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PCN-Based Marked Flow Termination

http://www3.informatik.uni-wuerzburg.de/staff/menth/Publications/Menth08-PCN-MFT.pdf
http://tools.ietf.org/wg/pcn/draft-menth-pcn-emft-00.txt

www3.informatik.uni-wuerzburg.de

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Overview

- Motivation
- Mechanisms
- Performance
- Summary

Marked Flow Termination (MFT)

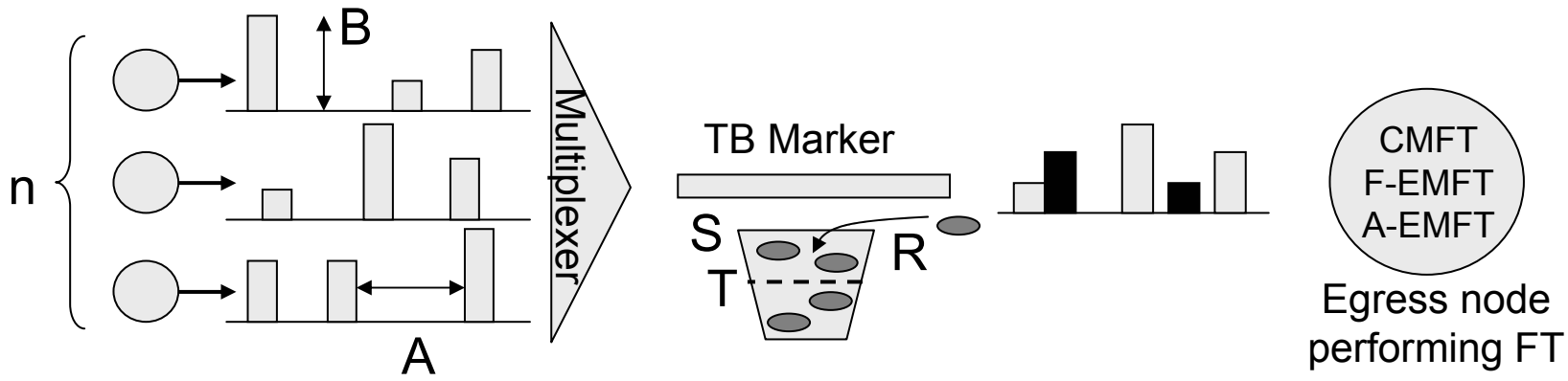
- Terminates flows with marked packets
  - Gradual termination process
  - Copes well with ECMP
- Problem: too aggressive
- 2 solutions
  - Core-assisted MFT (CMFT, 3sm)
    - Marking frequency reduction in core nodes
      - Fewer packets get marked
      - Terminate any flow with marked packets
  - Edge-assisted MFT (EMFT)
    - Egress nodes terminate only some marked flows

Edge-Assisted MFT (EMFT)

- Flow-based EMFT
  - Applicable for end-to-end PCN
  - Credit counter per flow
    - Random initialization
  - Marked bytes reduce credits
  - Credit counter ≤ 0
    - Terminate flow
- Aggregate-based EMFT
  - Applicable for PCN domain
  - Credit counter per IEA
    - Random initialization
  - Marked bytes reduce credits
  - Credit counter ≤ 0
    - Terminate one flow of the IEA
    - Increase credit counter proportionally to rate of terminated flow

