# On the Treatment of Application-Limited Streams

Andreas Petlund, Anna Brunstrom,
Jonas Markussen, Markus Fuchs


[ simula . research laboratory ]

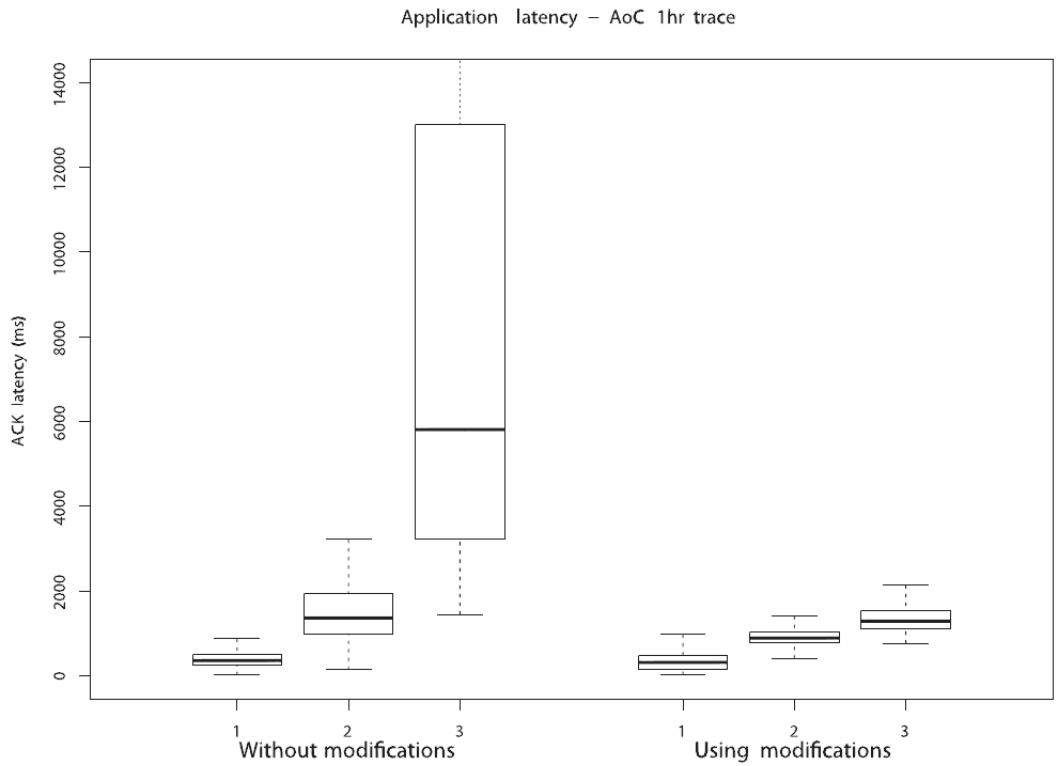
TECHNISCHE UNIVERSITÄT
KAISERSLAUTERN

R / TE
REDUCING INTERNET TRANSPORT LATENCY

# Application-limited streams

- Send rate is limited by the application rather than by congestion control
  - E.g. Massively multi-player on-line games (MMORPG)
- Latency is the key performance metric and the delay of each individual message is important
- When reliable transport is used, loss recovery may contribute significantly to latency
- Redundancy and more aggressive retransmissions can help
  - Perform fast retransmit on the first dupACK (mFR)
  - Up to 6 retransmissions without RTO backoff (LT)

