DCL

EPFL

Straggler Resilient Practical BFT via Blind Agreement

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Project Advisor

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BFT Consensus

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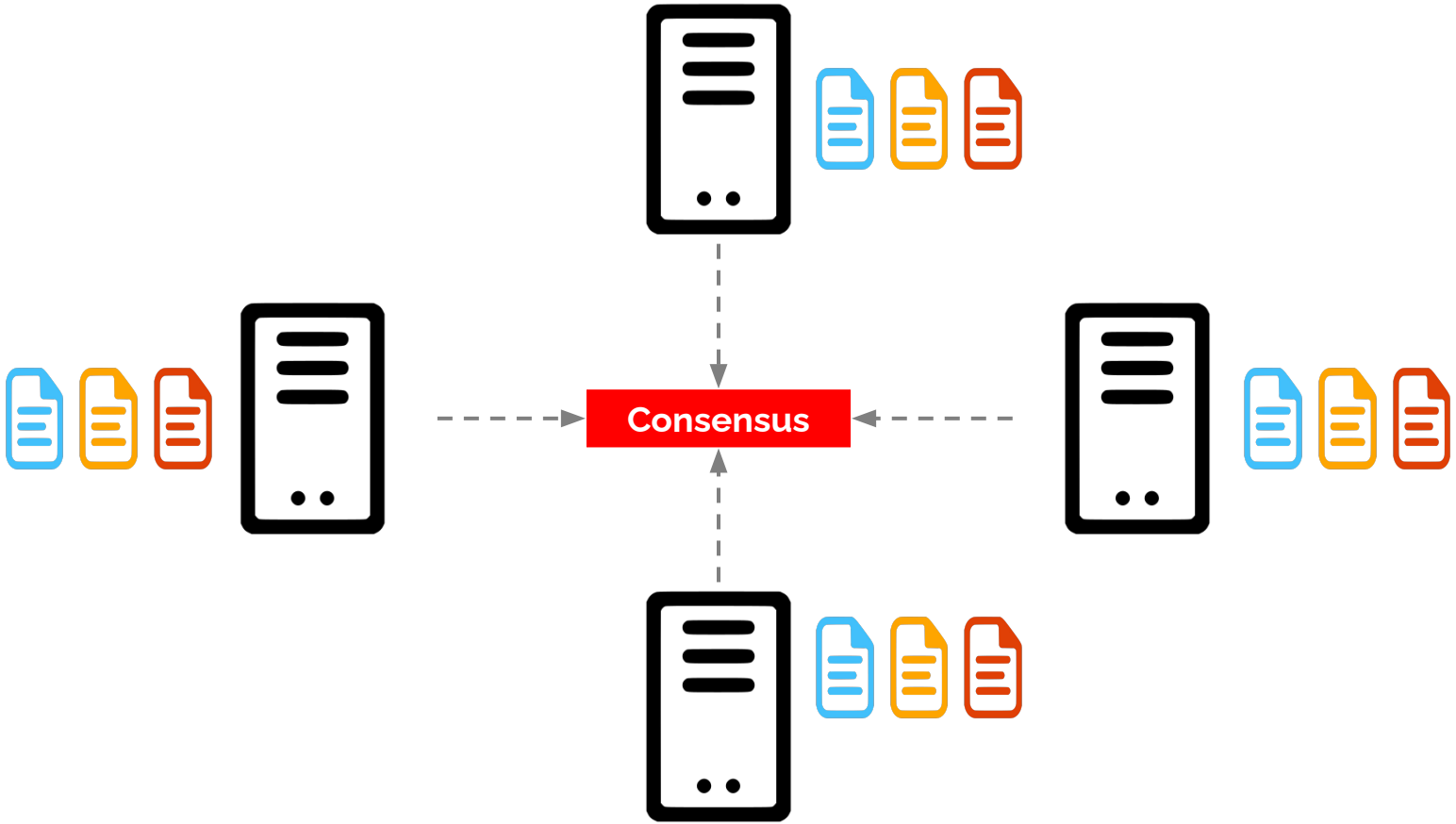
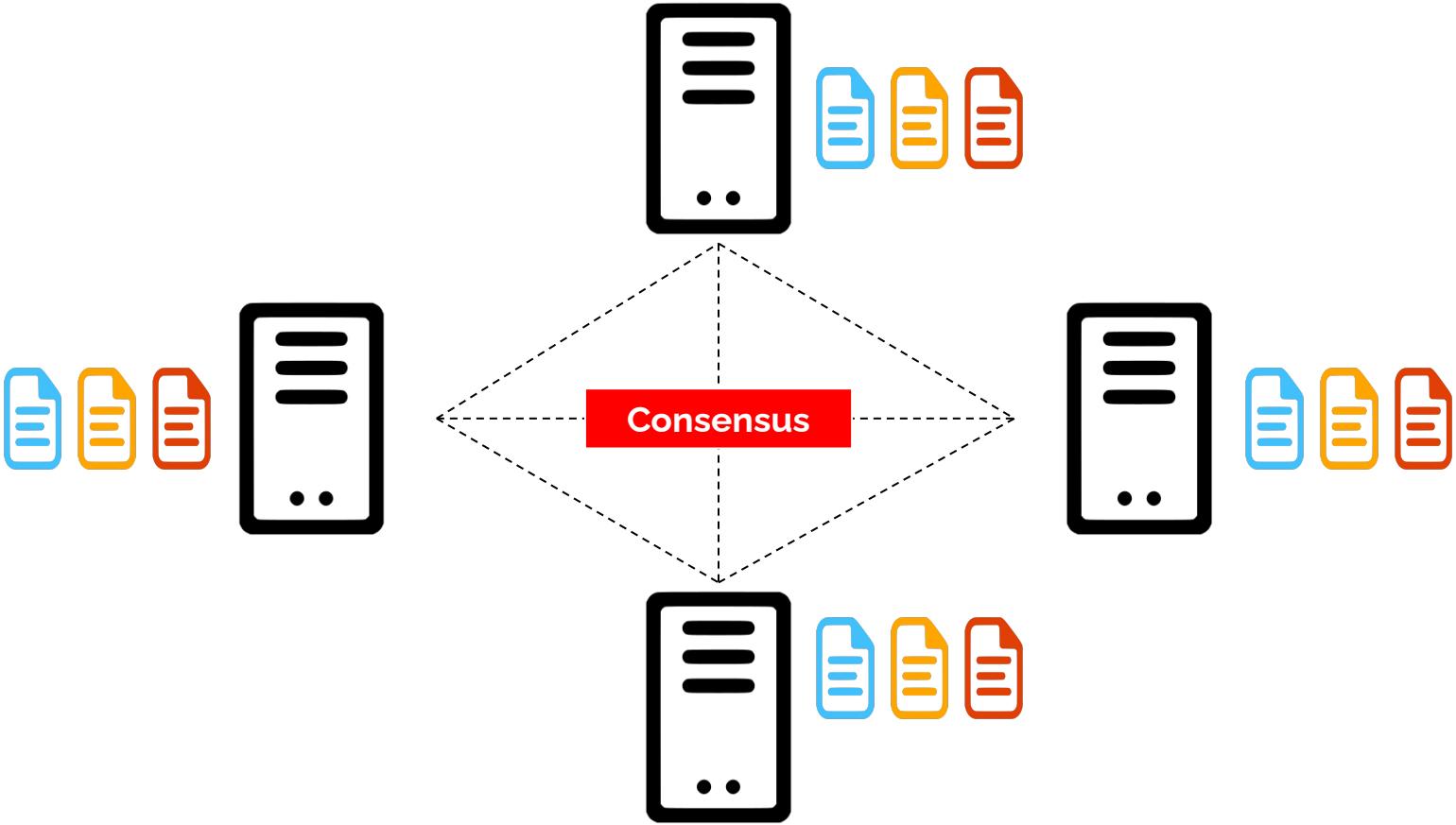
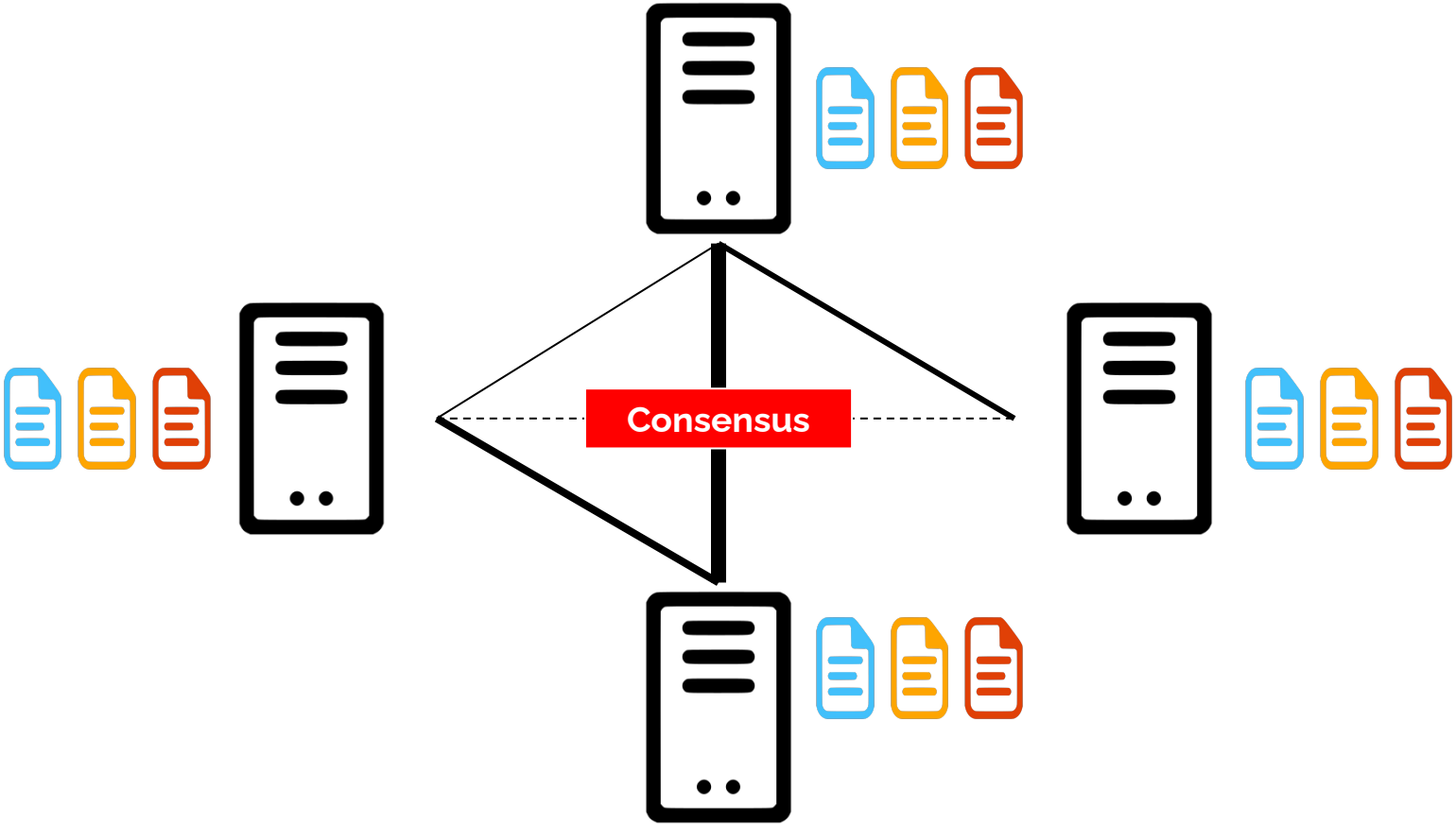


