The Latency Spin Bit

draft-trammell-quic-spin-01

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measurement | architecture | experimentation

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Introducing the Spin Bit

- Goal of QUIC: encrypt all the bits.
  - The path will see anything not encrypted.
  - The path will change anything not integrity protected.

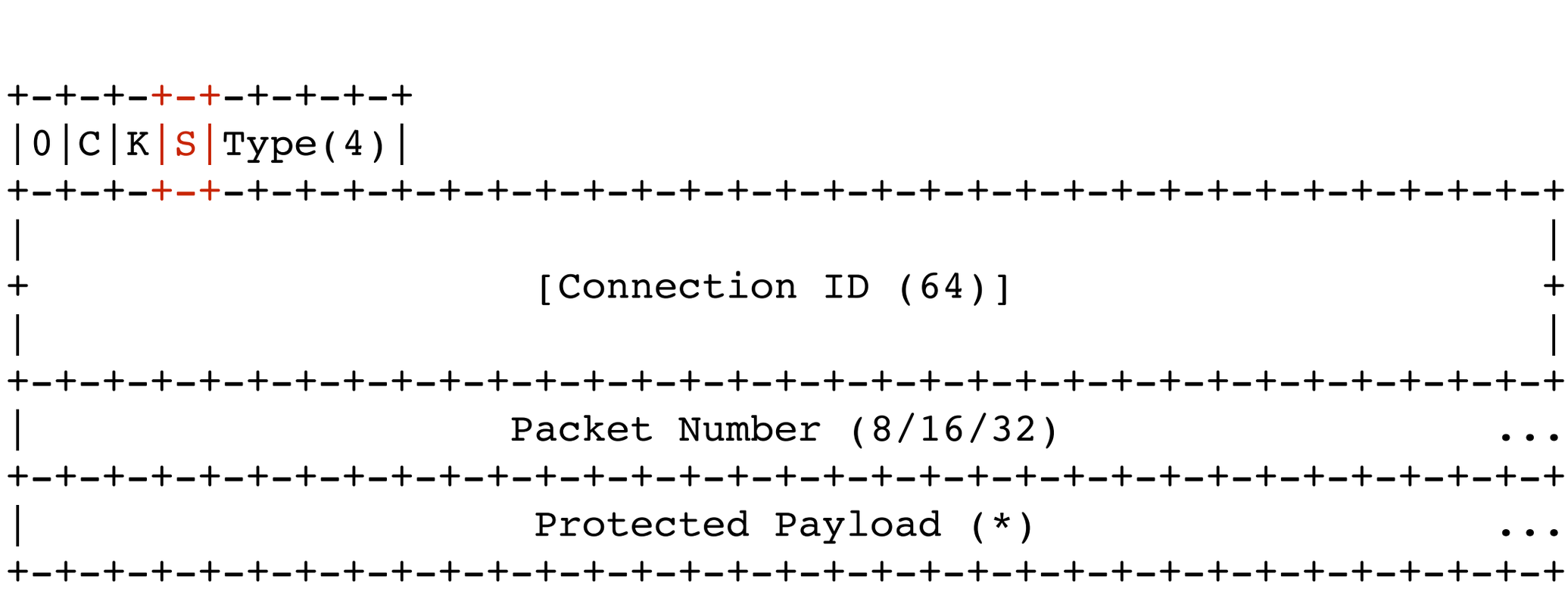
- Goal of MAMI: explicit middlebox cooperation
  - Per [1], design signals expressly for path consumption

