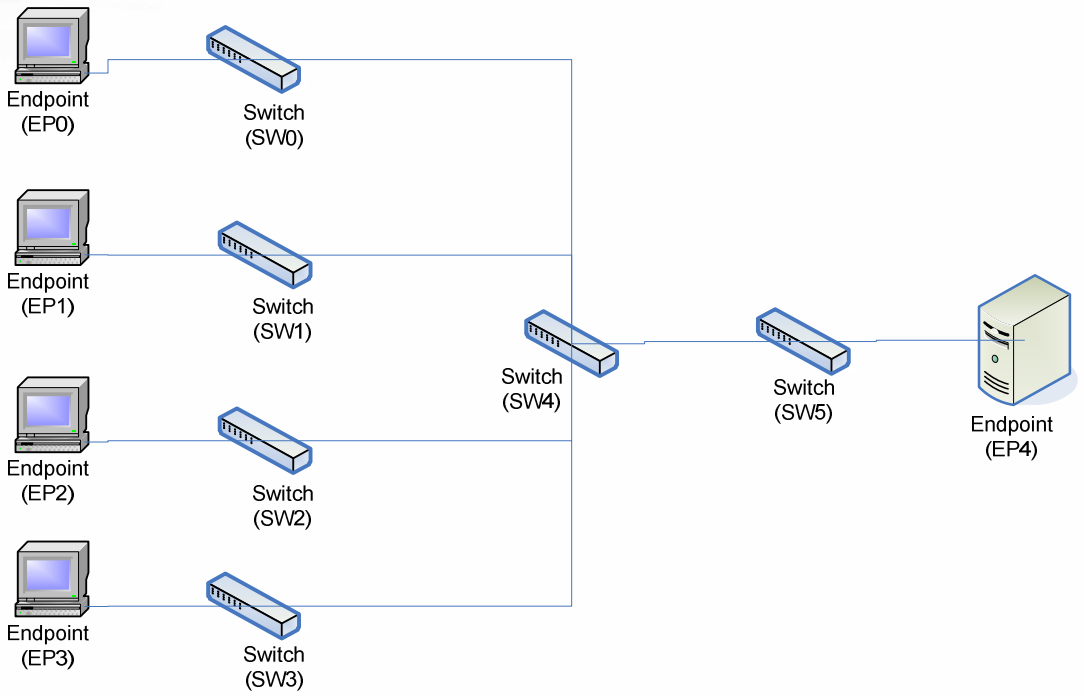
BCN Calibration Simulation Results

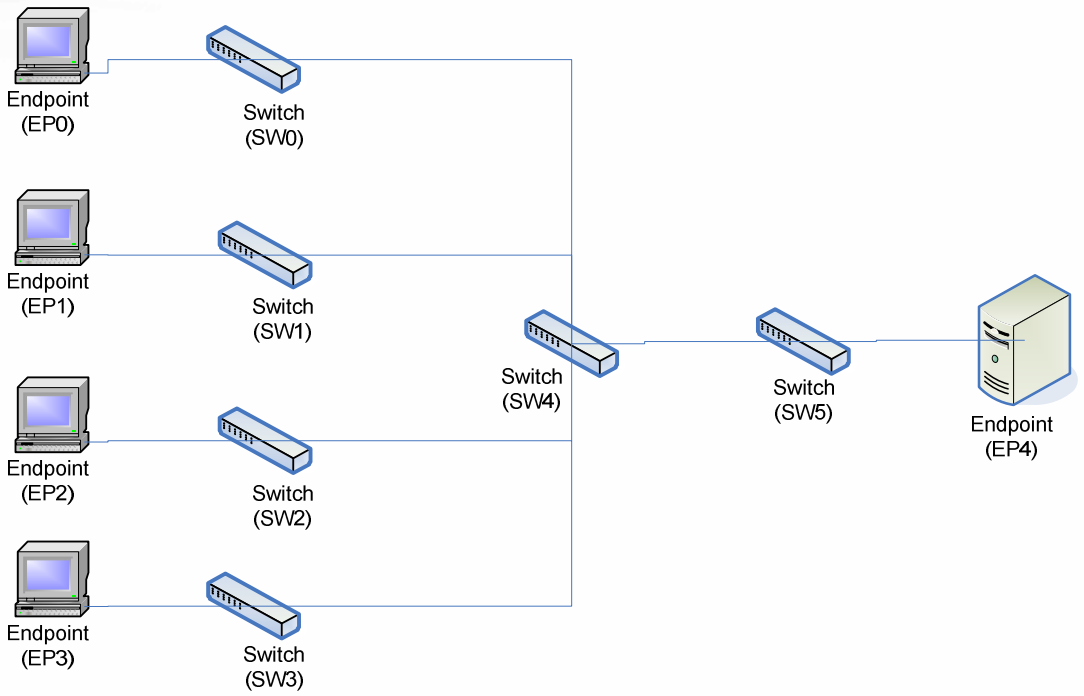
September 7, 2006

Topology



- **Short Range, High-Speed Datacenter-like Network**
  - **Link Capacity = 10 Gbps**
  - **Egress Port Buffer Size = 1 Mbyte**
  - **Switch Latency = 1 us**
  - **Link Length = 100 m (.5 us propagation delay)**
  - **Endpoint response time = 1 us**

Workload



- **Traffic Type: 100% UDP (or Raw Ethernet) Traffic**
- **Destination Distribution: EP0-EP3 send to EP4**
- **Frame Size Distribution: Fixed length (1500 bytes) frames**
- **Arrival Distribution: Bernoulli temporal distribution**
- **Offered Load/Endpoint = 50%**

BCN Parameters

- Qeq
  - 16 (1500-byte frames)
  - 375 * 64 byte pages
- Frame Sampling
  - Frames are sampled on average 150 KB received to the egress queue
- W = 2
- Gi = 12.42
  - Computed as (Linerate/10) * [1/((1+2*W)*Q_eq)]
  - Gi = $5.3 \times 10^{-1} * (1500/64) = 12.42$
- Gd = 6.09×10^{-3}
  - Computed as 1/2*[1/((1+2*W)*Q_eq)]
  - Gd = $2.6 \times 10^{-4} * (1500/64) = 6.09 \times 10^{-3}$
- Ru = 1 Mbps

