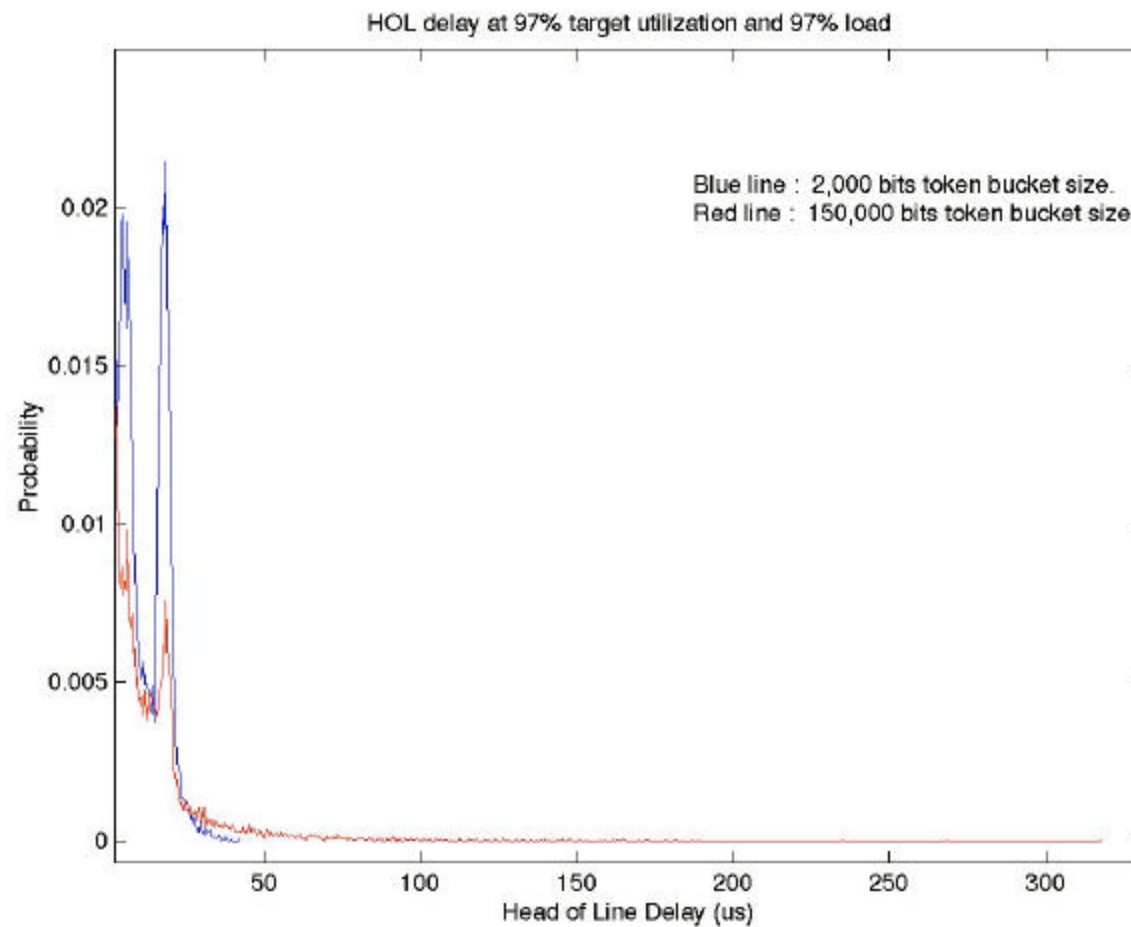
Conclusions

- Mono-queue and dual-queue based on Darwin model interwork
 - Simulation result for High and low priority traffic
- Transient state results:
 - No transient state for class A0
 - Achieves expected bounded MAC access delay and jitter
 - 1TB High/low ~ NxBurst