- Spin bit: add passive RTT to QUIC for one bit per packet

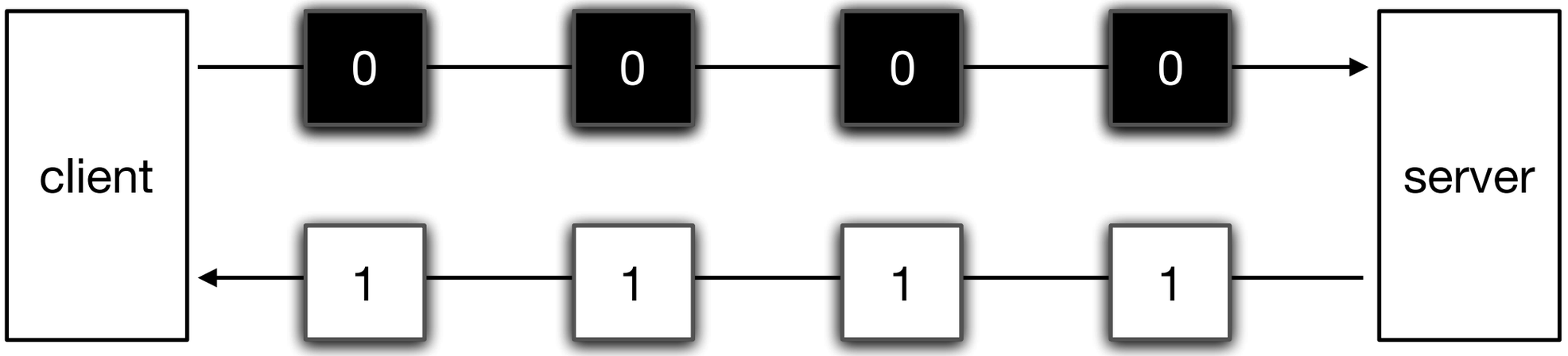
[1] Allman, Beverly, Trammell "Principles for Measurability in Protocol Design", ACM CCR April '17

What is it?

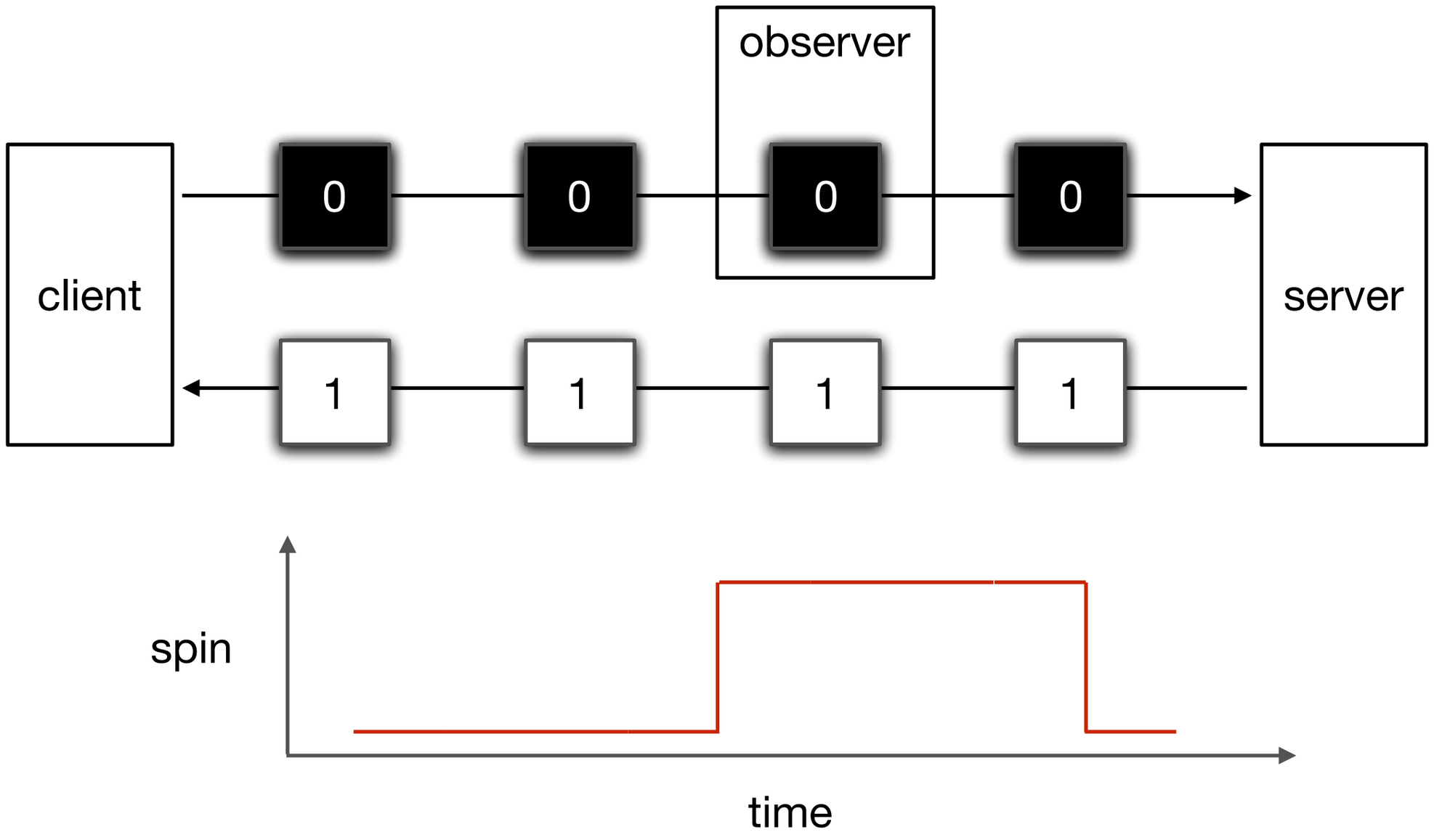
- Proposal: take one bit from QUIC short header type field and make it spin
- Server sets last spin it saw on each packet it sends
- Client sets ~(last spin it saw) on each packet it sends
- Creates a square-wave with