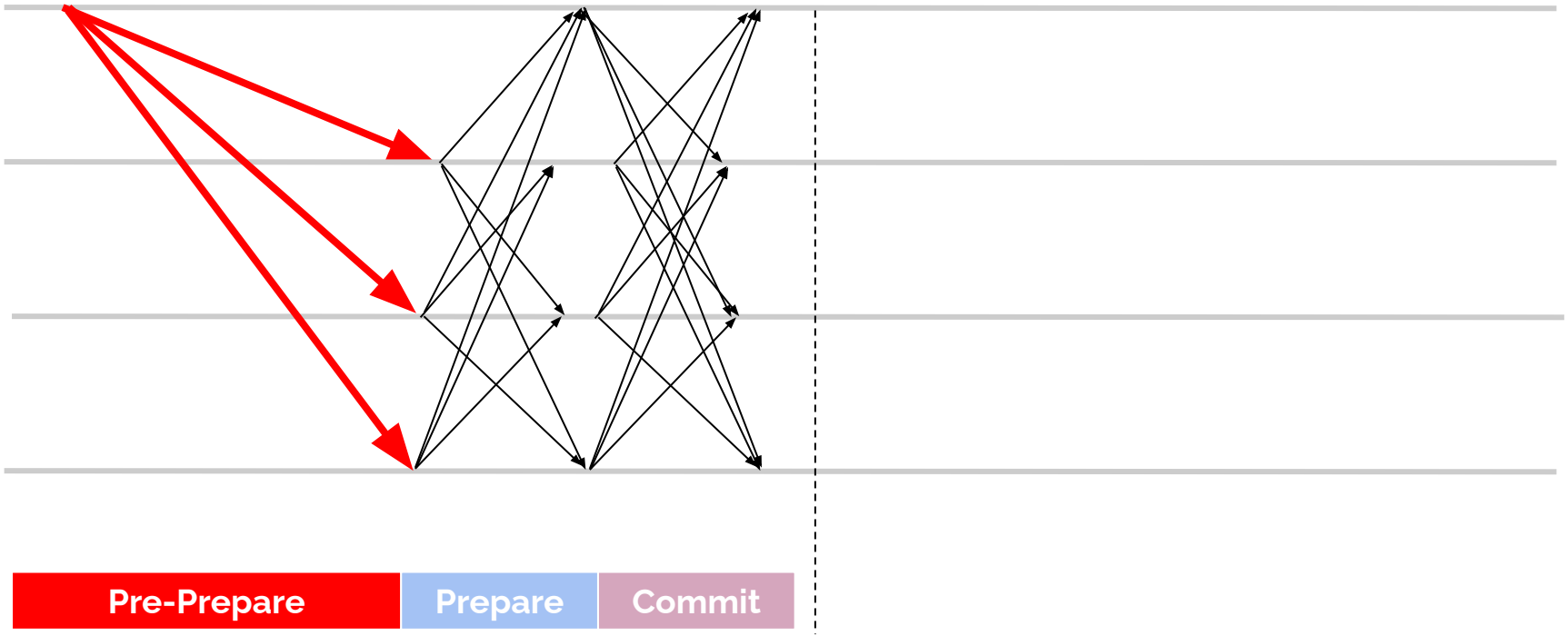
Expectations



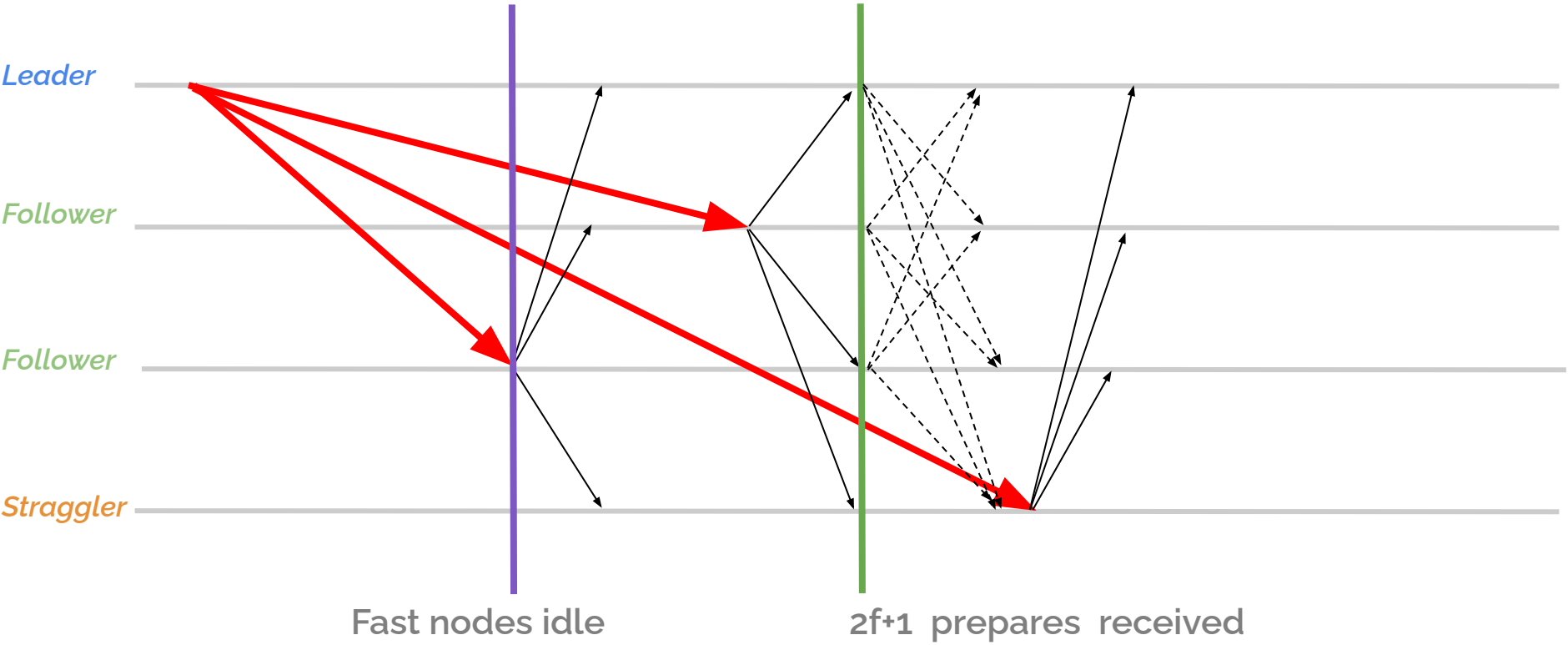
Reality

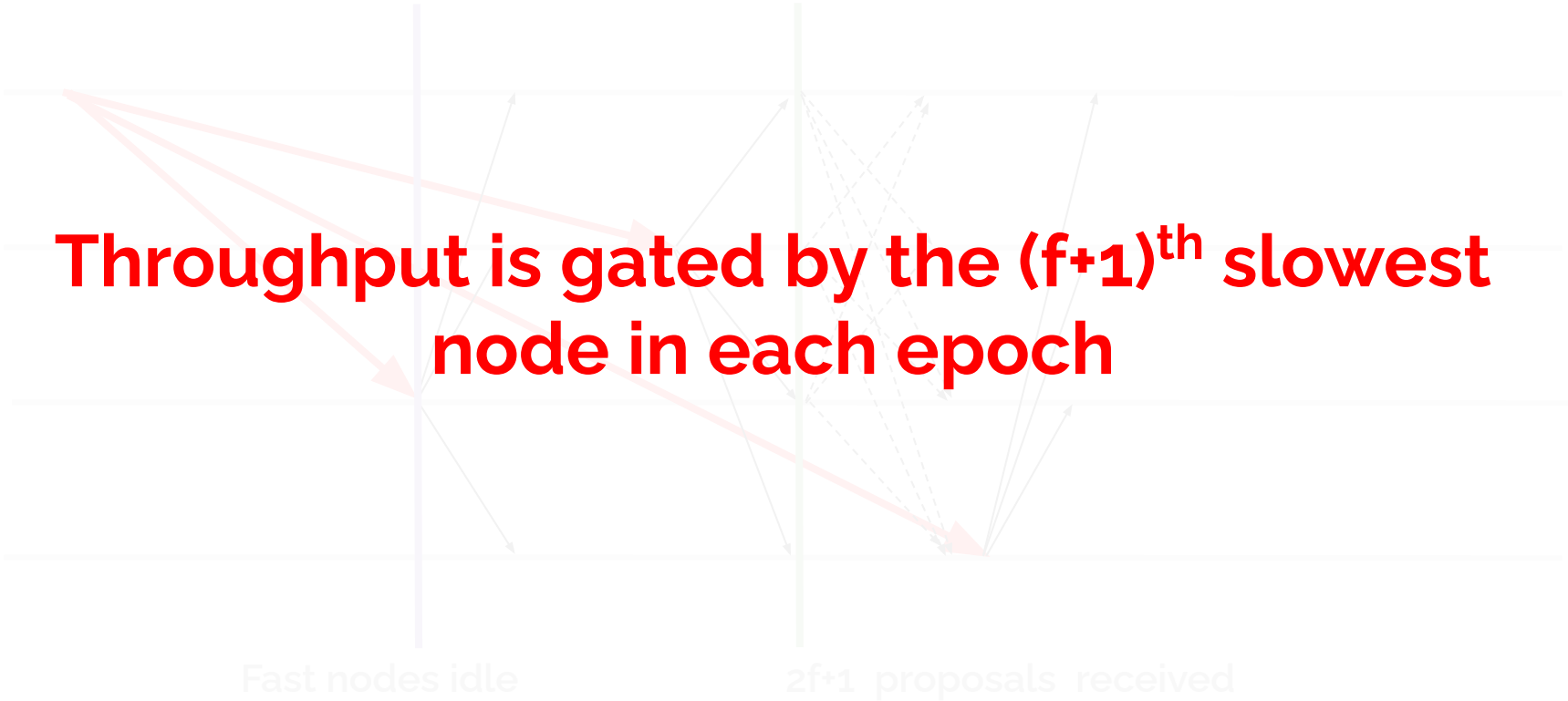


Existing BFT Protocols - PBFT



Heterogeneous Network Bandwidths





Throughput is gated by the $(f+1)^{th}$ slowest node in each epoch

Contributions

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- How to prototype and simulate BFT protocols on heterogeneous networks

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- How to make the slowest nodes vote in the consensus without slowing its progress

PAXI BFT

- Easy prototyping of BFT protocols
- Benchmarking
- Fill in three GO modules:
  - bft.go
  - replica.go
  - messages.go