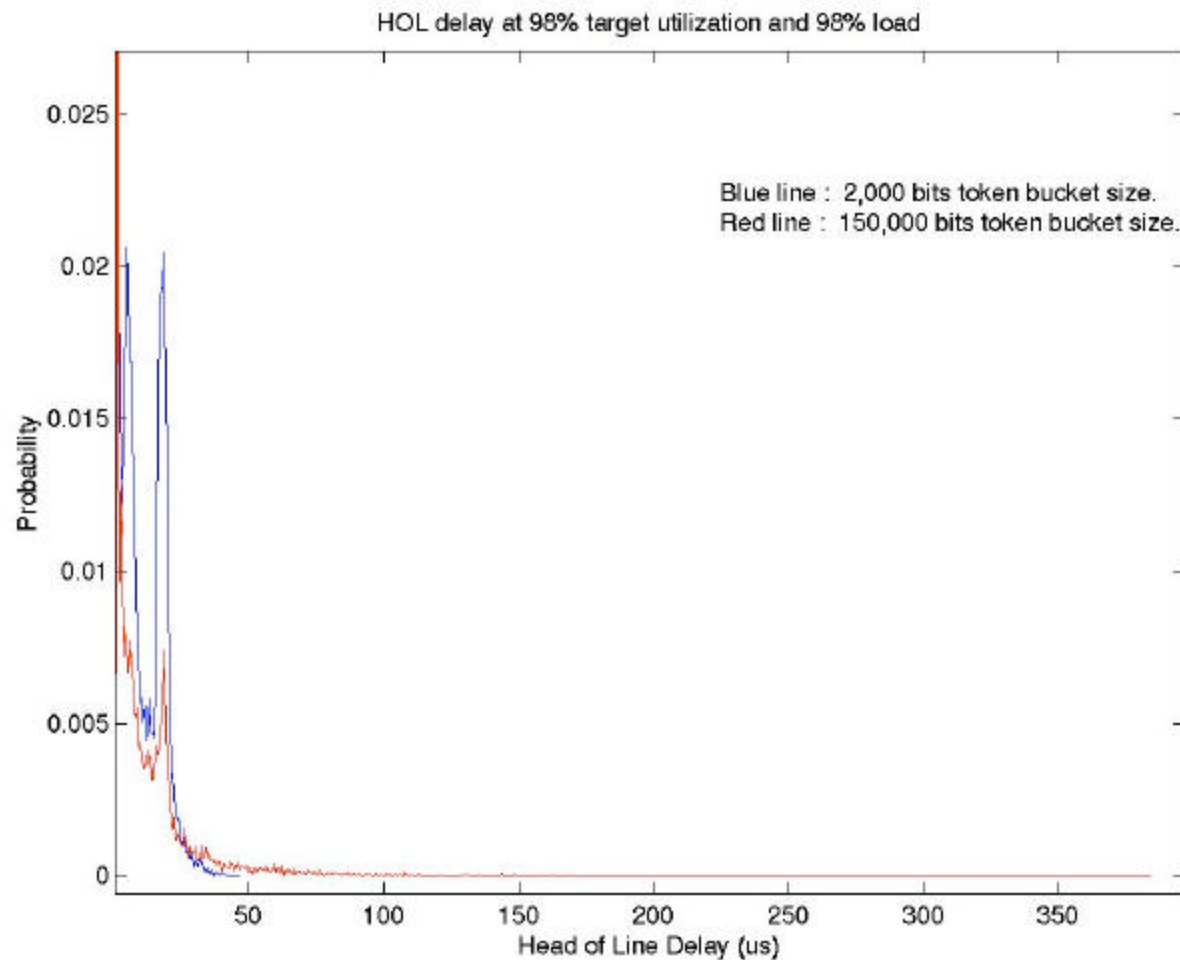


Backup Slides

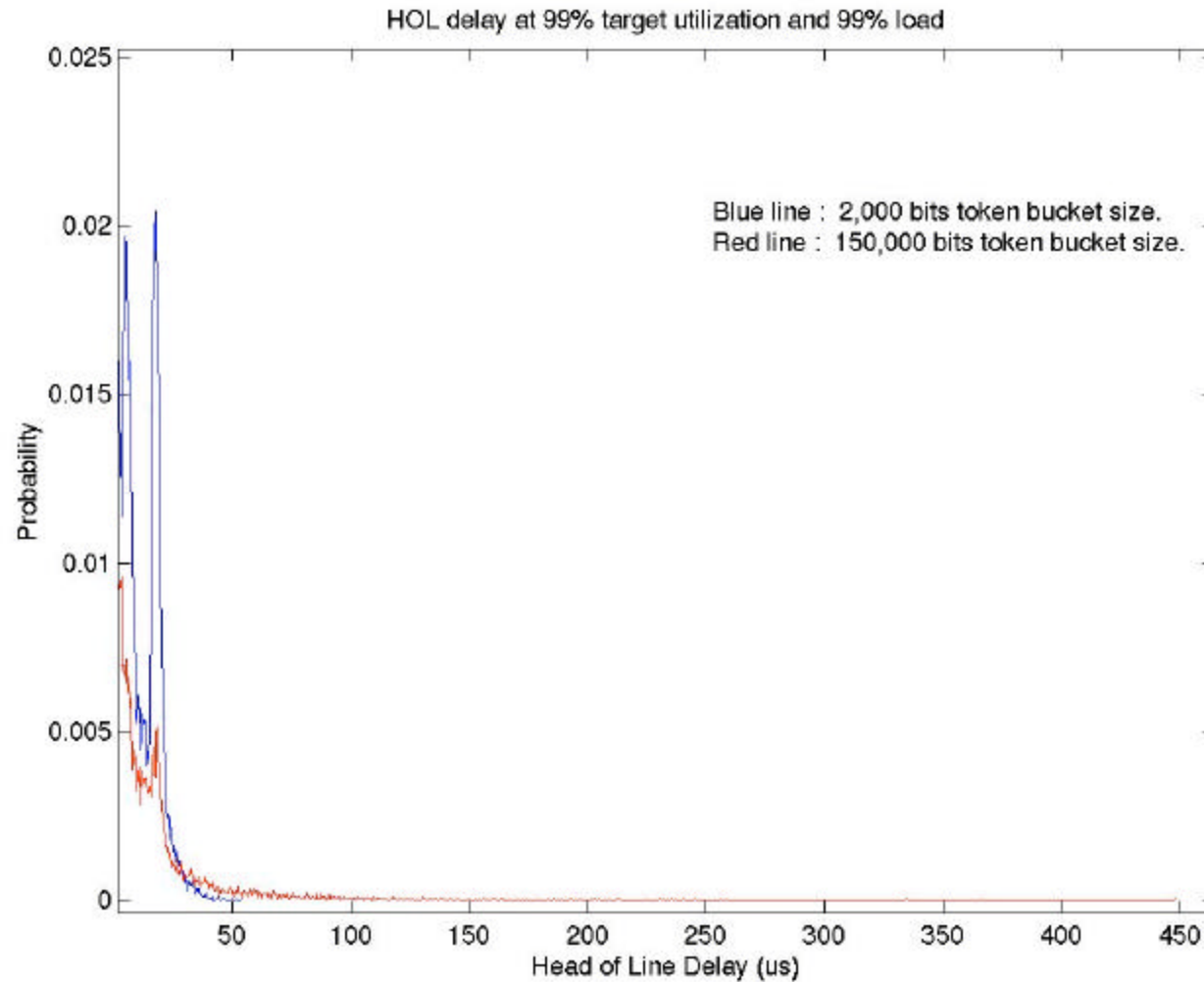
