

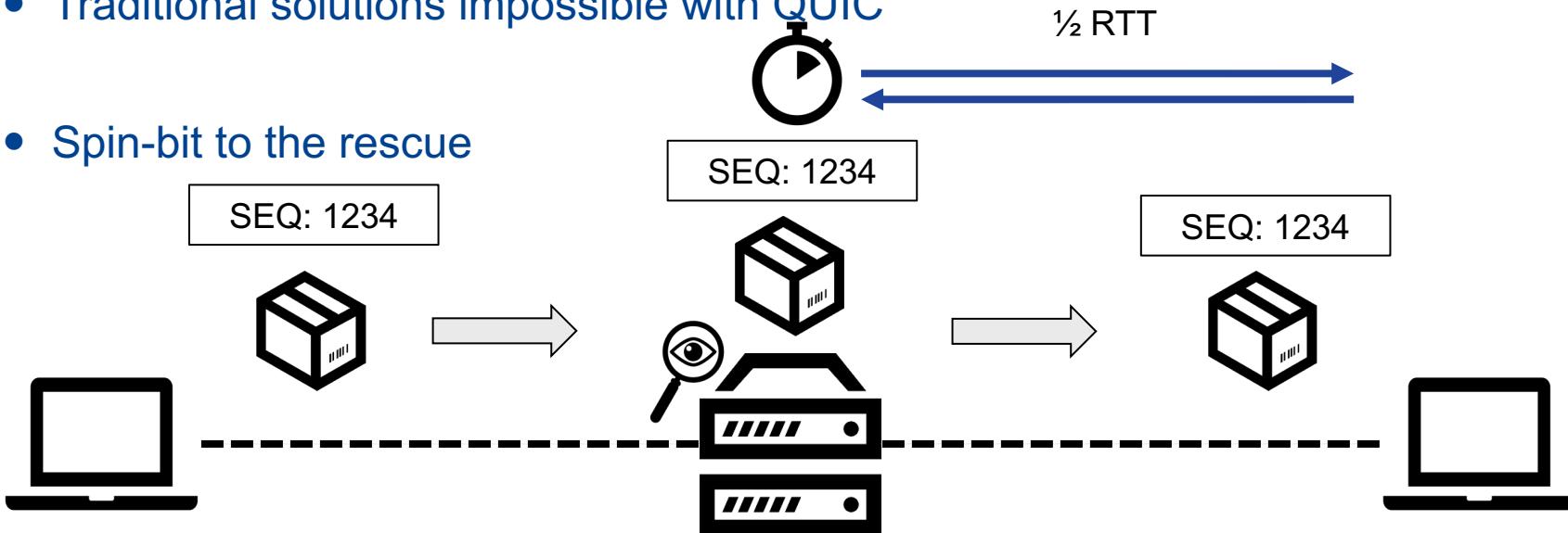
# **L, Q, R, and T**

## **Which Spin Bit Cousin Is Here to Stay?**

Ike Kunze, Klaus Wehrle, Jan Rüth

# Network Measurements & Encrypted Transports

- Network measurements important since the early Internet
- Traditional solutions impossible with QUIC
- Spin-bit to the rescue



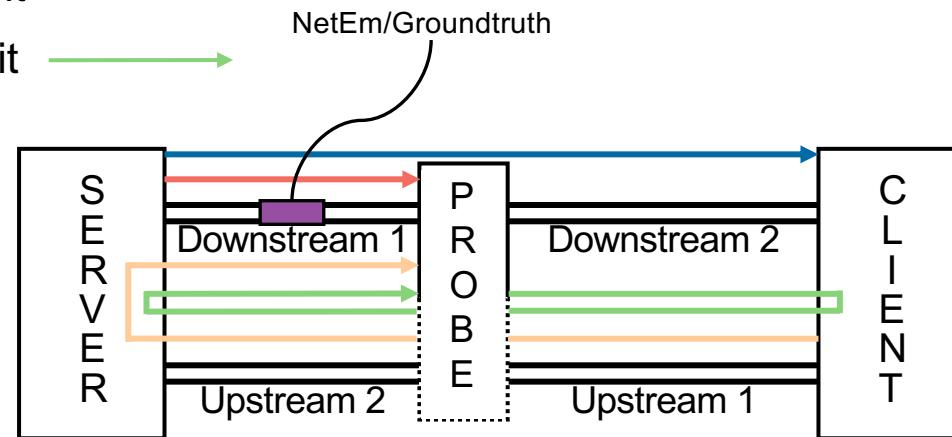
# Loss-Focused Explicit Flow Measurements