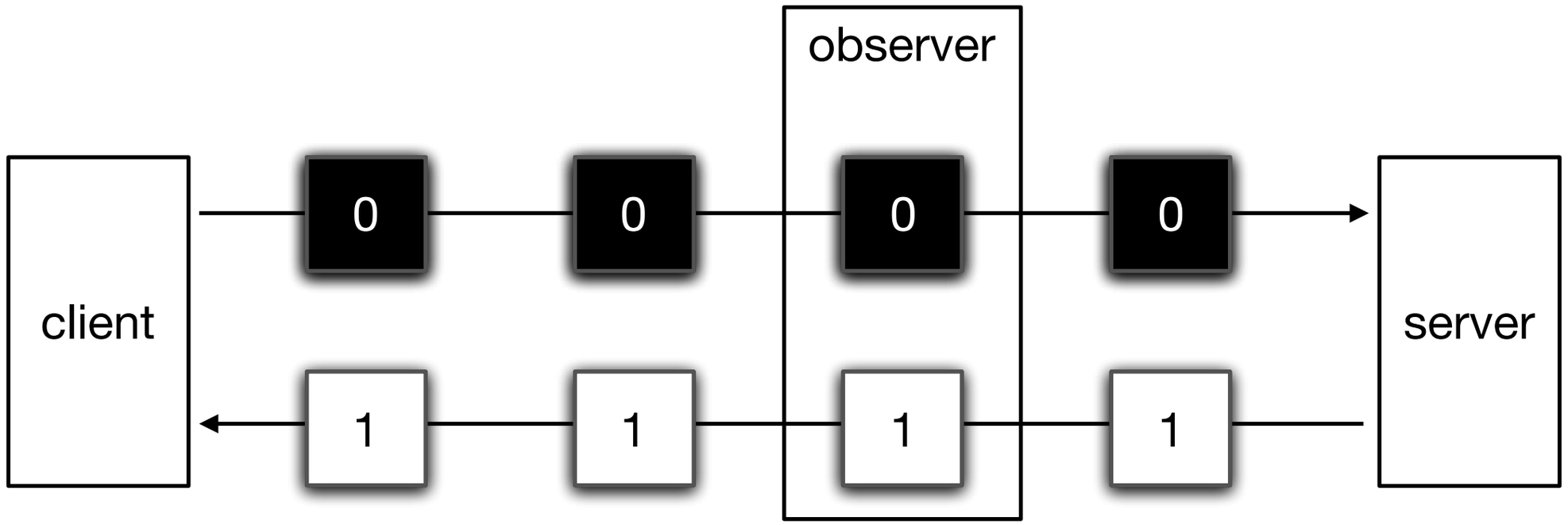
How does it work?

