
Towards a common TCP test-suite

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+ others by teleconference

Outline

- Objectives
 - What will a test suite achieve?
 - Design space
 - What do we specify?
 - Summary of tests
 - Implementations
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Roundtable

- Outcome of a meeting at Caltech
 - November 2007
 - Plus subsequent email discussions
 - Authors \approx those physically present
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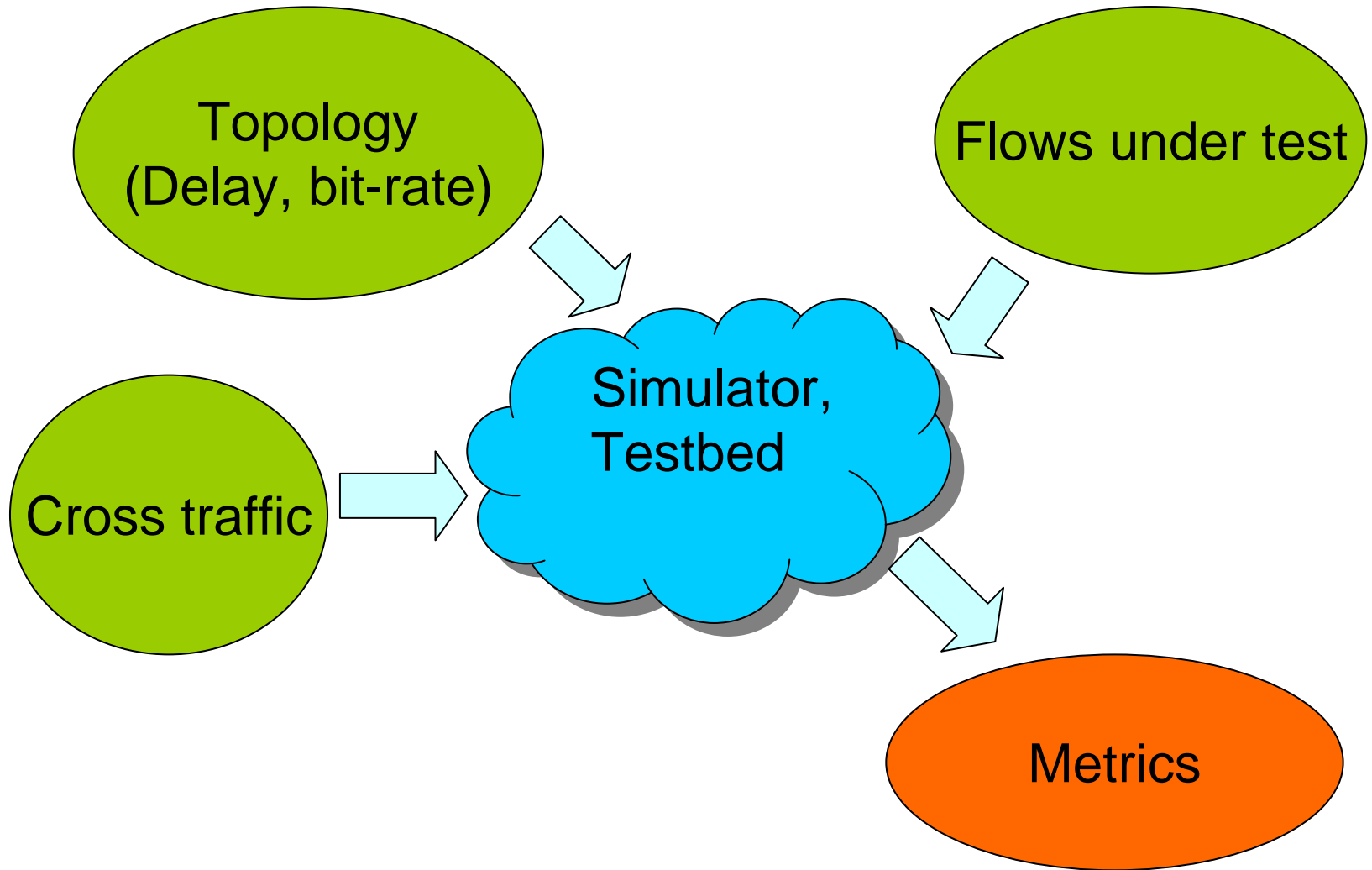
Objectives