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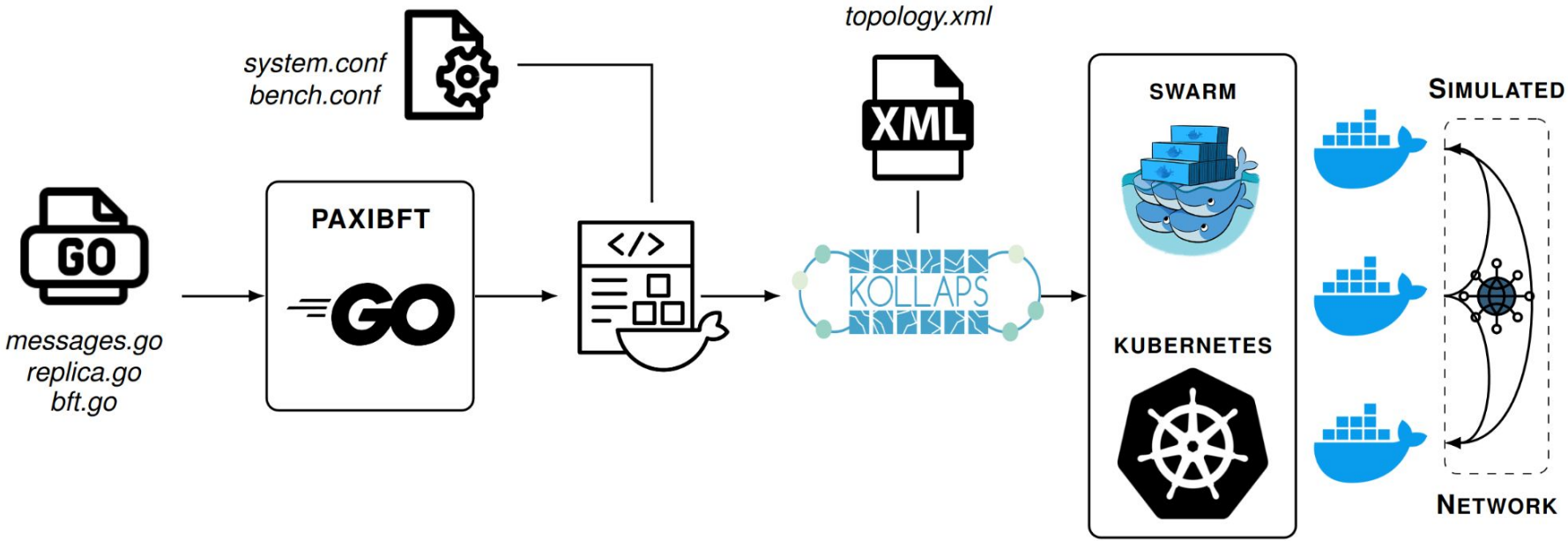
- Network simulation tool
- Agnostic of application language
- Easy customization of end-to-end properties (bandwidth, delay, jitter ...)
- Dynamic events such as node crashes or link removals

EASY BFT PRO SIM



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→ Blind Agreement: Stragglers see only the hash of the request and wait for (f+1) votes to accept the proposal

Straggler Resilient BFT

F-Pre-Prepare <V, SEQ, H, Request >

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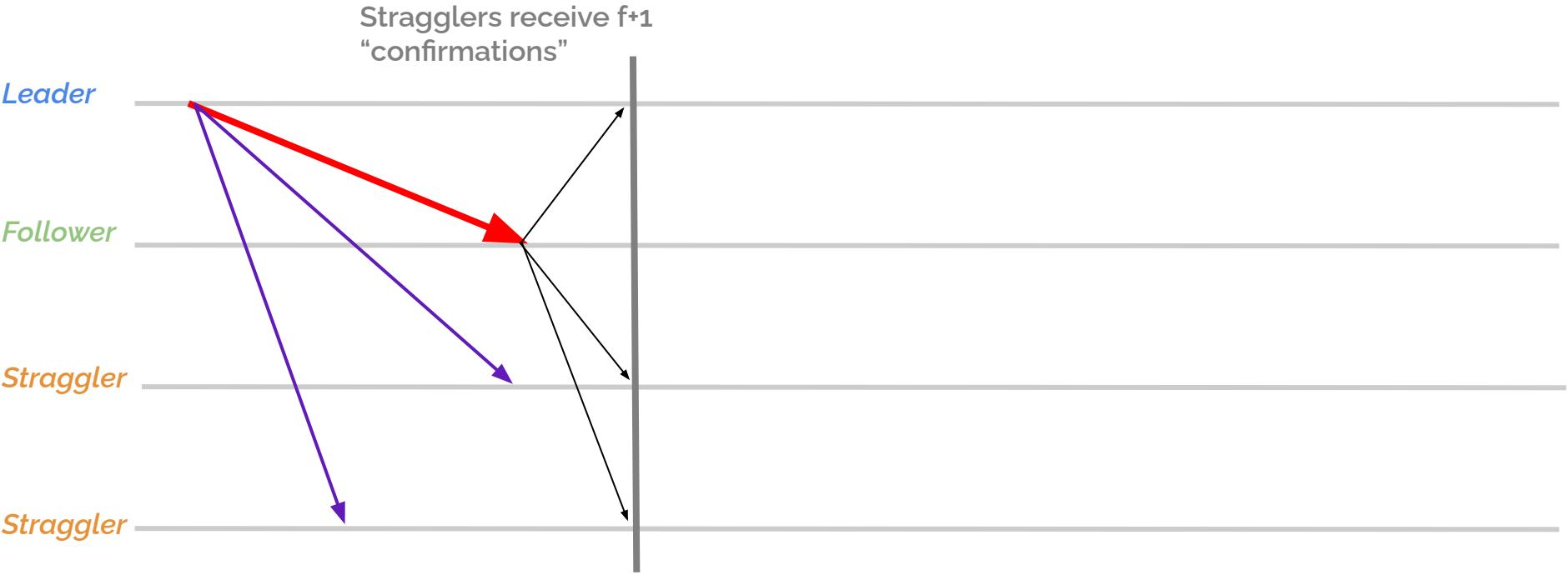