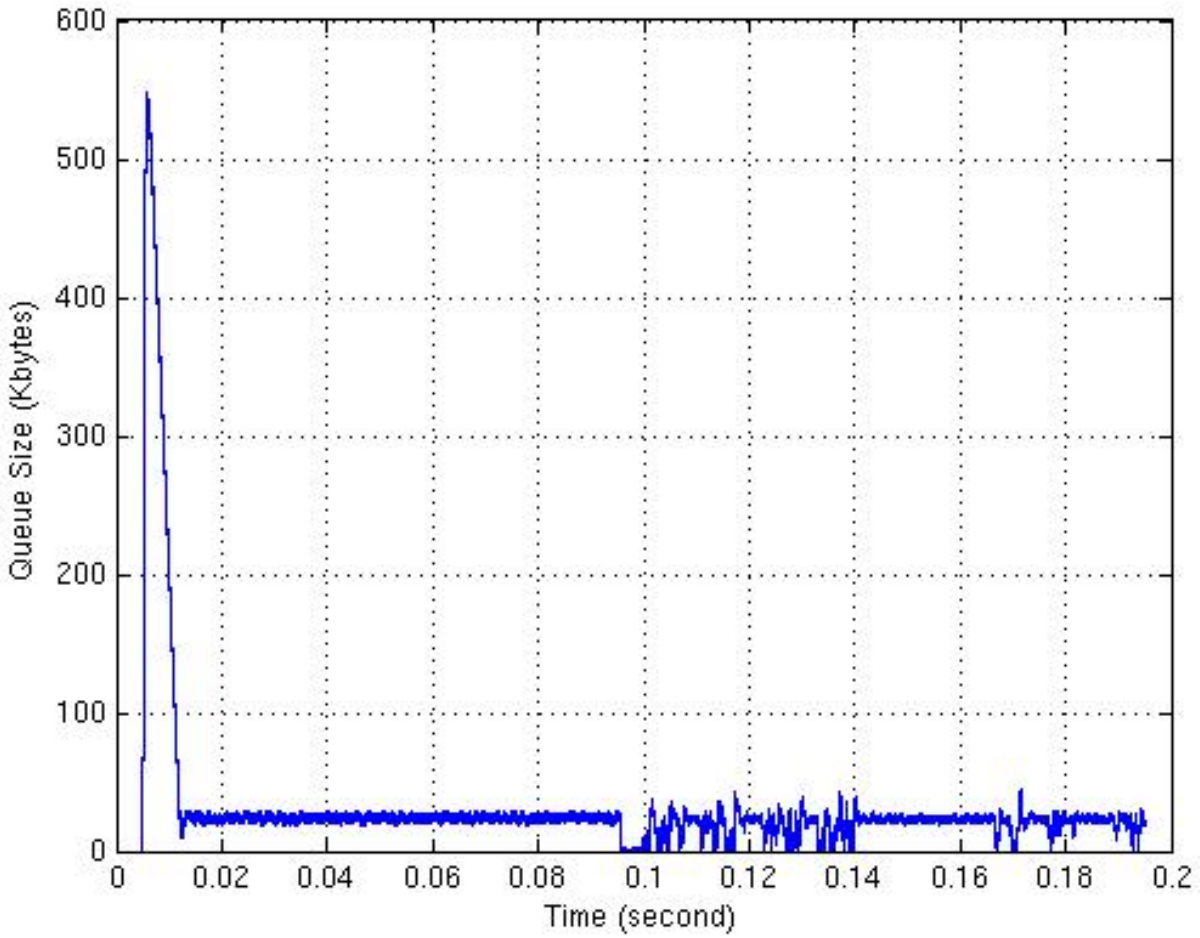
Simulation Run & Results

- Simulation
  - Duration: 195ms
  - Initial Transient @ t = 5ms (source start)
  - 2 flows stop @ t=95ms
  - Simulation stops @ t = 195ms

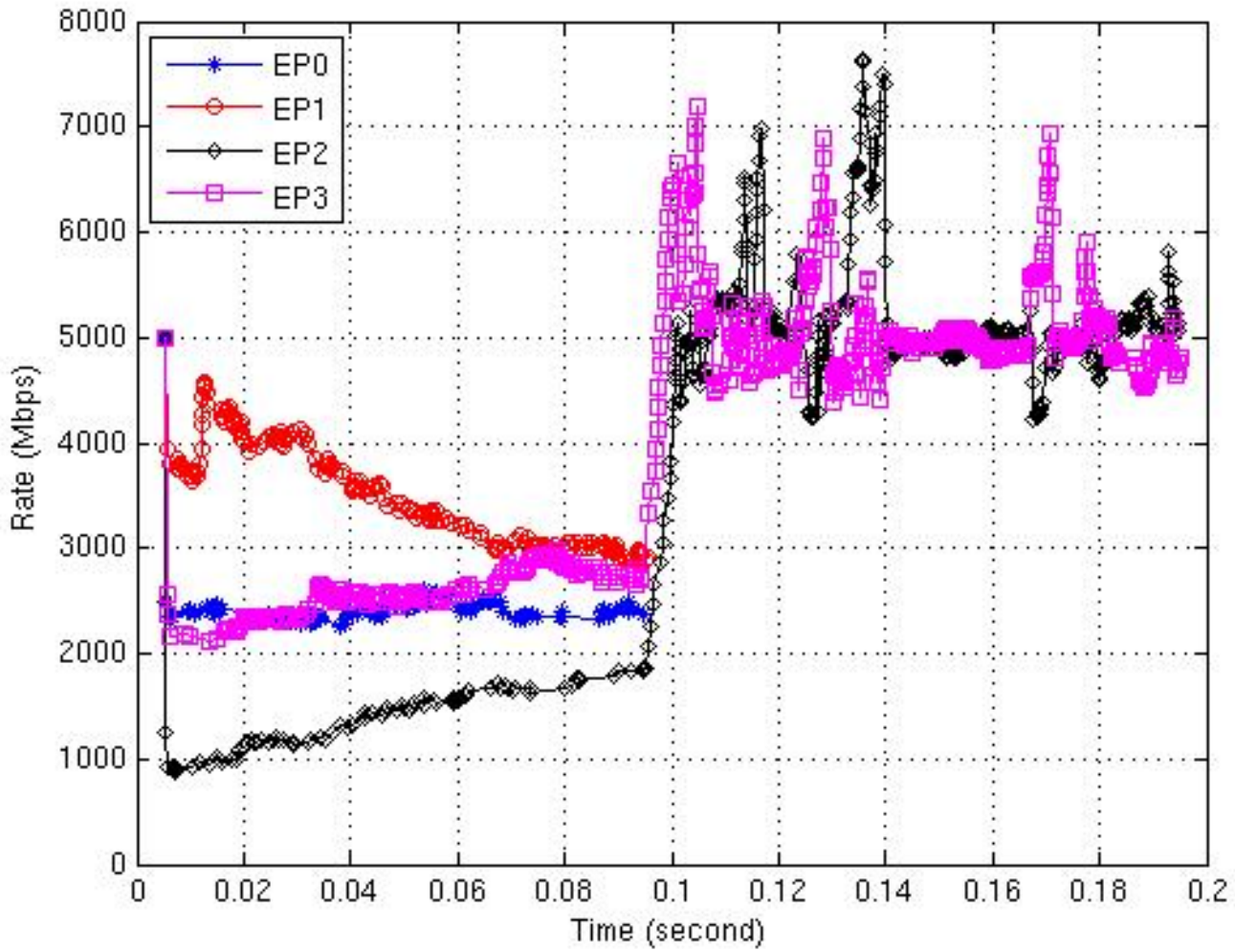
- Results:
  - Throughput on congested downlink
    - 10Gbps, 100% utilization during congestion
  - Throughput on uplinks (during 5ms-95ms): see table
  - Packets Transmitted (during 5ms-95ms): 149674
  - Packets Received (during 5ms-95ms): 74202
  - Frame Dropped:
    - 0 @ CP
    - See table for drop @ RP

