Summary of draft-zhang-pcn-performance-evaluation and draft-charny-single-marking

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Outline and Scope

- **Performance comparison of admission control**

  - **Single-marking vs. draft-briscioe-style virtual-queue based admission**

    - **New results since last meeting**

- **Summary of Termination performance**

  - **The same algorithm for draft-brsicoe and single-marking**

- **Other single marking tradeoffs**

- **Impact of single marking on other drafts**

- **Note: recent proposals (draft-babiarz- and draft-westberg) need separate comparative evaluation**

  - **Work on alignment of performance criteria and simulation setups in progress**

High-level Results: Admission Control (Previously reported)

	Virtual Queue	Single Marking Admission
Marking Parameters	• **Ramp vs. Step: no difference** • **Upper/Lower Threshold: relatively insensitive**	• **Token Bucket Depth: Relatively insensitive**
Absolute or Relative RTT Difference	No Effect on bottleneck utilization	No Effect on bottleneck utilization
EWMA weight and CLE	Insensitive	Relatively Insensitive

# High-level Results: Admission Control (New in these drafts)

	Virtual Queue	Single Marking Admission
Ingress-Egress Aggregation	No effect	• Over-admission at low aggregation (synchronization effect) • Sensitive to bursty flow arrivals at low aggregations
Multi-Bottleneck	• No effect at bottleneck • Unfair to long-haul aggregates	• No effect at bottleneck • Unfair to long-haul aggregates

High-level Results: Termination Control

|	
Sanity check on SingleLink topology	Worked as Expected
RTT Difference	• Absolute Difference: No effect • Relative Difference: Visible over-termination, though not significant
Multi-Bottlenecks	Worked as Expected, long-haul aggregates are more affected
Ingress-Egress Aggregation	Visible over-termination at low aggregation (synchronization)

Marking Synchronization

- **Cause: for periodic traffic and certain parameter combinations marking is not well distributed among flows sharing the bottleneck**

  - **some flows are always marked and some are never marked**

  - **most relevant for CBR, but visible for near-CBR portions of other traffic types**

- **Relevant only to excess-rate token bucket marking/metering when ingress-egress aggregation is low**