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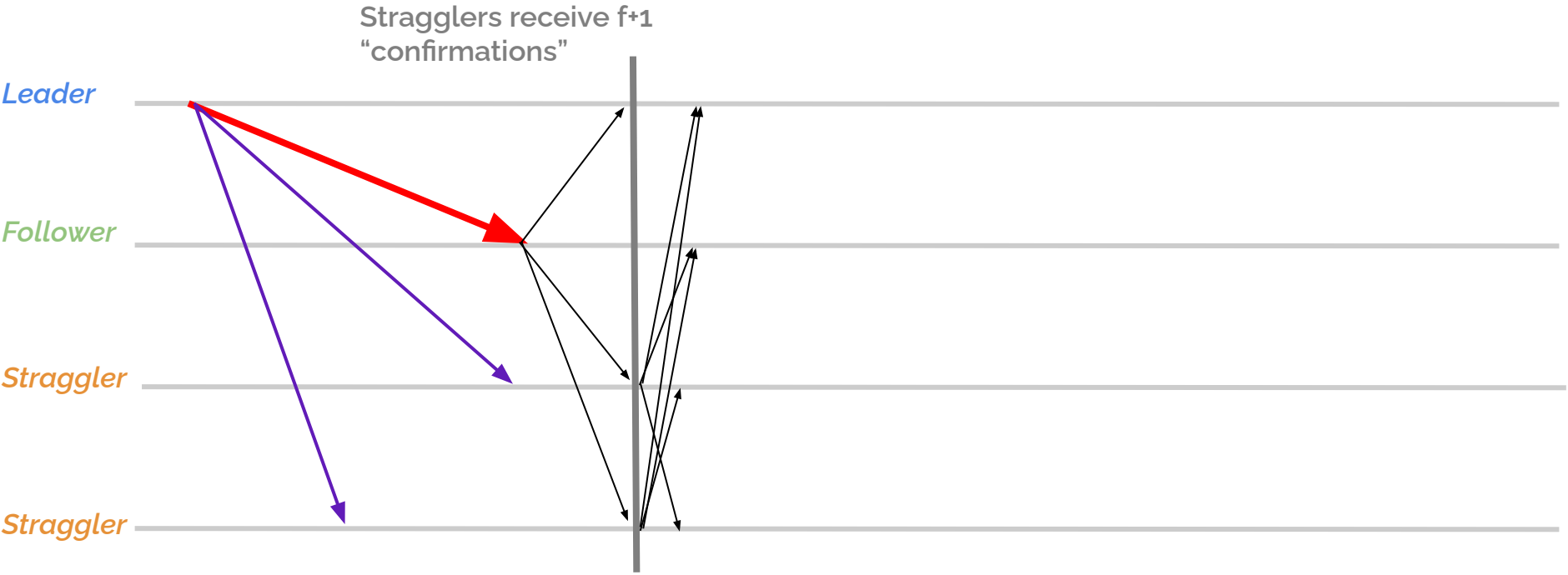

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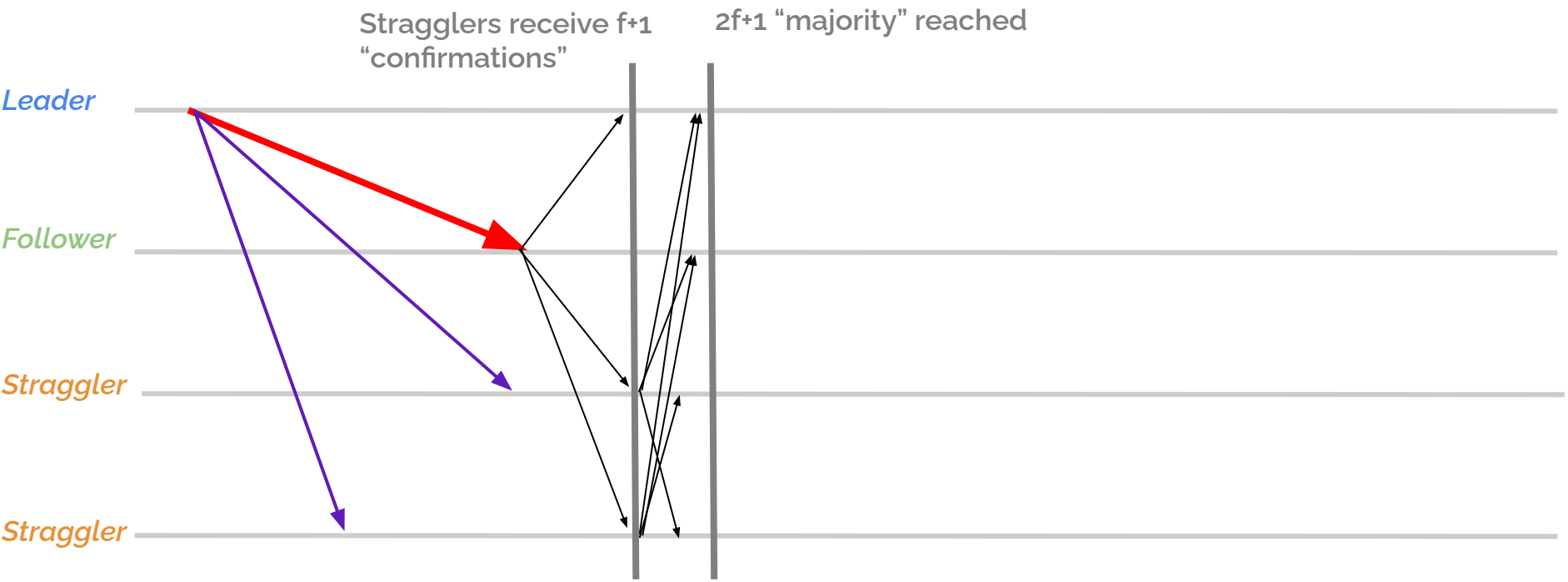