- IPPM WG discusses four proposals for measuring packet loss

- ▶ L-Bit
- ▶ Q-Bit

- ▶ R-Bit
- ▶ T-Bit

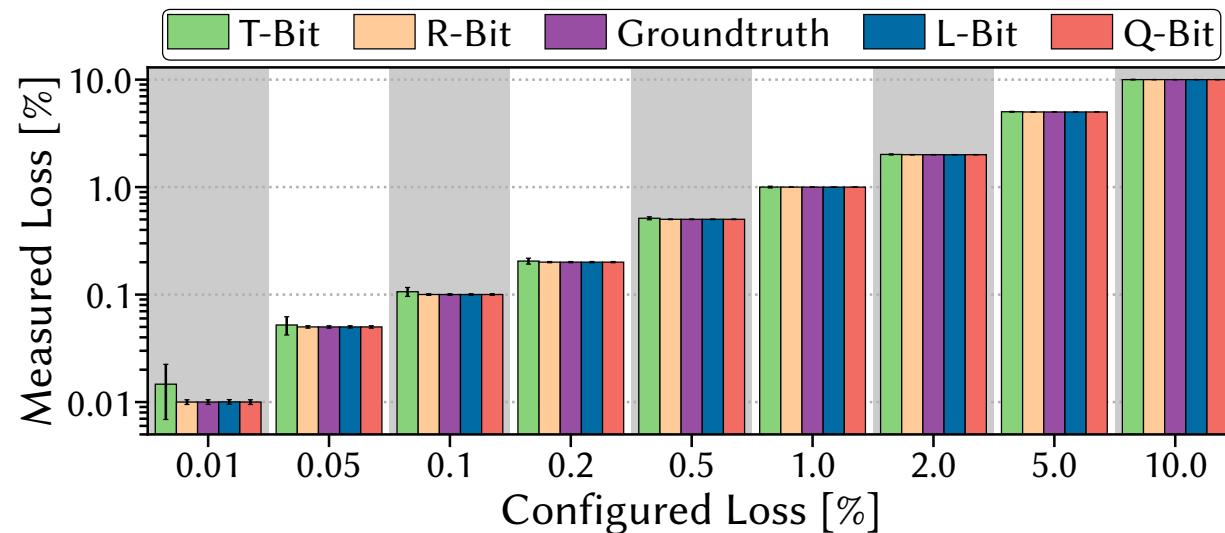
- Which one to choose?
  - ▶ Localization capabilities
  - ▶ Measurement accuracy



- Our contribution
  - ▶ Mininet-based experimental evaluation (testbed available on GitHub)
  - ▶ Investigated Scenarios
    - Random Loss
    - Burst Loss
    - Different flow sizes

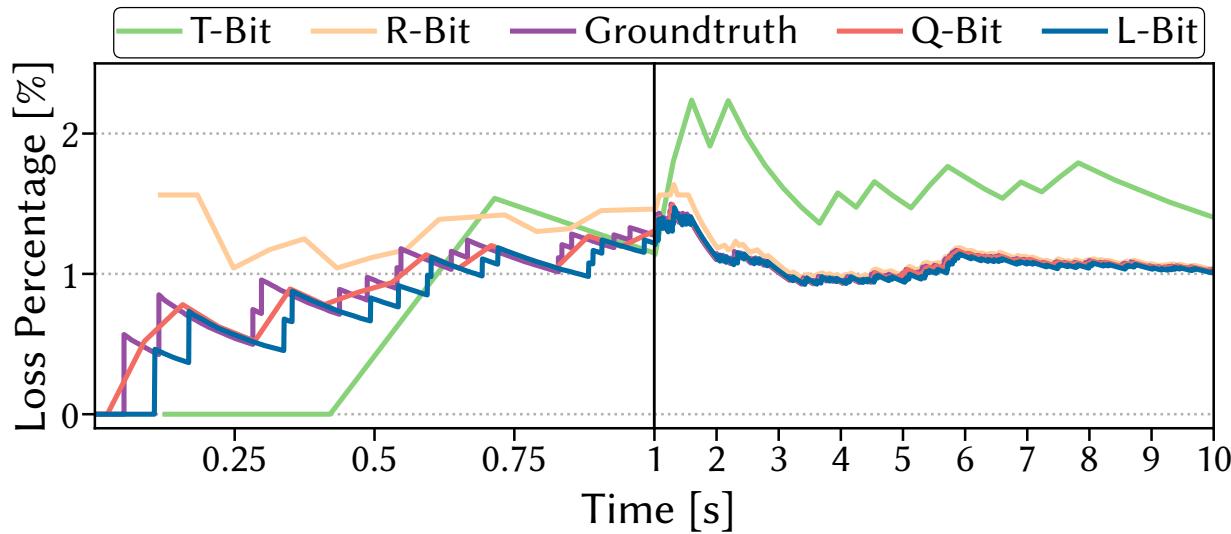
# Random Loss

- Symmetric traffic wo. congestion control
- ~1 mio. packets & 30 iterations per setting
- Cumulative loss percentages



# Random Loss – A Closer Look at One Example Run

- First 10 seconds of hand-picked run
  - ▶ Configured loss rate: 1%



# Which Spin Bit Cousin Is Here to Stay?

- Measurement Accuracy

- ▶ L-Bit has highest accuracy, but requires end-host loss detection
- ▶ Algorithmic intervals of Q/R/T
  - decrease accuracy in times of burst (burst loss scenario)
  - prolong measurement stabilization (flow length scenario)

- Which one to choose?

- ▶ Measurement accuracy seems suitable
- ▶ Path segmentation properties likely the kicker

