CN-SIM: A Baseline Simulation Scenario

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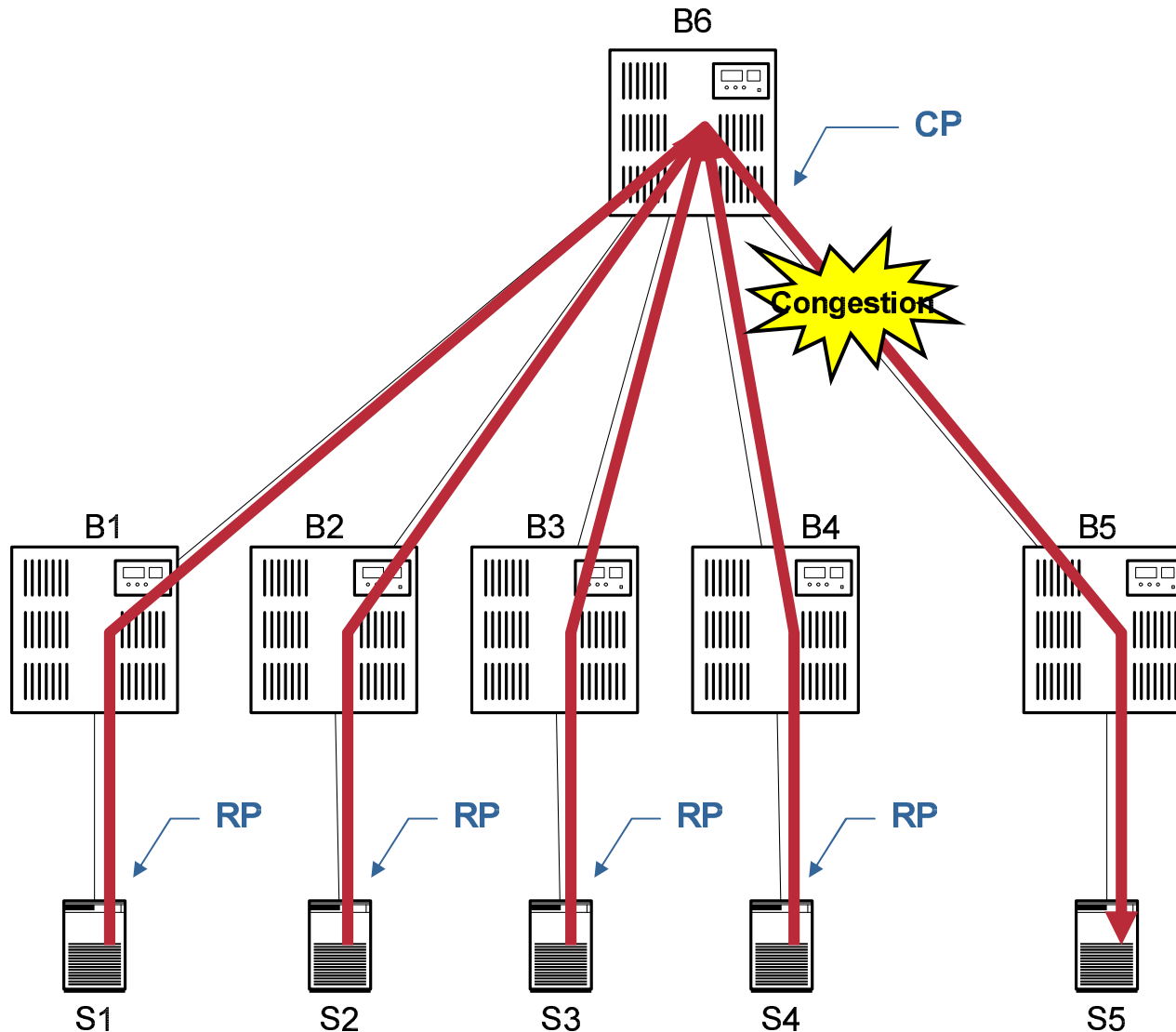
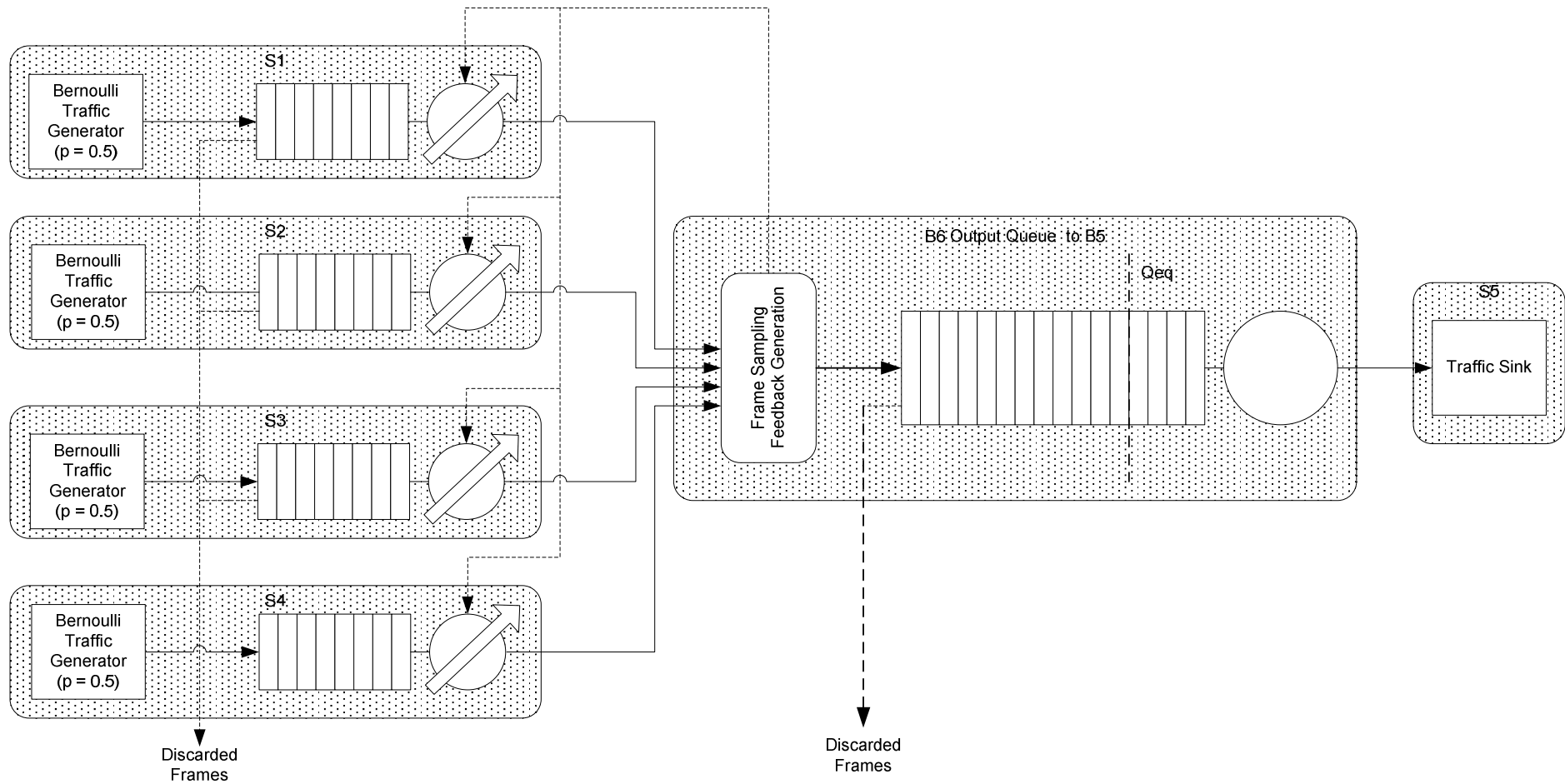**September 13th, 2006**

