Mind the Gap: Towards a Backpressure-Based Transport Protocol for the Tor Network

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KEEP CALM AND USE Tor
#bufferface
End-to-End

Multiplexing

Overlay

Underlay
Loooooong queues are possible
The Problem with Fixed Windows

![Graph showing the relationship between end-to-end rate and end-to-end RTT for Tor (250kB) and Tor (500kB).]
The Problem with Fixed Windows

![Graph showing the relationship between window size and end-to-end RTT.]
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BackTap: Backpressure-Based Transport Protocol
hop-by-hop flow/congestion control
► yet another queue
► minimize queue lengths/ queuing delays
► delay-based window adjustment à la TCP Vegas

\[ \text{diff} = \text{swnd} \cdot \frac{\text{actualRtt}}{\text{baseRtt}} - \text{swnd} \]

► additive increase additive decrease (AIAD)
- UDP-based
- hop-by-hop feedback
- ACKs separate from FWDs
- delay-based congestion control
- joint congestion control

- nstor: a Tor module for ns-3
- BackTap prototype
- related approaches (PCTCP, N23)
Evaluation (single circuit — rate)
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Evaluation (Responsiveness)

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Evaluation (Web Traffic)

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Conclusion

1. reason for performance problems: fixed end-to-end window + feedback gap

2. proposed solution: Backpressure-Based Transport Protocol (BackTap)