# Gain from more aggressive retransmissions

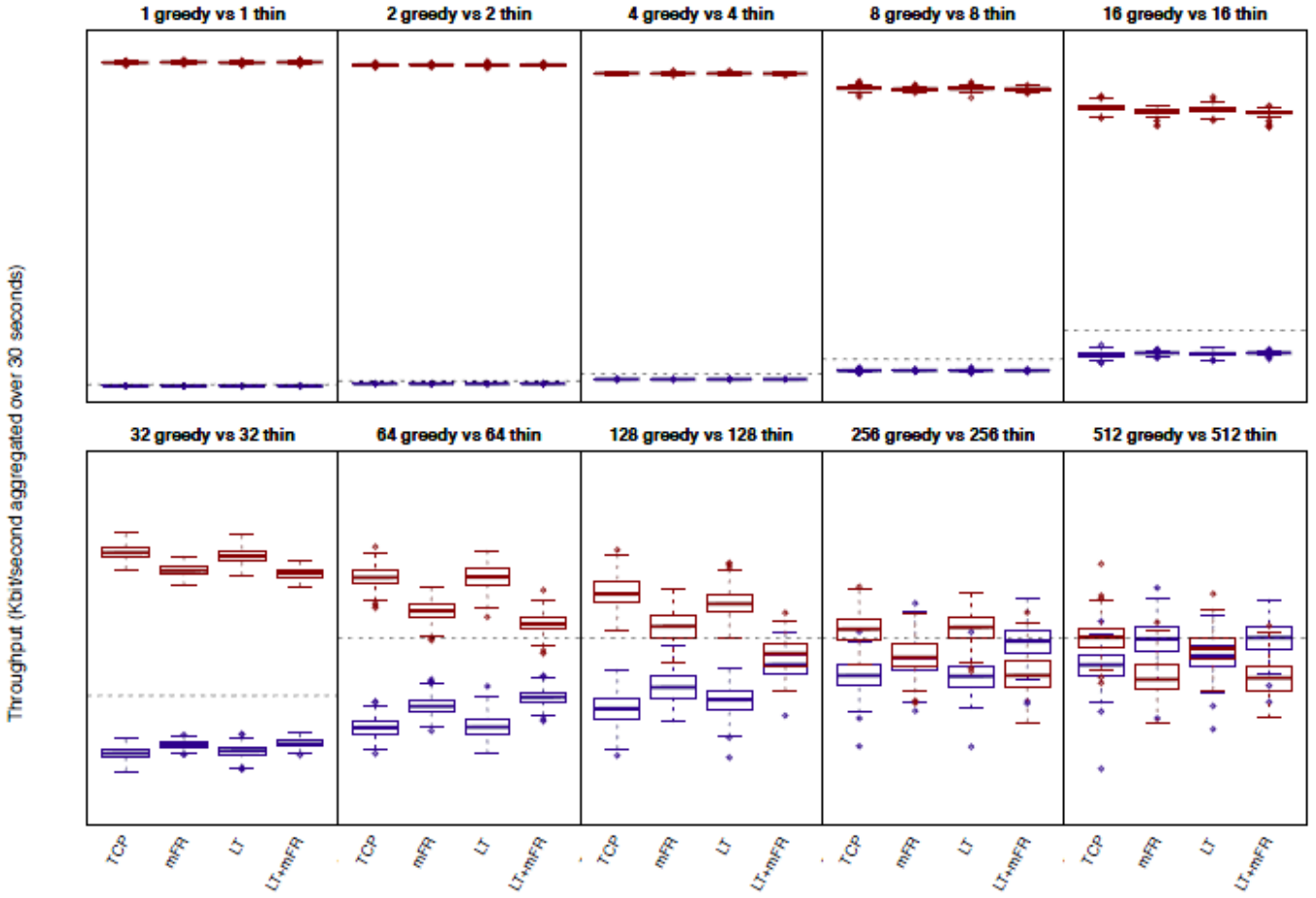



Live game server evaluation of recovery optimizations


# Application-limited streams

- Send rate is limited by the application rather than by congestion control
  - E.g. Massive multi-player on-line games (MMORPG)
- Latency is the key performance metric and the delay of each individual message is important
- When reliable transport is used, loss recovery may contribute significantly to latency
- Redundancy and more aggressive retransmissions can help
  - Perform fast retransmit on the first dupACK (mFR)
  - Up to 6 retransmissions without RTO backoff (LT)
- Proposals that advocate more aggressive behaviors are often met with skepticism based on fairness arguments

# So are they really unfair?



# Conclusions and open issues

- Need for latency is application dependent
  - All streams are not the same
- Redundancy and more aggressive retransmissions is a viable option for application-limited streams
  - Use of push anticipation
- Unfairness is not an argument (even if fairness was a valid metric)
  - Application-limited streams are at a disadvantage when sharing resources with greedy streams

- How much redundancy / aggression should we use?
- How much knowledge of application semantics is needed?