Ver. 4

Motivation

- **So far we have defined a set of common**

    - **Topologies**

    - **Traffic Patterns**

    - **Metrics**

    - **Bridge Model**

- **To ensure comparability of results, we also need to make sure our models and simulation tools are properly calibrated**

- **The baseline simulation scenario should allow us to achieve a reasonable alignment quickly and easily**

Topology & Traffic Pattern

Topology & Traffic Pattern

Configuration, Parameters & Workload

- **Short Range, High-Speed Datacenter-like Network**

  Link Capacity (C) = 10 Gbps

  Buffer Size (B) = 150 KB (both CP and RP)

  Switch latency = 1 μs

  Link Length = 100 m (.5 μs propagation delay)

  Station processing time = 2 μs

  Loop Latency = 8 μs

- **BCN Control Loop Parameters**

  Qeq = 375 64-byte pages (or 16 1500-byte frames or approx 24 KB)

  S = 150 KB (frames are sampled on average every 150 KB received)

  W = 2

  Gi = 5.3 x 10^{-1} (Max rate increase: C/10 when Max Fb^+ = (1 + 2 * W) * Qeq is received)

  Gd = 2.6 x 10^{-4} (Max rate decrease: 1/2   when Max Fb^- = (1 + 2 * W) * Qeq is received)

  Ru = 1 Mbps

- **Workload: 100% UDP (or Raw Ethernet) Traffic**

  S1-S4: fixed-length (1500 bytes) frames, Bernoulli temporal distribution with parameter p = 0.5
     (i.e., offered load = 50%)

Simulation Run & Results

- **Simulation**

  Runs: 10

  Duration: 100 ms

  Initial Transient @ t = 5 ms (all sources start)

  Final Transient @ t = 80 ms (2 sources stop)

- **Results**

  Throughput on congested downlink:

  10 Gbps (100%, measured during congestion)

  Throughput and fairness on uplinks:

  Average 2.5 Gbps (25%, measured between 78 and 80 ms)

  See table on slide 7

  Buffer utilization @ congested link:
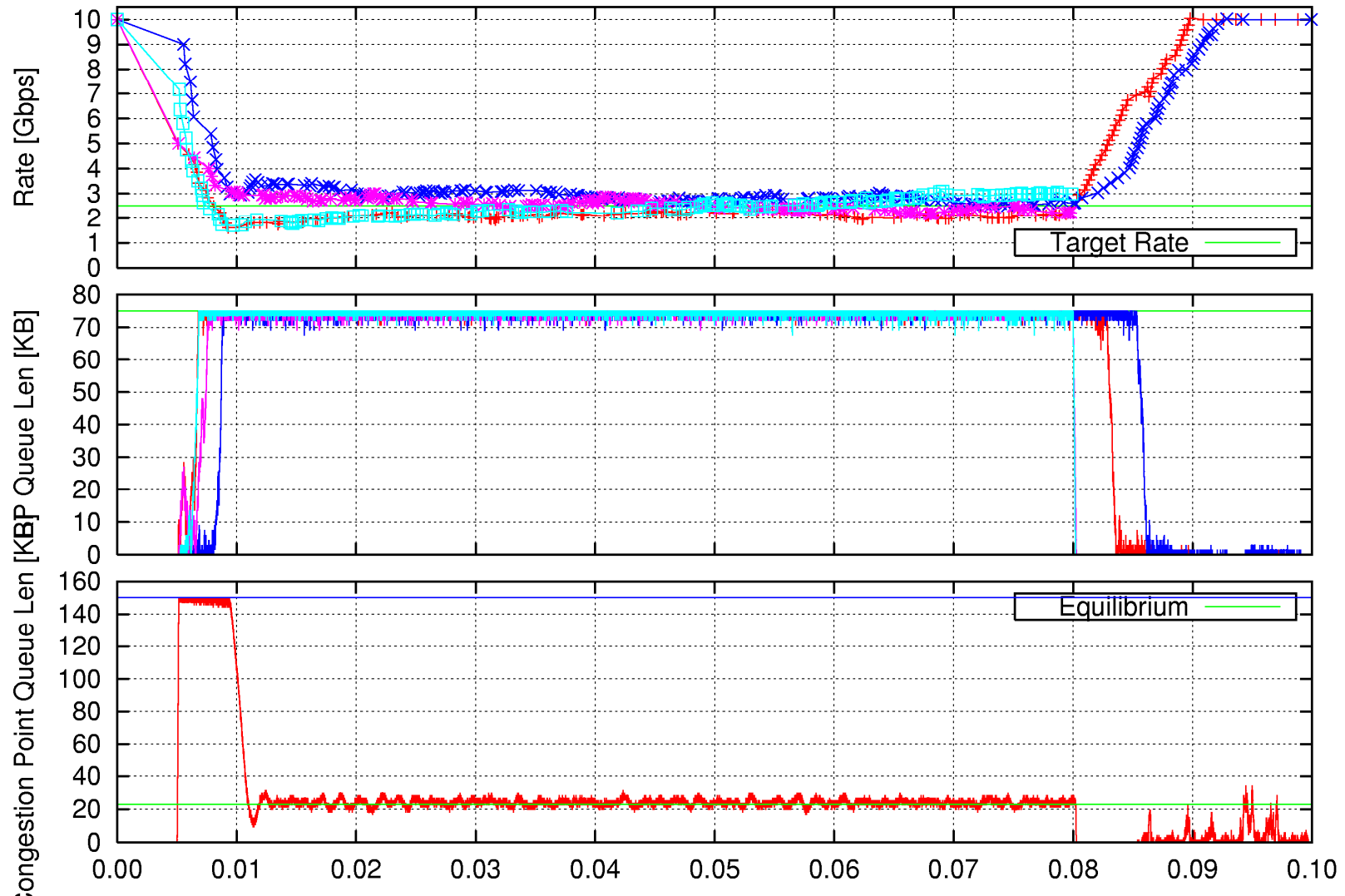
  See diagram on slide 8 and 9

Throughput & Fairness

- **Target Rate = 2.5 Gbps**

- **Normalized deviation from Target**

```
Run          Max            Min            Mean           FI
----------------------------------------------------------------
27923        0.24           0.01           0.11           0.98
27782        0.30           0.06           0.15           0.97
27611        0.13           0.02           0.06           0.99
27434        0.09           0.00           0.04           1.00
27267        0.10           0.01           0.06           1.00
27096        0.14           0.09           0.11           0.99
26929        0.16           0.13           0.15           0.98
26816        0.21           0.03           0.13           0.98
26645        0.25           0.11           0.17           0.97
26470        0.19           0.03           0.11           0.98

Max Dev = 0.30    Avg Max = 0.18    Avg FI = 0.98
```

Buffer Utilization (Run 27434)

Buffer Utilization (Run 26645)