Ring Access Delay vs. Bucket Size



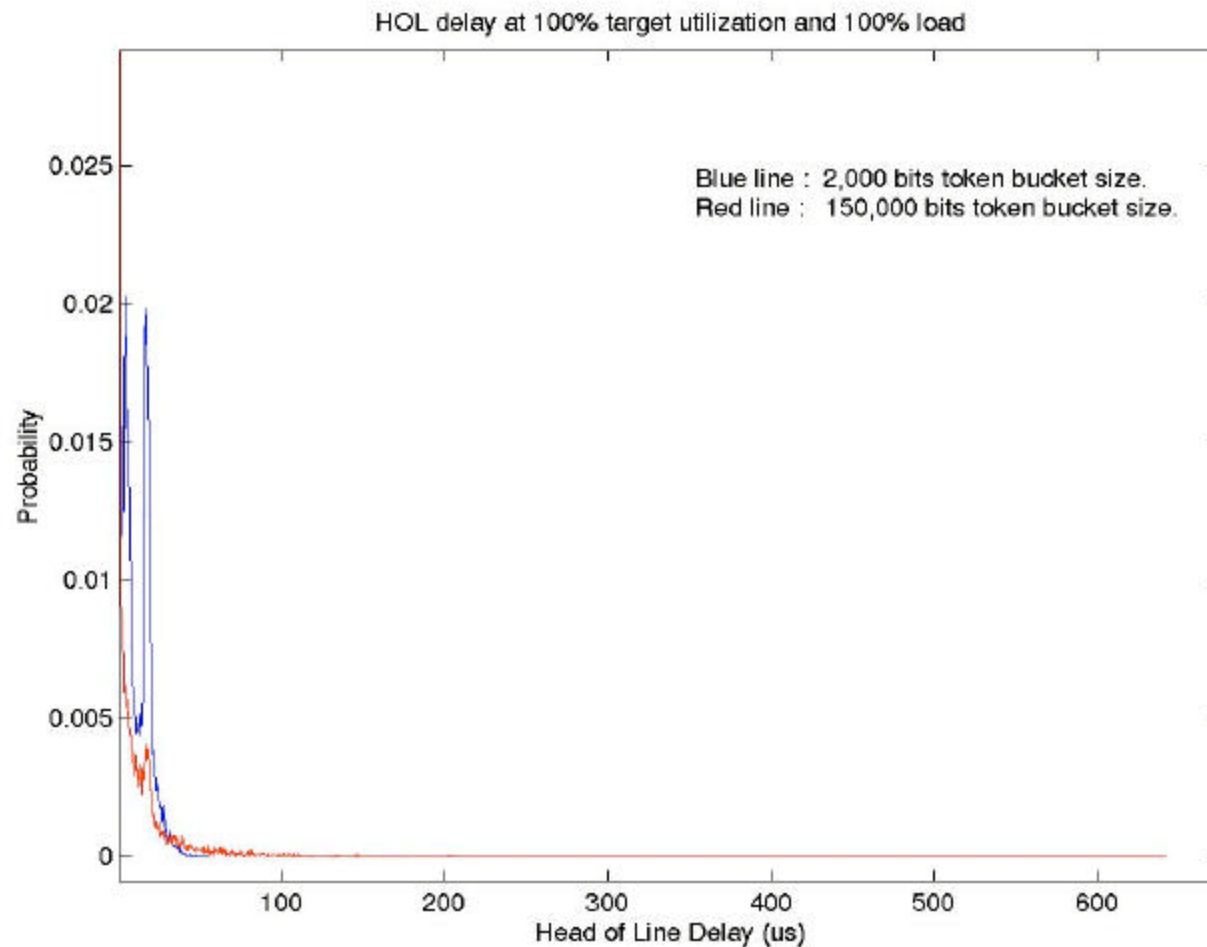
Ring Access Delay vs. Bucket Size



Ring Access Delay vs. Bucket Size



Ring Access Delay vs. Bucket Size



Ring Access Delay vs. Bucket Size

8-Node Scenario