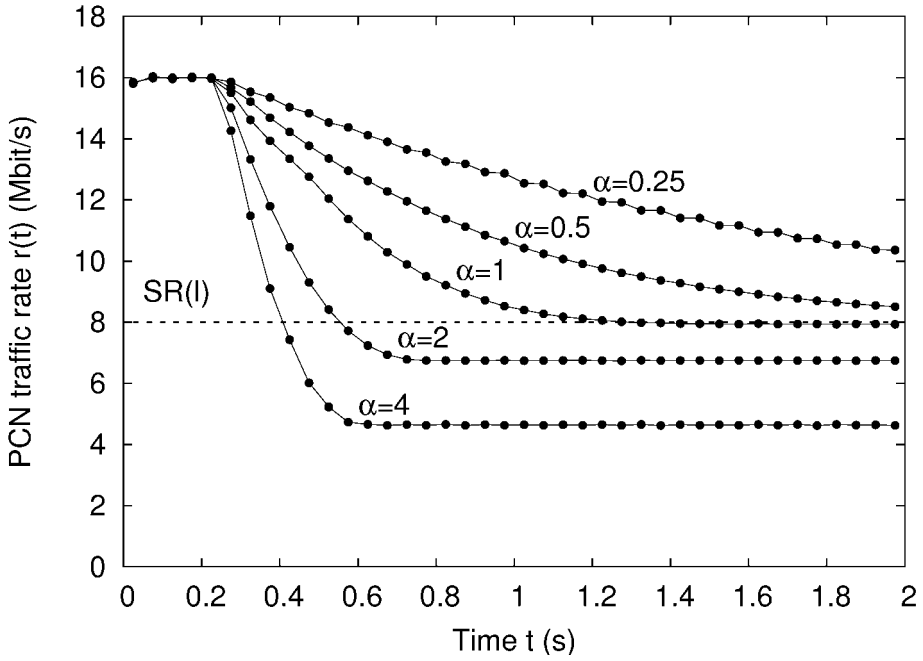
Experiment Setup

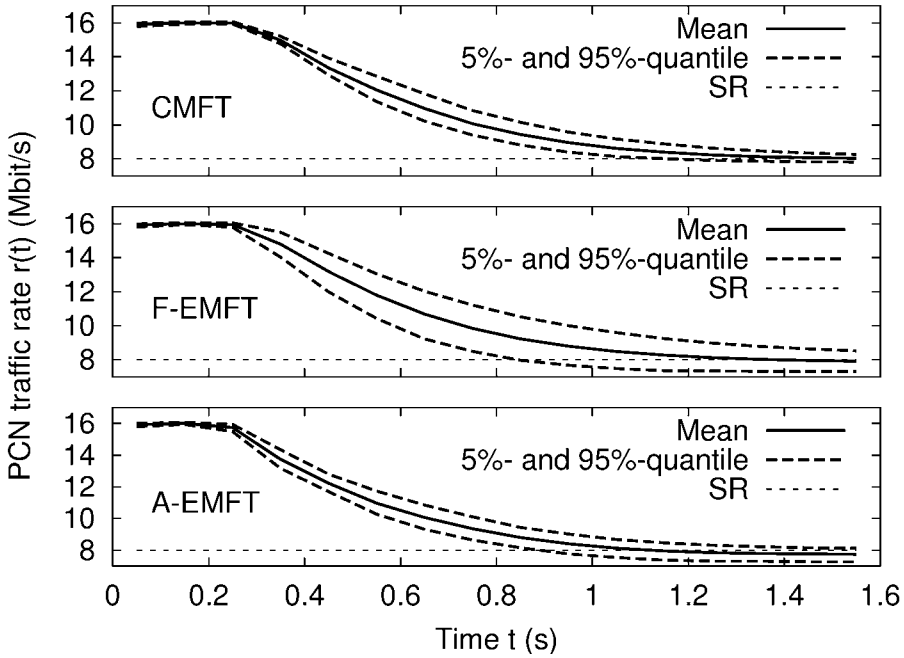
- n independent traffic sources
- Bottleneck link
  - Termination rate 100 flows
  - Overload 100%
  - No packet loss
- Flow termination delay: D_T=200ms



