Putting the Spin Bit under the Microscope

work in progress

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• **Optional**, explicit RTT measurement signal in QUIC
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• **Spin bit** findings of our longitudinal QUIC web measurements (IMC ‘23 paper [1])
  ▶ Used by ~10% of domains with QUIC support and supported by ~50% of underlying hosts

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  - Only few domains always spin (which is good → mandatory disabling)
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- **Spin bit** findings of our longitudinal QUIC web measurements (IMC ‘23 paper [1])
  - Used by ~10% of domains with QUIC support and supported by ~50% of underlying hosts
  - Only few domains always spin (which is good → mandatory disabling)
    - But: limited methodology
  - Very accurate (diff < 25%) for one third of connections
    - But: very inaccurate (diff > 400%) for more than half of connections

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Digging into mandatory disabling compliance

- Extensions to our measurement pipeline
  - Selective checks of domains that spin
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Understanding the real-world RTT overestimations

- In-depth RTT estimation analysis
  - A more fine-grained view into the RTT estimations
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Impact of stack and configuration
- Testbed (parameter/configuration) study of different QUIC stacks
  - Do stacks & their configurations affect the RTT estimations?
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The Spin Bit at the Connection Start of Web Traffic

client

①

QUIC Handshake

②

HTTP Req./Resp. (Short header w. spin bit)

HTTP Request

HTTP Response
target
The Spin Bit at the Connection Start of Web Traffic

Client

①

QUIC Handshake

②

HTTP Req./Resp. (Short header w. spin bit)

HTTP Request

HTTP Response

QUIC ACK

QUIC ACK

Target
The Spin Bit at the Connection Start of Web Traffic

client

① QUIC Handshake

HTTP Req./Resp. (Short header w. spin bit)

② client

0 HTTP Request

0 QUIC ACK

0 HTTP Response

0 QUIC ACK

target
The Spin Bit at the Connection Start of Web Traffic

HTTP Req./Resp. (Short header w. spin bit)

① HTTP Request
② QUIC ACK

① HTTP Response
② QUIC ACK

ACK Delay

App. Delay
QUIC "Control Traffic" Patterns Impact Spin Bit Estimations

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  - Three investigated stacks, three different patterns
  - In general: beneficial for RTT estimations
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PING frames

- Force response (and immediately trigger spin flank)
- Possible result: RTT estimation neither corresponding to real RTT nor to application delay
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- **Planned next steps**
  - Testbed study to investigate impact/behavior of different stacks and parameterizations
Conclusion

- **Spin bit**
  - used in the wild
  - real-world behavior not yet fully understood

- **Ongoing work to dig deeper into**
  - Mandatory disabling
  - Real-world RTT overestimation
  - Stack-specific behavior

- **Interested in contributing?**
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