	Throughput	Frames Dropped at RP
EP0	2.44 Gbps	19240
EP1	3.54 Gbps	10926
EP2	1.44 Gbps	26636
EP3	2.58 Gbps	18229

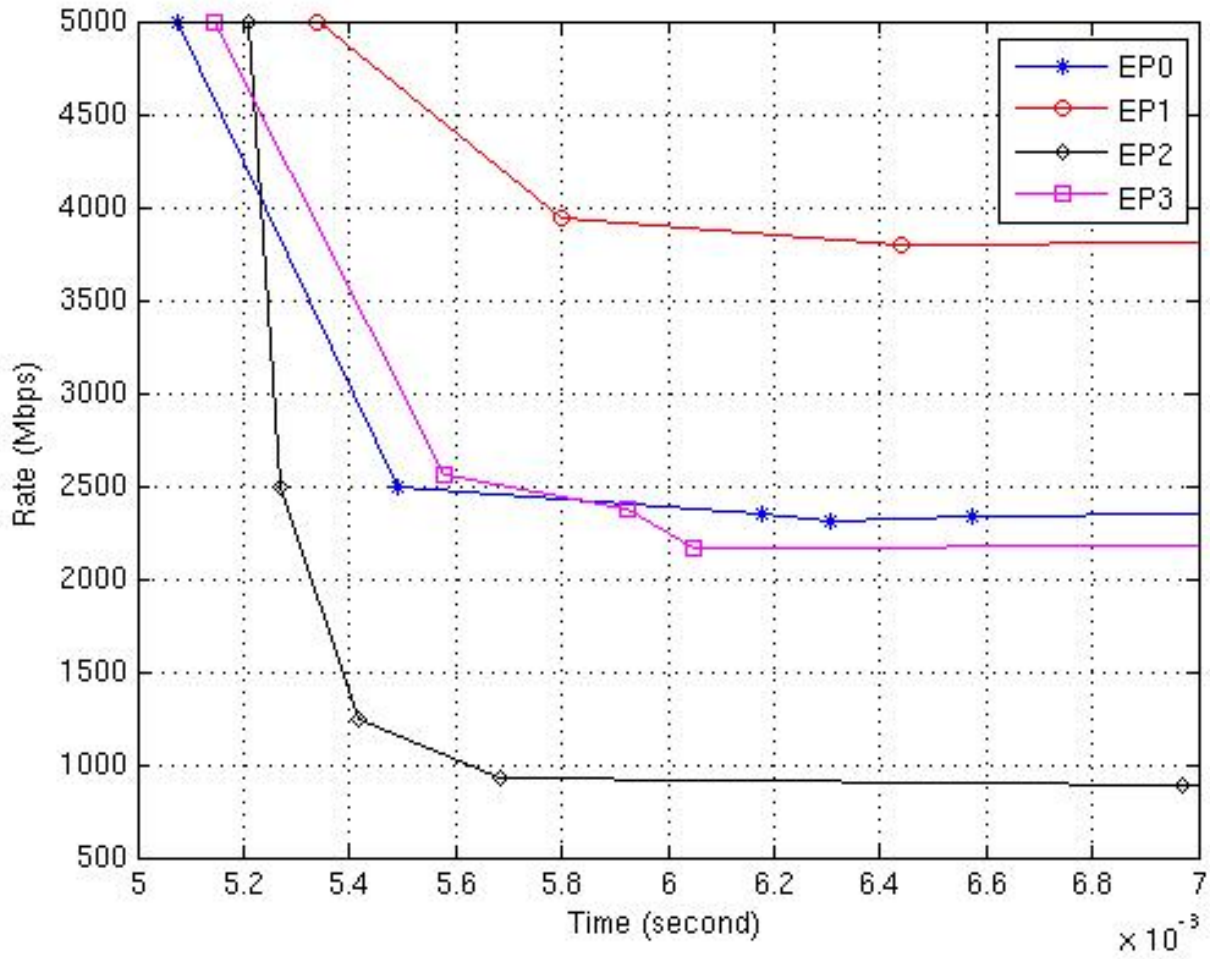
Buffer Utilization at Core Switch (SW4)