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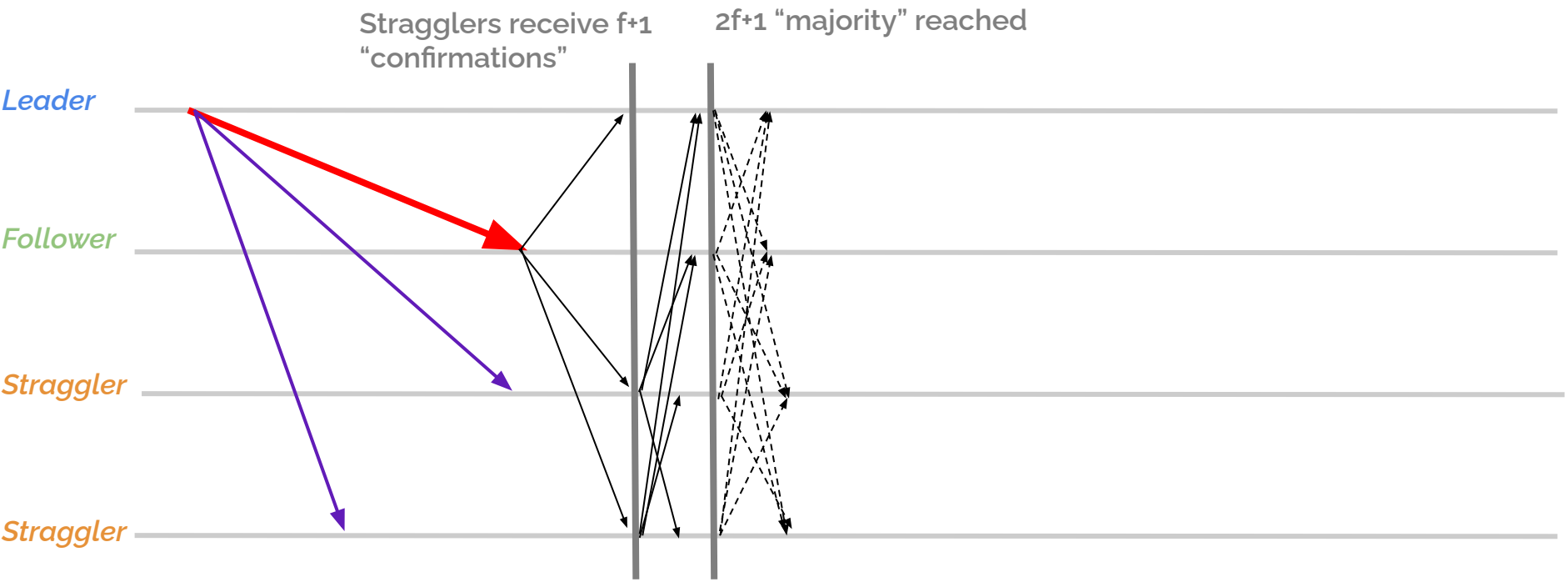