- Reality-check for new TCP mechanisms
 - Standardized to facilitate comparisons
 - Publicly available implementations
 - Realistic scenarios
 - Small – “three days’ simulation”
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Issues

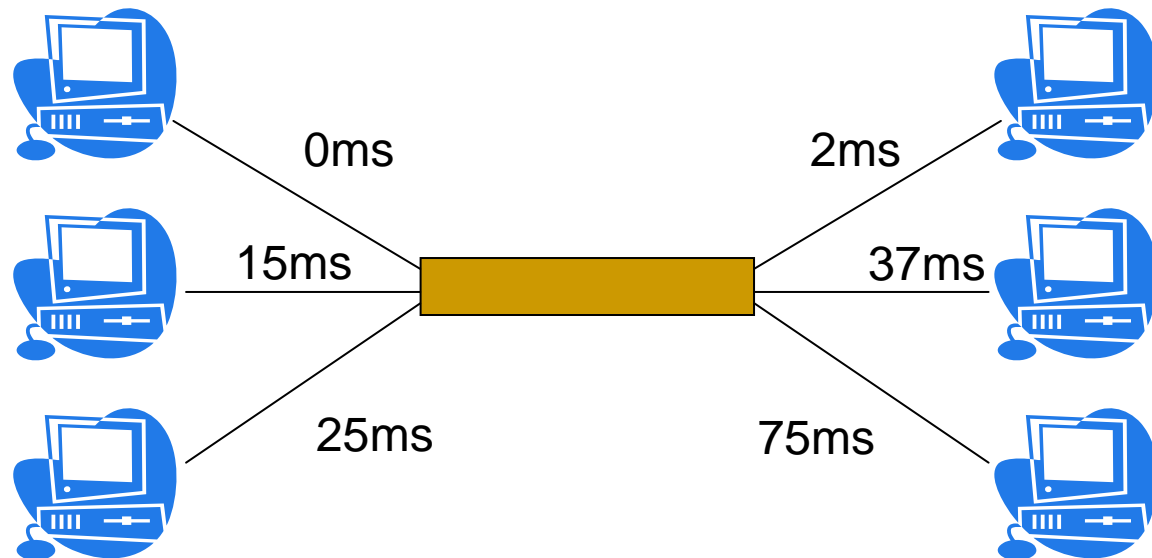
- Reductionism vs realism
 - Statistical reliability vs simulation time
 - Implementability
 - Testbed constraints, simulation speed
 - Not tailoring to specific testbeds
 - Equilibrium vs overload
 - Summarising data vs many graphs
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Design space



Topology

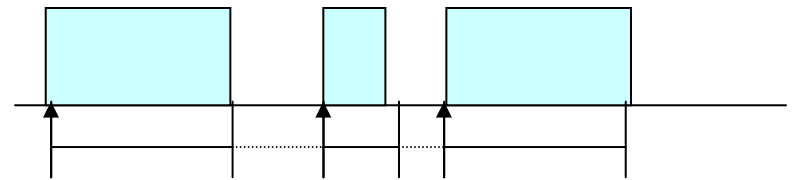
- Dumbbell (central link not always bottleneck)
- Delays seek to match measurement
 - Depend on setting / rate / congestion?