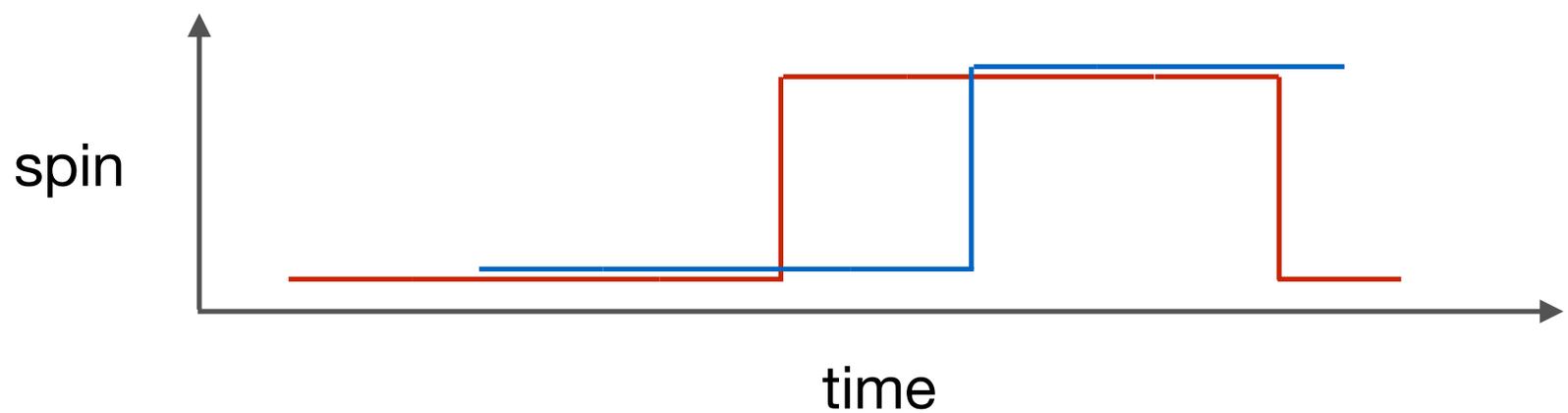


Unidirectional one-point measurement



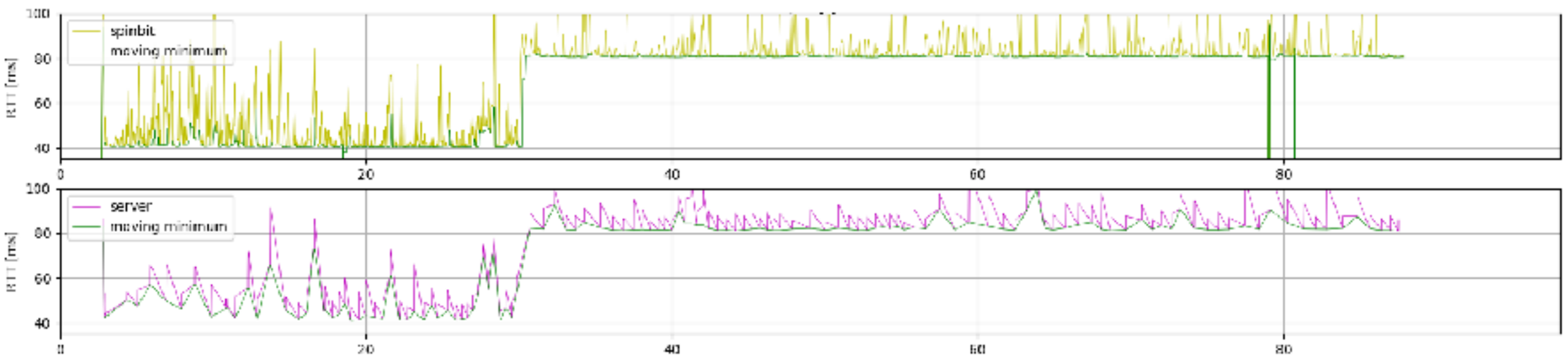
Bidirectional one-point measurement





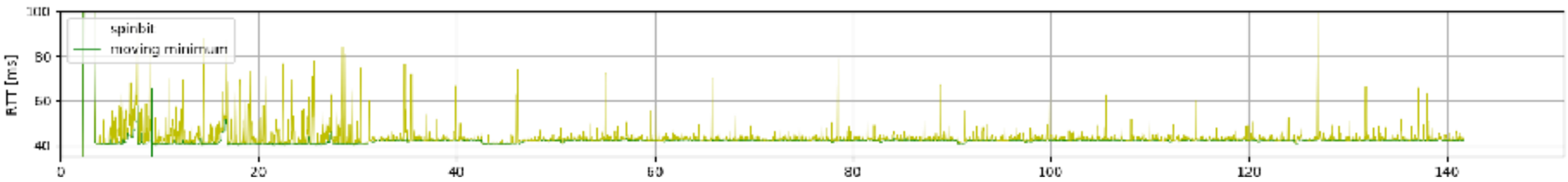
Does it work?

- Piet De Vaere (ETH student) has implemented the spin bit in minq (a minimal QUIC implementation in Golang)
- Spin signal gives high-resolution information to obervers about the RTT series the endpoints experience.

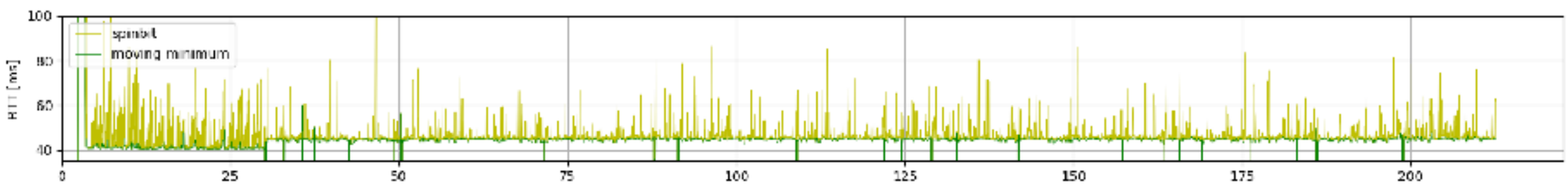


Coping with Loss and Reordering

- Signal survives heavy loss with slight RTT overestimation



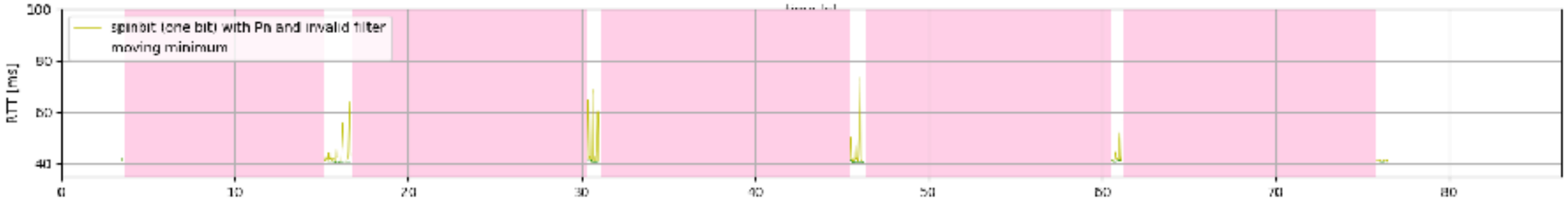
- Some loss of fidelity with heavy reordering:



- Increment-by-one in the packet number can be used to

Coping with bursty traffic

- Addition of a spin valid bit can reject bad samples when endpoint delay would cause vast overestimation of RTT
  - Set when a spin edge contains a value less than *k* µs old (static experimentation with *k*=1000)



- Current work on valid bit vs. "don't worry" (i.e., "this flow is not network-limited") bit.

Developments in the QUIC WG

- Following discussion in Singapore, chairs asked for an Enhanced Justification process
- → draft-trammell-quic-spin-01
- pull requests on -transport (1046) and -manageability (24)

- Transport Measurement (i.e., spin bit) table at IETF 101 London hackathon
  - ETH will bring minq, fd.io-based measurement
  - other stuff to do in the project?

Breaking News from Melbourne

- Packet number encyption (for AEAD, delinking oblivious migration) is back on the table, PR to follow.
  - This would imply we need to add a "subsequence" number to the short header for loss/reordering protection for the spin bit ... more Enhanced Justification? 😠