  - **Detrimental to excess-rate admission: overadmission**

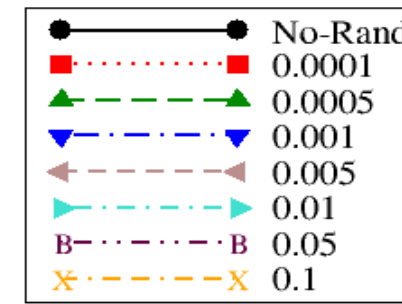 - **Beneficial to termination: less over-termination than theoretical worst case**
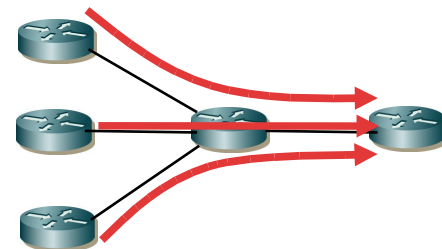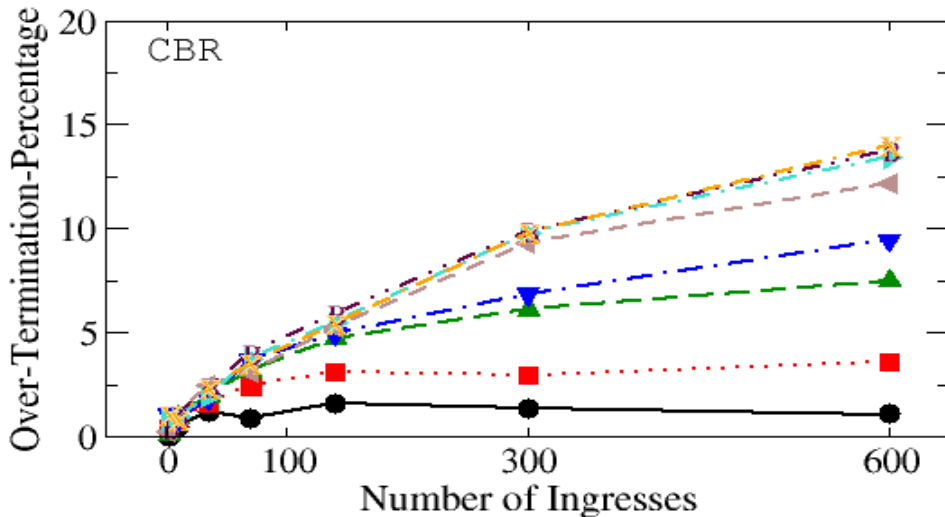
Is it a simulation artifact?
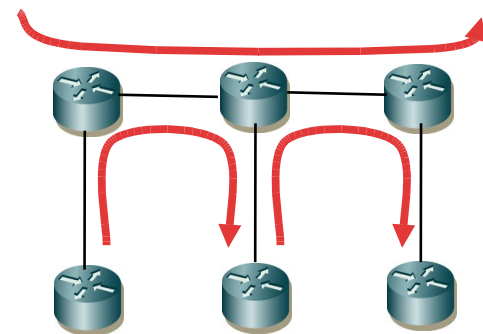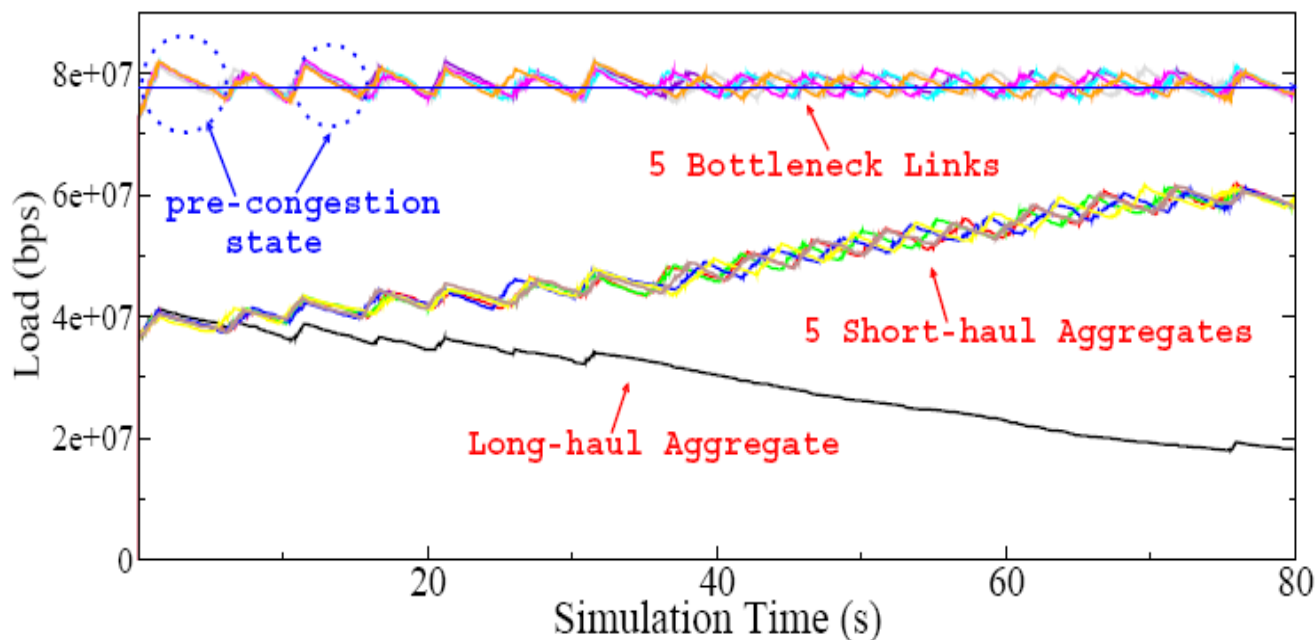
- **Probably Not!**
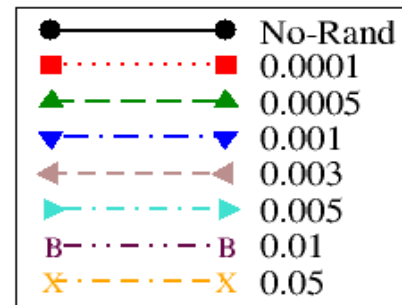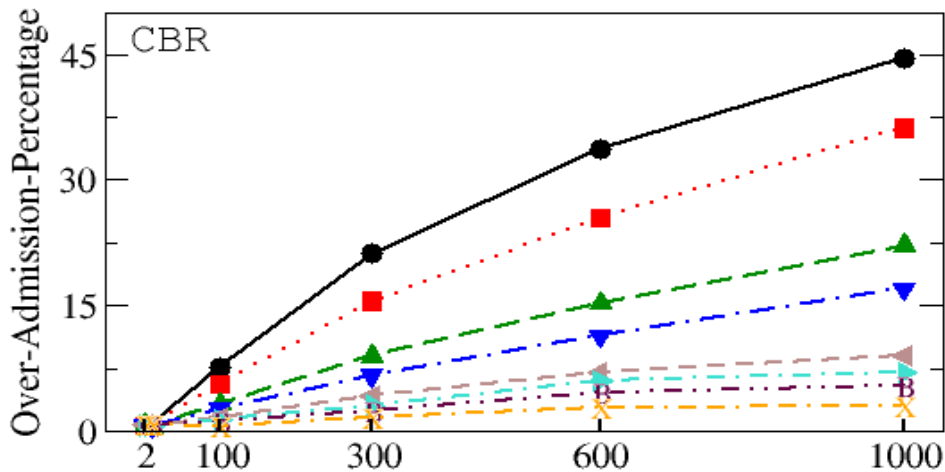
Single Marking
Admission