Termination Aggressiveness α

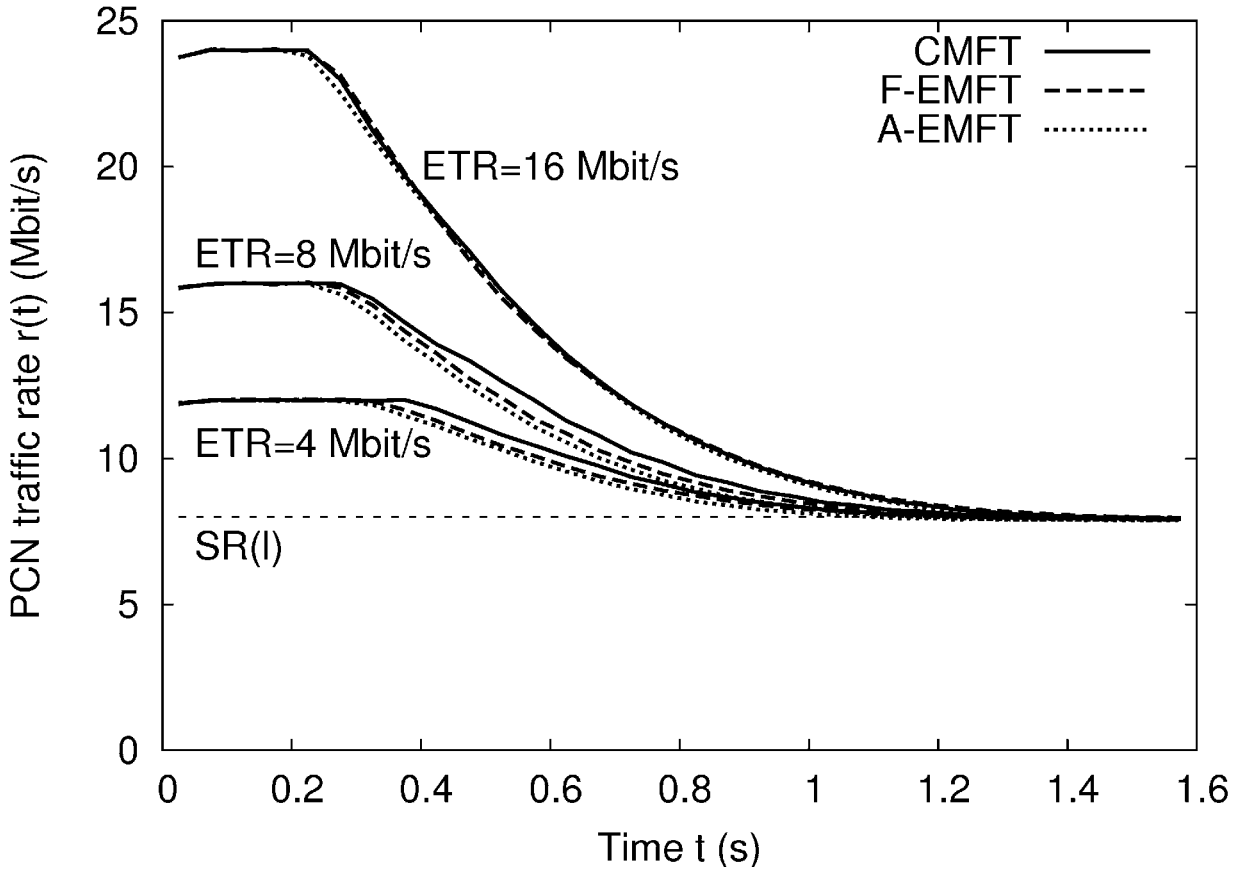
- CMFT: α controls marking frequency reduction in core
- EMFT: α controls initialization and increments of credit counters
- Termination speed increases with α
- Overtermination avoided for α≤1





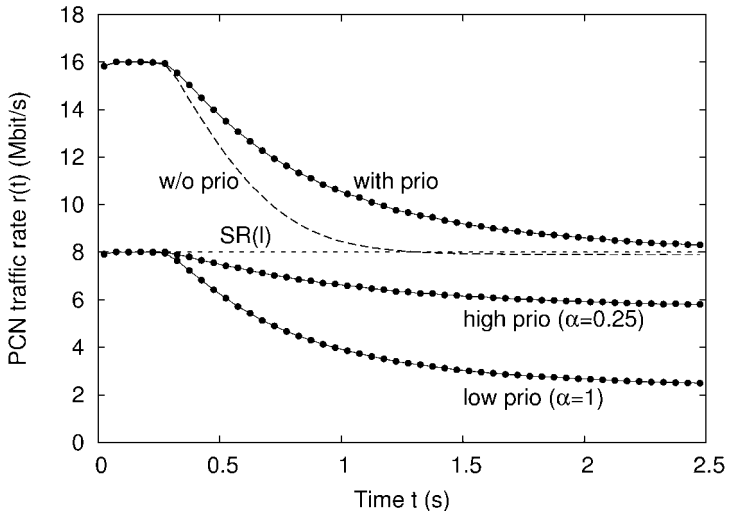
Impact of Overload

- Fast termination also for large overload
- Packet loss not simulated



Differences of MFT Variants

- All methods
  - Flow termination delay impacts termination speed
  - No unfairness
- CMFT
  - Termination speed depends on packet frequency of flows
  - No termination priorities possible
  - Allows anti-cheating for end-to-end PCN
- Flow-based EMFT
  - Suitable for end-to-end PCN
  - Termination priorities possible (α=0.25, 1.0)



- Aggregate-based EMFT
  - Suitable for PCN domains
  - Termination policies possible

Summary

- Marked flow termination (MFT)
  - Core-assisted MFT
  - Edge-assisted MFT
    - Flow-based (end-to-end PCN)
    - Aggregate-based (PCN domain)
  - Simple edge behaviors

- Termination behavior well understood
  - Aggressiveness α
  - Self-correcting mechanism
  - Invariant to many system parameters
  - What's missing in the study: severe overload and packet loss