Performance Evaluation of PCN-Based Admission Control

http://www3.informatik.uni-wuerzburg.de/staff/menth/Publications/Menth08-PCN-AC.pdf

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Overview

- Edge behaviors for admission control
  - Congestion level estimate based AC (CLEBAC)
  - Observation-based AC (OBAC)
- Metering and marking in the core
  - Excess marking
  - Threshold marking
- Performance results
- Summary
CLEBAC and OBAC

- Ingress-egress aggregates (IEAs)
  - State K (block, admit)

- CLE-based admission control (CLEBAC)
  - Measurement intervals $D_{MI}$
  - CLE = “marked bytes” / “all bytes” per IEA
  - After $D_{MI}$, state K switched to
    - block when CLE exceeds $T_{AStop}$
    - admit when CLE falls below $T_{ACont}$

- Observation-based admission control (OBAC)
  - State K is switched to
    - block when a marked packet is observed
    - admit when no marked packet has been observed for time $D_{block}$
Experiment Setup

- Bursty traffic
  - Packet size: $E[B]=1000$ bytes
  - Interarrival times: $E[A]=100$ ms
- $n \sim 100$ independent traffic sources over bottleneck link
- Admissible rate $AR = 100$ flows
- $n$ and 10 flows in studied IEA
CLEBAC with Threshold Marking

- False AC decisions
  - Few false negatives ($n \leq 100$)
  - Few false positives ($n > 100$)

- Little impact of parameters

![Graphs showing flow blocking probability vs. number of flows for different IEA values with D_MI = 100ms. The graphs compare $\frac{AC}{CLE}$ and $\frac{AC}{AClear}$ with marked points indicating different thresholds.]
OBAC with Threshold Marking

- False AC decisions
  - Many false negatives ($n \leq 100$)
  - Few false positives ($n > 100$)

- Little impact of parameters
CLEBAC with Excess Marking

- False AC decisions
  - Few false negatives \((n \leq 100)\)
  - Many false positives \((n > 100)\)
- Little impact of parameters
OBAC with Excess Marking

- False AC decisions
  - Few false negatives ($n \leq 100$)
  - Many false positives ($n > 100$)
- Significant impact of parameters

![Graphs showing flow blocking probability vs. number of flows for different $D_{\text{min}}$ and $D_{\text{block}}$ values.](image)

IEA=n

IEA=10
Summary

4 Combinations
- 2 edge behaviors: CLEBAC, OBAC
- 2 marking behaviors: excess rate marking, threshold marking

Findings
- Threshold marking
  - Any edge behavior works fine
  - Also for small IEAs (10 flows)
- Excess marking
  - Many false positives, danger for flash crowds
  - Big problem for small IEAs (10 flows)
  - Usefulness?
  - OBAC not good, but better than CLEBAC

No figures
- OBAC blocks faster than CLEBAC
- Important for flash crowds