(Cross) Traffic model

- Important for realism
- Want load independent of algorithm

- Can't use on-off sources
- Specify arrival times and durations
- Can talk of “x%” of traffic



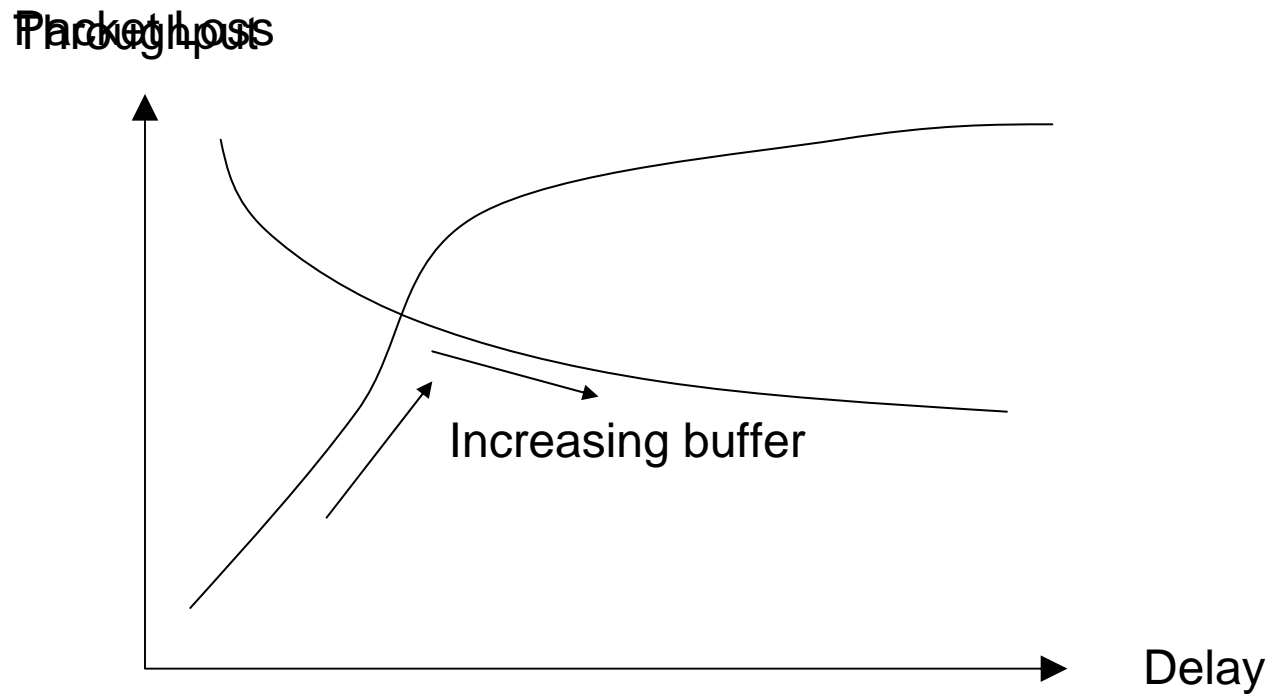
- Use common traces: allow comparison
- Bidirectional

Scenarios: Basic

- Dumbell, range of RTTs
 - Vary bit-rate, RTTs to reflect:
 - Data centre
 - Access link
 - Trans-oceanic link
 - Geostationary satellite
 - Wireless access
 - Dial-up
 - Range of buffer sizes
 - Congestion levels
 - All traffic “under test”
 - Utilization
 - Packet drop rate
 - Queueing delay
 - Completion time v size
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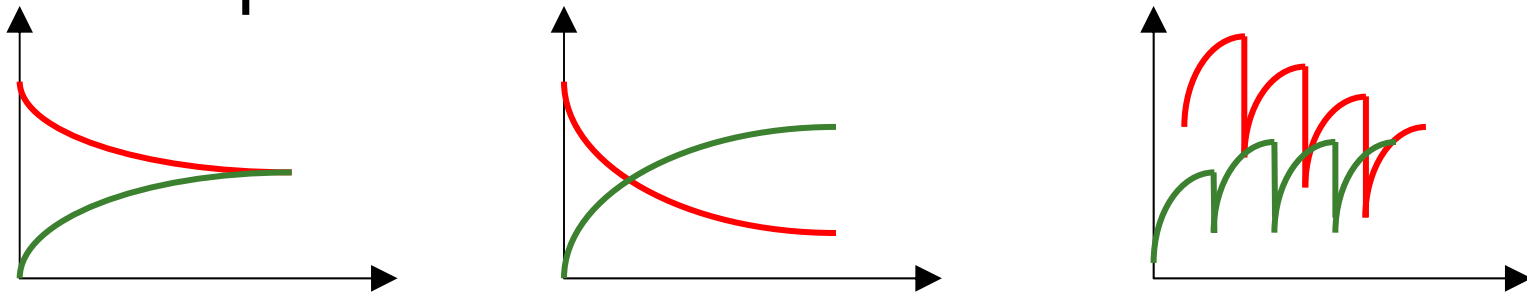
Scenario: Delay/throughput tradeoff

