BBR Congestion Control Draft

draft-ietf-ccwg-bbr-01

Internet Draft Editors:

Neal Cardwell (Google), Ian Swett (Google), Joseph Beshay (Meta)

Speaker: Neal Cardwell

Outline

Overview

- Outline BBR Internet Draft updates
- Summarize open issues

Goals for this talk:

- Provide a road map for...
  - Readers of the draft
  - Implementers of BBR reading the draft
  - Members of the CCWG/ICCRG community who would like to contribute
- Inviting the community to…
  - Read the draft
  - Contribute to the draft

Overview of draft-ietf-ccwg-bbr-01

- BBR was adopted a CCWG WG item in October
- Intended status: experimental RFC
- IETF CCWG members are collaborating on github:
  - https://github.com/ietf-wg-ccwg/draft-ietf-ccwg-bbr
- Latest published revision is at:
  - https://datatracker.ietf.org/doc/draft-ietf-ccwg-bbr/
- Latest editor's copy (with hot-off-the-press changes not in published revisions above):
  - https://ietf-wg-ccwg.github.io/draft-ietf-ccwg-bbr/draft-ietf-ccwg-bbr.html
- Draft editors:
  - Neal Cardwell (Google)
  - Ian Swett (Google)
  - Joseph Beshay (Meta)

Changes in draft-ietf-ccwg-bbr-01: summary

- Previous version was: draft-cardwell-ccwg-bbr-00, discussed at IETF 120 in July, 2024 [slides]
- Diffs: [text diff between draft-cardwell-ccwg-bbr-00 and draft-ietf-ccwg-bbr-01]
- Main changes between draft-cardwell-ccwg-bbr-00 and draft-ietf-ccwg-bbr-01:
  - Renamed draft & repo: individual draft draft-cardwell-ccwg-bbr => WG item draft-ietf-ccwg-bbr
  - Converted source text from XML to Markdown (thanks, Carsten Bormann!)
  - Clarifications
  - Spelling fixes
  - Pseudocode style fixes
  - Removed mentions of specific products/sites where BBR was tested
  - Updated/added/fixed details in references (URLs, etc)

Changes in draft-ietf-ccwg-bbr-01: how to view

- To see changes between draft-cardwell-ccwg-bbr-00 and draft-ietf-ccwg-bbr-01:
  - From the command line:
    - git clone https://github.com/ietf-wg-ccwg/draft-ietf-ccwg-bbr.git
    - cd draft-ietf-ccwg-bbr/
    - git log draft-cardwell-ccwg-bbr-00..draft-ietf-ccwg-bbr-01
  - From github.com: https://github.com/ietf-wg-ccwg/draft-ietf-ccwg-bbr/commits/main/

Changes in draft-ietf-ccwg-bbr-01: commits

- 14 commits between draft-cardwell-ccwg-bbr-00 and draft-ietf-ccwg-bbr-01:
  - bbc5137 Reformat text lines to be 80 characters or less
  - b912be6 Merge pull request #3 from jbeshay/20240920
  - acbd8ca Clarifications and remove Youtube references
  - 7adf80a Emphasize pacing_gain as the primary control mechanism
  - 871539f add to Acknowledgments: Carsten Bormann, Pouria Mousavizadeh Tehrani
  - 4159875 Remove secs inside pseudocode of BBRPickProbeWait
  - 3f8e332 Make variable prefix names clearer
  - cc637f6 Switch from IRTF to IETF
  - 93905d7 update README.md: "Individual Draft" -> "Working Group Draft"
  - d1eb105 update README.md: draft-cardwell-ccwg-bbr -> draft-ietf-ccwg-bbr
  - 9525f2c switch from XML to MD, individual draft to WG item, draft-cardwell-ccwg-bbr.xml to draft-ietf-ccwg-bbr.md
  - a9eb2f4 fix BBR.loss_in_round() typo; this is a variable, not a function
  - 144adc9 rename update_windowed_max_filter to UpdateWindowedMaxFilter for consistency
  - fbb5bc1 fix: correct misspelling "que" to "queue"

Goals of evolving the BBR draft text

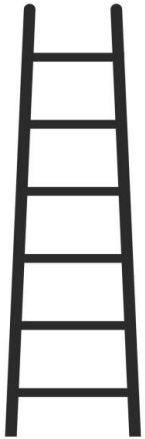
- Goals as we evolve the BBR draft text:
  - Clarification
  - Simplification
  - Better coexistence with Reno/CUBIC
  - Better performance
  - Avoiding performance regressions in the real world

Thoughts about ways to contribute

- Contributions at any "rung of the ladders" below are welcome!
- The higher on the "ladders" (the more concrete/specific/tested the contribution is)...
  - The more useful to the BBR draft effort
  - Given editor time constraints, the more likely the eventual inclusion in the draft
- To finalize significant algorithm changes, we'd like to ultimately reach the top rung of the ladder
- Collaboration encouraged: e.g., idea from person A, implemented by person B, tested by sites B/C

Editorial changes:

- Github pull request with draft text
- Github issue describing the idea
- CCWG email/meeting suggestion



Technical algorithm changes:

- Multiple at-scale Internet deployments
- At-scale Internet deployment data
- Lab/simulation experiment results
- Patch to an open-source BBR code base
- Github pull request with draft text
- Pseudocode
- Github issue describing the idea
- CCWG email/meeting suggestion

2 open pull requests: minor algorithm changes

- 2 open Github pull requests, both for algorithm changes:
  - Use consistent value for drain pacing gain which matches derivation doc
    - Proposes to change BBR DRAIN gain from 1/2.89 = 0.35 to 1/2 = 0.5
    - To match analytical derivation of DRAIN pacing gain, which derives 1/2 = 0.5
    - Under discussion
    - Have some performance A/B experiment data from Linux TCP YouTube experiments:
      - Unclear if there are statistically significant performance regressions
      - Would like to re-run an experiment to ensure there are no regressions
  - Remove BBR.ack_phase from pseudocode
    - A minor algorithm simplification
    - Under discussion
    - Has one implementation
    - We'd like
      - A second implementation
      - Internet performance data to verify there is no performance regression

1 open issue: generalization to non-TCP transports

1 open Github issue, for an editorial issue:

Talk about TCP and SACK less: generalization to non-TCP transports

The intent is to make the draft as transport agnostic as possible

A section will be added discussing ways a QUIC implementation may be different:

- Ideally this text will be implementation considerations, and not normative
- Could include other transports, such as SCTP if there is interest

Goal: Ensure implementation of BBR across as many transports as possible

Non-Goal: Create an universal approach for mapping any congestion control to any transport

Conclusion

- Inviting the community to...
  - Read the draft: draft-ietf-ccwg-bbr
  - Offer contributions/comments/edits, in whatever manner you prefer
- Thanks!