

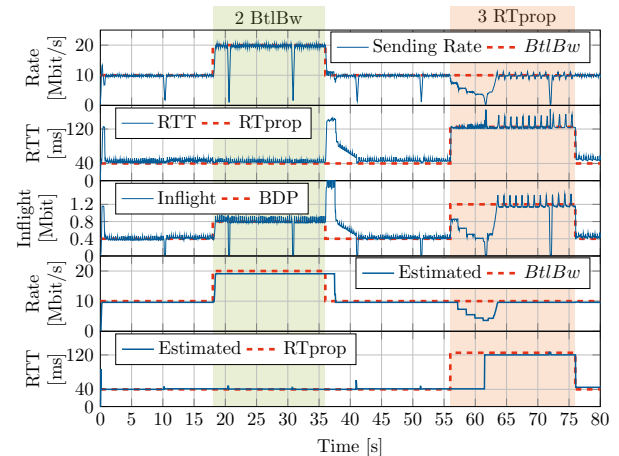
Evaluation of TCP BBR v2

Motivation

In 2016 Google presented a new congestion control algorithm called TCP BBR (Bottleneck-Bandwidth and Round-trip time) [1]. Other than widely used loss-based algorithms, BBR follows a model based approach estimating the optimal sending rate and amount of data inflight. Google deployed BBR on parts of the youtube.com and google.com servers and inside their backbone network with promising results.

However, several publications also show weaknesses of BBR, e.g. high retransmission rates with shallow buffers, RTT unfairness, unfairness against loss-based algorithms, long synchronization delays.

To face these problems Google announced BBR v2 in 2018 which widely changed the initial behavior. Although, slides and code [2, 3] are available for BBR v2, there is no draft describing its behavior in detail yet. According to the developer this will be done once BBR v2 reached a stable state.



[1] N. Cardwell, Y. Cheng, C. S. Gunn, S. H. Yeganeh, and V. Jacobson, "BBR: Congestion-based Congestion Control," *ACM Queue*, vol. 14, no. 5, 2016.

[2] "BBR Development." <https://groups.google.com/forum/#!forum/bbr-dev>. Accessed: 2019-11-11.

[3] "TCP BBR v2 Alpha/Preview Release." <https://github.com/google/bbr/tree/v2alpha>. Accessed: 2019-11-11.

[4] D. Scholz, B. Jaeger, L. Schwaighofer, D. Raumer, F. Geyer, and G. Carle, "Towards a Deeper Understanding of TCP BBR Congestion Control," in *IFIP Networking 2018*, (Zurich, Switzerland), May 2018.

Requirements

- Experience in working with Linux and kernel compilation
- Python and Bash programming skills

Your Task

- Understand how BBR and BBR v2 work in detail
- Compile Linux kernel with BBR v2 [3]
- Reproduce the results from [4] as ground truth (use existing Mininet code)
- Repeat all tests with BBR v2 and compare the results to vanilla BBR
- Evaluate improvements or deteriorations
- Extend measurements if not all modifications of BBR are evaluated

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