- Buffer size 10, 20, 50, 100, 200% BDP

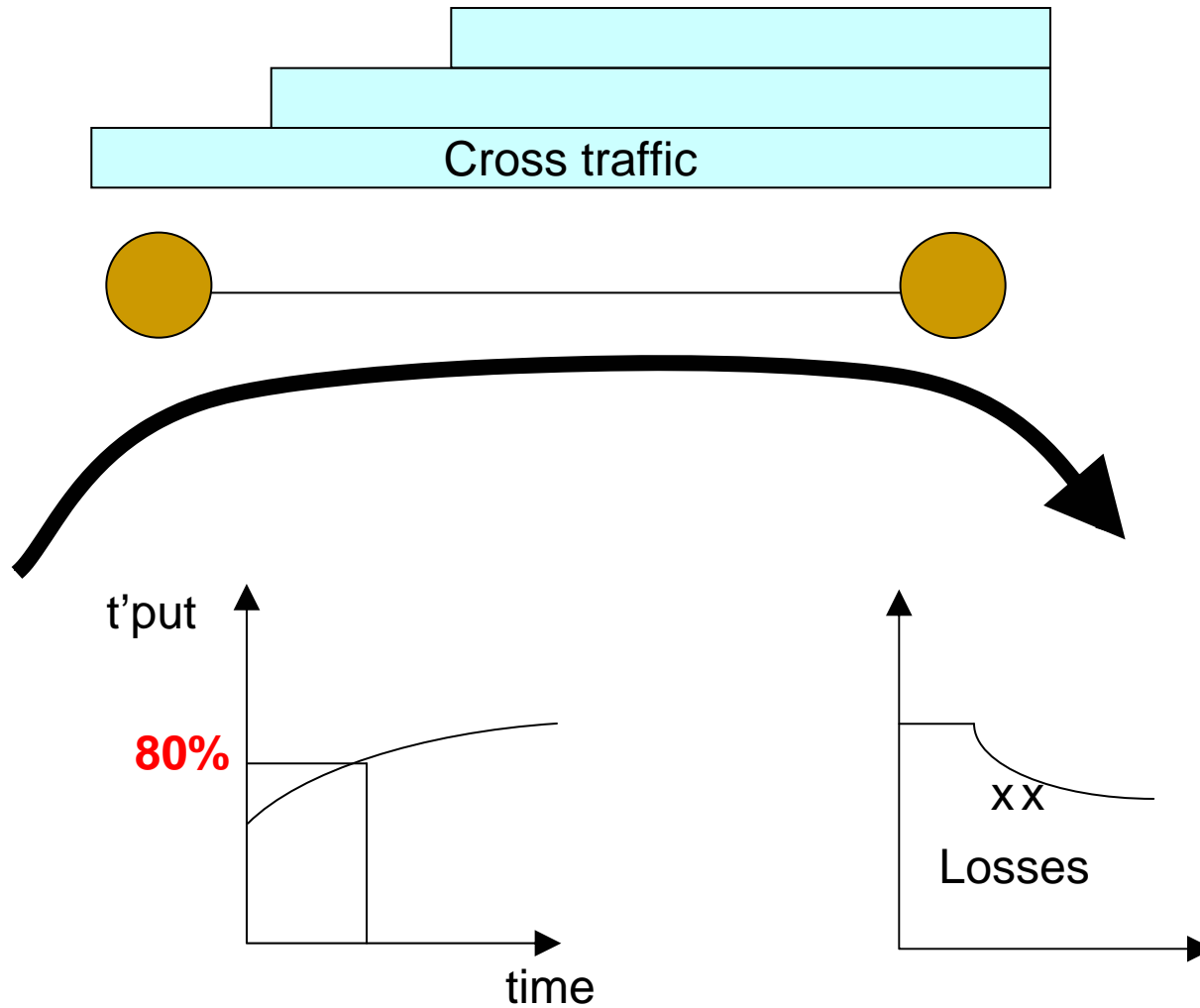


Convergence time

- Time until settled / equal rates
 - No. Might never happen. Might happen too soon
- Rate achieved by newly arriving flow
 - Time for x bytes to be sent
- Long flows, one starting (no slow start)
- Unequal RTTs

