CCID5: An implementation of the BBR Congestion Control algorithm for DCCP

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https://www.ietf.org/id/draft-romo-iccrq-ccid5-00.txt
### Target
Extend DCCP with a new CC algorithm -> BBR

### Motivation
- All the current standardized algorithms for DCCP (CCID2, CCID3, CCID4) are loss-based
- Application to multipath scenarios where the latency difference among paths is a key factor -> Use BBR within MP-DCCP.

#### Background

<table>
<thead>
<tr>
<th>Development</th>
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#### Standardization
- Adopt existing and mature (TCP) BBR as a new CCID profile for DCCP.

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### Progress

#### Development
- BBR v1->CCID5 (for DCCP) -> Within the Linux kernel 4.14 -> available as open source.
- https://github.com/telekom/mp-dccp/blob/master/net/dccp/ccids/ccid5.c

#### Standardization
- Adopt existing and mature (TCP) BBR as a new CCID profile for DCCP.

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Early results

Single Path

- CCID5 shows significant improvement in terms of latency for both: single and multipath scenarios, when a BW limitation is imposed in the path
- In the multipath scenario, CCID5 also improves the scheduling performance
- Conceptual basis of TCP BBR as well as existing studies and results are valid for DCCP

Multi Path – UDP traffic over MP-DCCP

Further details can be found at: https://dl.acm.org/doi/10.1145/3472305.3472322
Clash of BBR requirements and DCCP features

➢ Tests in live network
  ▪ Deeper BW drops were found for CCID5 on ProbeRTT phase

➢ Analysis
  ▪ **BBR requirement:** Restoration of cwnd when leaving probeRTT phase
  ▪ **DCCP feature:** The big change in the cwnd requires a synchronization of the Sequence and ACK validity windows [RFC4340 section 7.5]

- The problem: The probeRTT phase duration acquires a latency dependency - The synchronization extends its duration at least one RTT
Clash of BBR requirements and DCCP features

➢ Temporary solution
- Pro-active update of local values even if the confirmation has not been received yet (feature negotiation not finished)

 Tests in live network
- After applying the change, the depth of the BW drops in CCID5 is reduced -> results comparable to BBR TCP

New or enhanced feature for Sequence Window negotiation in DCCP required?
➢ Adopt existing and mature (TCP) BBR as a new CCID profile
  ➢ All simulation and verification from TCP are kept valid for DCCP
  ➢ Main differences come from the unreliable nature of DCCP -> ACK definition
    https://www.ietf.org/id/draft-romo-icrge-ccid5-00.txt

➢ What would be the right please to discuss the Sequence window negotiation problem (slides 4 and 5)?
  ICCRG OR TSVWG?