Termination

Multi-Bottleneck Admission
Unfairness to long-haul flows (Beat-Down Effect)

- **Common problem for Single-Marking and VQ admission**
  - is a known property of many MBACs and likely to be a problem for all other admission control proposals

- **Is probably of limited practical worry**
  - for its effect to be significant needs large demand overload of long duration
  - overload is not large under "normal" conditions
  - in exceptional condition utilization control is more important than fairness

Conclusions of Performance Evaluation

- **Admission**

  - **At reasonable ingress-egress aggregations (~10 flows or more) performance of both schemes is comparable**

  - **At low ingress-egress aggregation single marking performance degrades**

    - **over-admission**

    - **sensitivity to call arrival assumptions**

  - **Both schemes unfair to long-haul flows for Multi-Bottleneck**

- **Termination**

  - **Performs as advertised in most scenarios**

  - **Occasional over-termination – but typically tolerable**

Single Marking Tradeoffs

- ## Pros (or why we may want single marking)

    Single codepoint

    One metering/marking scheme in the forwarding path of core equipment

    Easy (easier?) deployment path

    Can be viewed as an intermediate step for dual-marking

- ## Cons (or why we should not do just single marking):

    some configuration restrictions

    unclear how to do anti-cheating in multi-domain case

    lower accuracy in the multipath case

    some traffic engineering tradeoffs

    some performance tradeoffs at very low ingress-egress aggregation levels

Impact on PCN Architecture and Encoding Documents

- ## Architecture

  No changes to architecture required in the core

  Addition of a single configuration parameter at the edges

  already planned for inclusion in the architecture draft

  Proposed optional renaming of marking-related terms

- ## Encoding

  Any encoding choice suitable for dual marking works for single-marking

  Allows additional encoding options

  already in the current encoding draft

What Next?

- **WG needs to decide whether single-marking needs to be allowed/accomodated in various WG documents.** *We argue – YES!*

- **This is part of more general decisions: which/how many of the proposed approaches should be chosen?**

  Need definition/performance criteria to aid the decision process (work in progress)

- **Smaller decision: should naming of the marking be associated with function (admission/termination) or semantics (excess rate/queue threshold/excess-rate-proportional/other). *We argue naming should reflect semantics to help interoperability if more than one marking algorithm can support a given function***

Relationship to Other PCN Proposals

- ## Core functionality

  a subset of core functionality needed for draft-brisoe

  a special case of core functionality required for termination of draft-babiarz

  coexistence with draft-westberg to be understood

- ## Edge functionality

  a trivial superset of the edge functionality of draft-briscoe

  differs substantially from edge functionality of draft-babiarz and draft-westberg