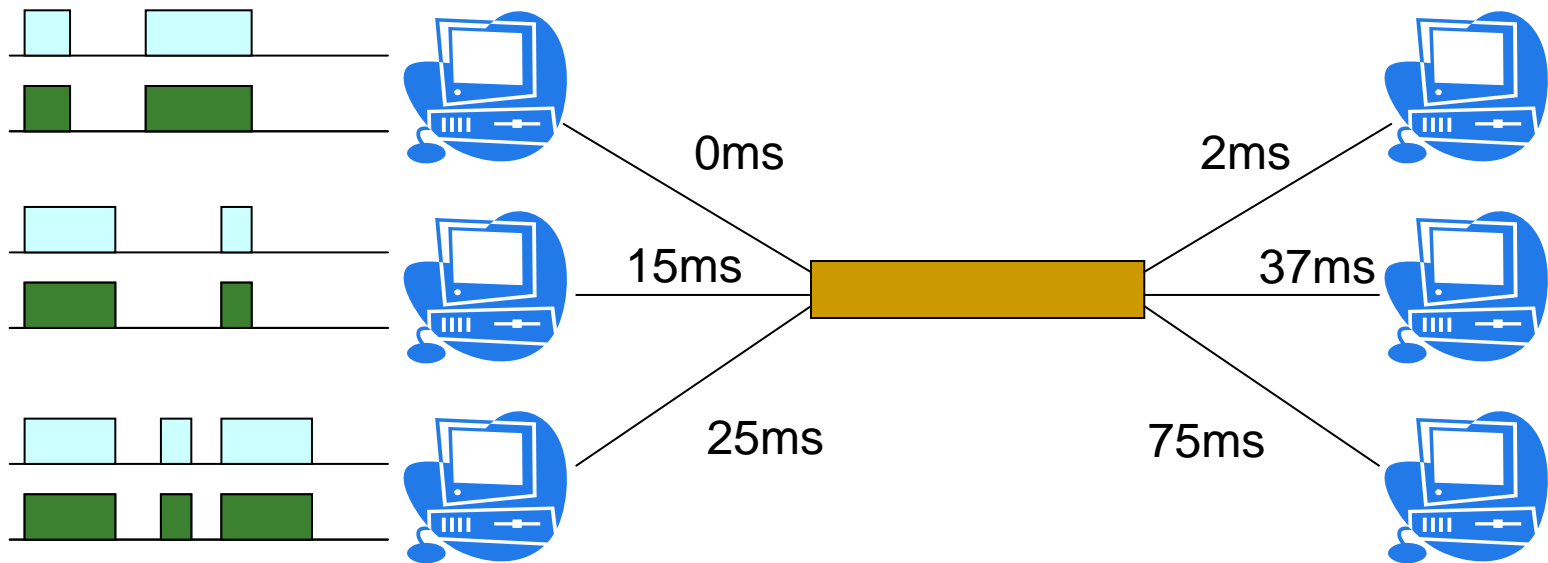


Scenario: Transients



Scenario: Impact on Reno

- Paired experiments with paired traffic
 - One Reno/Reno, one Reno/New



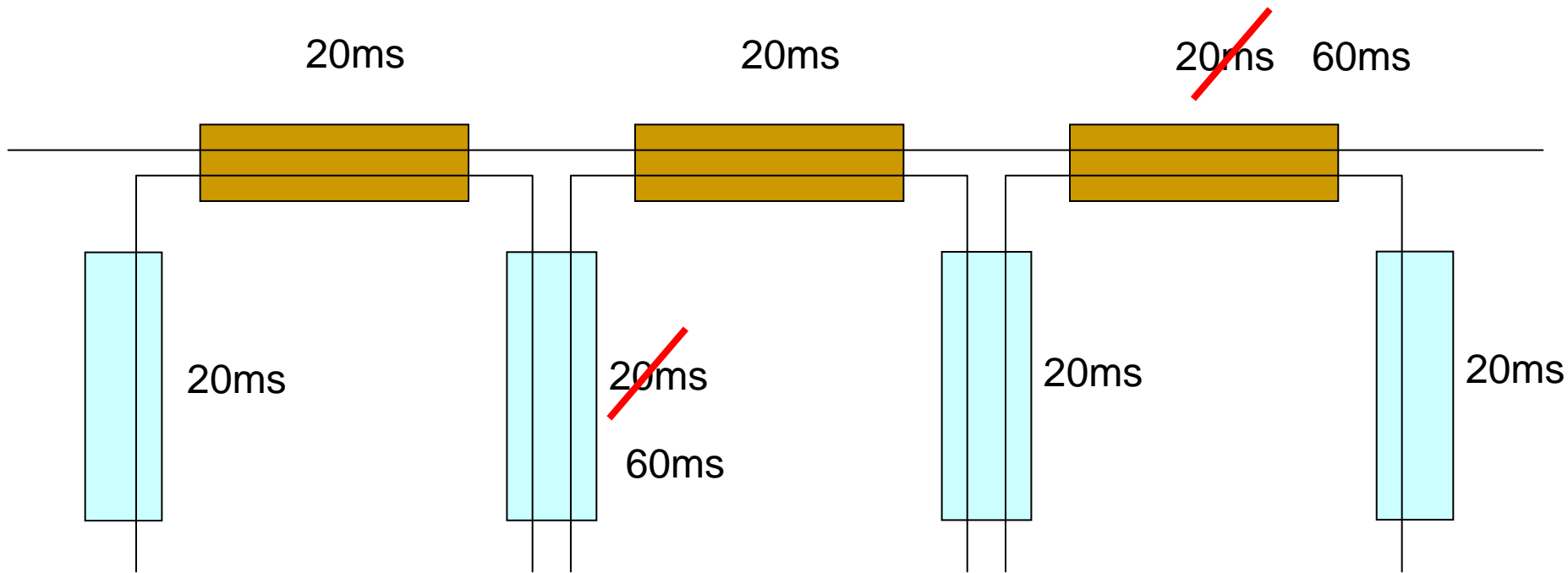
Scenarios: Intra-protocol/inter-RTT

- Two long-lived flows
 - Different start times
 - Same or different RTTs

 - Output: Ratio of throughputs
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Multiple bottlenecks

- Equal RTT, different bottleneck count
- Output: ratio of throughputs



Public implementations

- Work-in-progress
 - NS2
 - WAN-in-Lab
 - Grid-5000
 - Looking for volunteers
 - OmNet++
 - Opnet
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Future directions

- Hoping for measurement studies
 - More realistic traffic models
 - User response to congestion
 - Relation between properties (RTT, filesize) on congestion level
 - Better wireless model
 - Statistical reliability
 - >3day version
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Conclusion

- Call for feedback
 - Have
 - Topologies
 - Traffic loads
 - Metrics
 - Need
 - Specific traffic traces
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