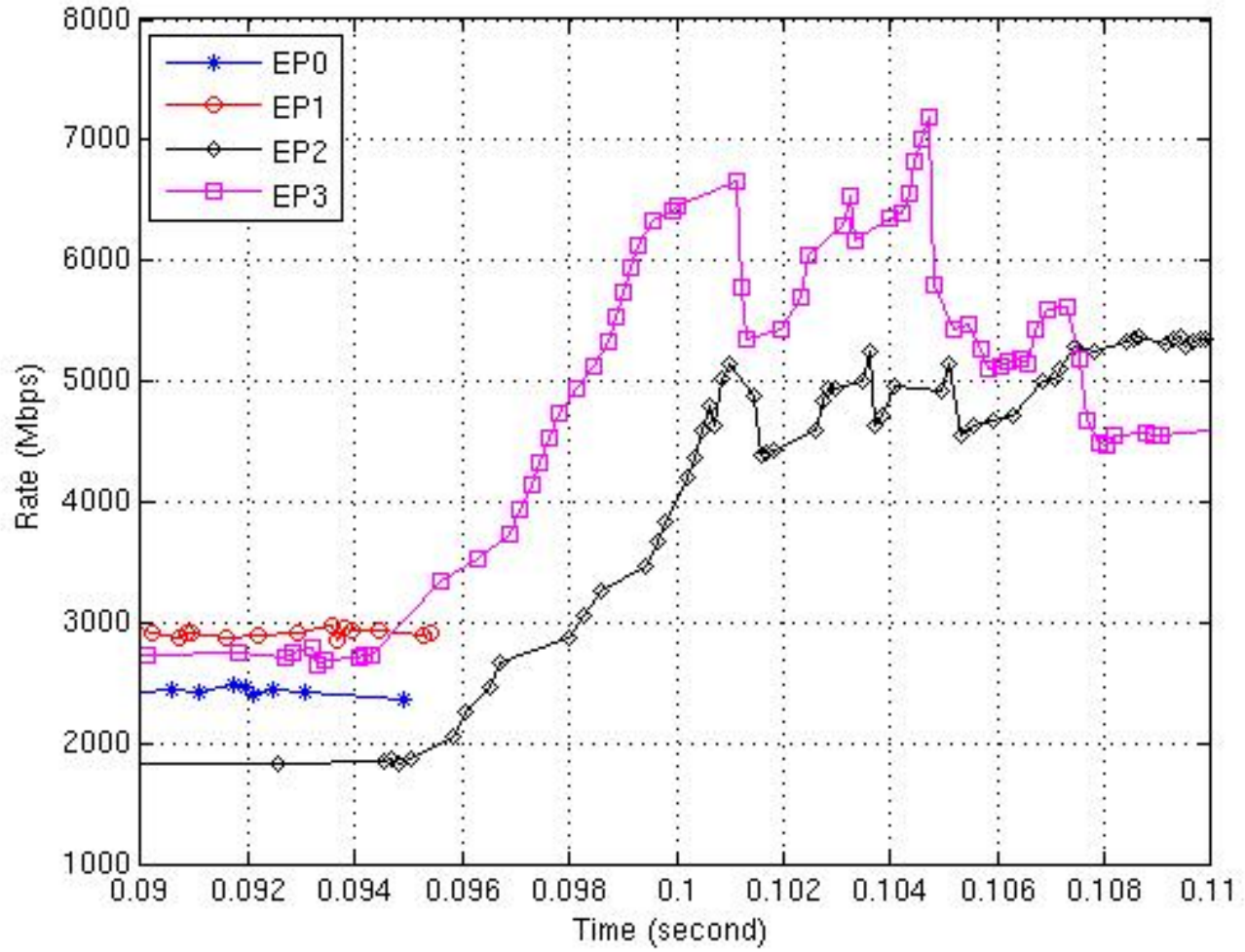
RLQ Rate v.s. Time



Close-up of RLQ Rate Adjustments [5ms – 7ms]



Close-up of RLQ Rate Adjustments [90ms – 110ms]



RLQ Rate v.s. Time
Convergence Time (4 active flows)