Transport parameters for QUIC 0-RTT connections

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QUIC WG, IETF-109
The Proposal

• The idea in a nutshell
  • Remembering and exchanging additional parameters when reconnecting with 0-RTT
    • BW estimation based on inflight_data
    • RTT estimation based on min_rtt

• Use-case
  • Sharing server's estimation of path parameters so that clients can adapt their requests
  • Improving ramp up with 0-RTT on the server

• Several implementations
  • Ours using PICOQUIC with TLS1.3
  • Matt Joras' using “BDP_TOKEN”

• Short term objective:
  • Merge the proposed ideas in single revised draft
Expected Benefits

• Evaluations based on
  • draft-kuhn-quic-4-sat-06 scenarios
  • Implementation of draft-kuhn-quic-0rtt-bdp-07
  • Picoquic : https://github.com/private-octopus/picoquic/pull/1073

• Network characteristics:
  • 50 Mbps download / 10 Mbps upload
  • RTT : 650 ms

• Congestion Control (CC)
  • CUBIC
  • 0-RTT-BDP reaction:
    • Jump to a previously measured capacity
    • (not recommended, but “easy to implement” as a first step)
    • Beware of the potential issue in using bytes_in_flight metric

• Application level
  • 2 MB transfer - median

<table>
<thead>
<tr>
<th></th>
<th>Without 0-RTT</th>
<th>With 0-RTT</th>
<th>With 0-RTT-BDP</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>4,3 s</td>
<td>3,4 s</td>
<td>2,9 s</td>
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Open Discussion: Exchanging parameters

• BDP_TOKEN vs NEW_TOKEN
  • Any views?
Open Discussion: CC Reaction

• Avoid CC overshoots
  • Same security as max_initial_data
  • “"I received at 1 Gbps last time", when in fact it can only absorb 10 Mbps”
    • Need to add mechanism to protect the integrity when client pushes a token back

• Algorithm proposed in 0-rtt-bdp draft
  • If reception of IW is confirmed for the first RTT of data (no loss)
  • If path is “similar” to a recent previous session (e.g., similar RTT)
  • Then, a sender can use the previous path information as an input to help determine a new safe rate (e.g., with pacing)

• Questions ? Comments ?
Next Steps

• Discuss and agree on a method
  • Revise draft
  • Test
  • More feedback

• Revise draft to describe the solution
  • Add in the interop matrix