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SR-BFT

In a System of $N = 3f + 1$ nodes

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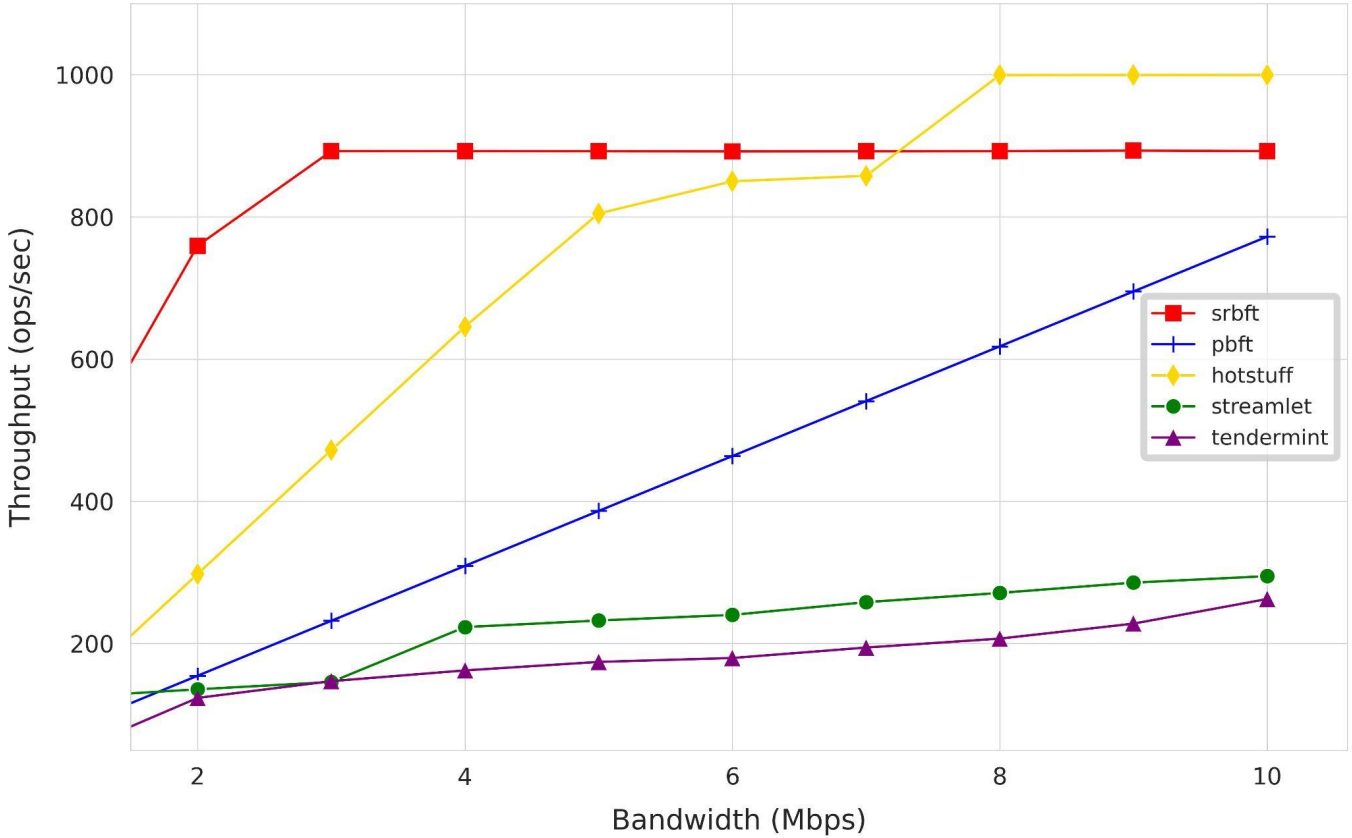
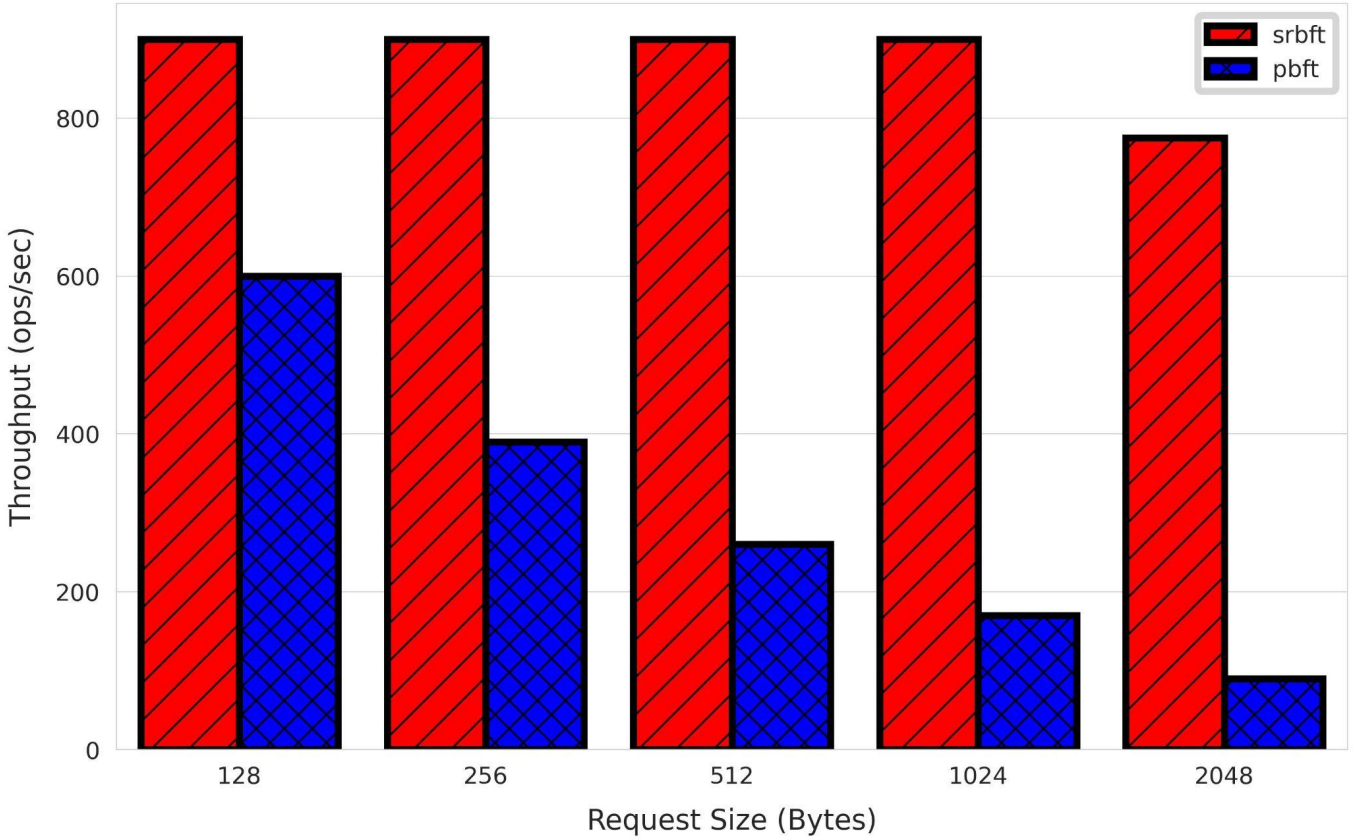
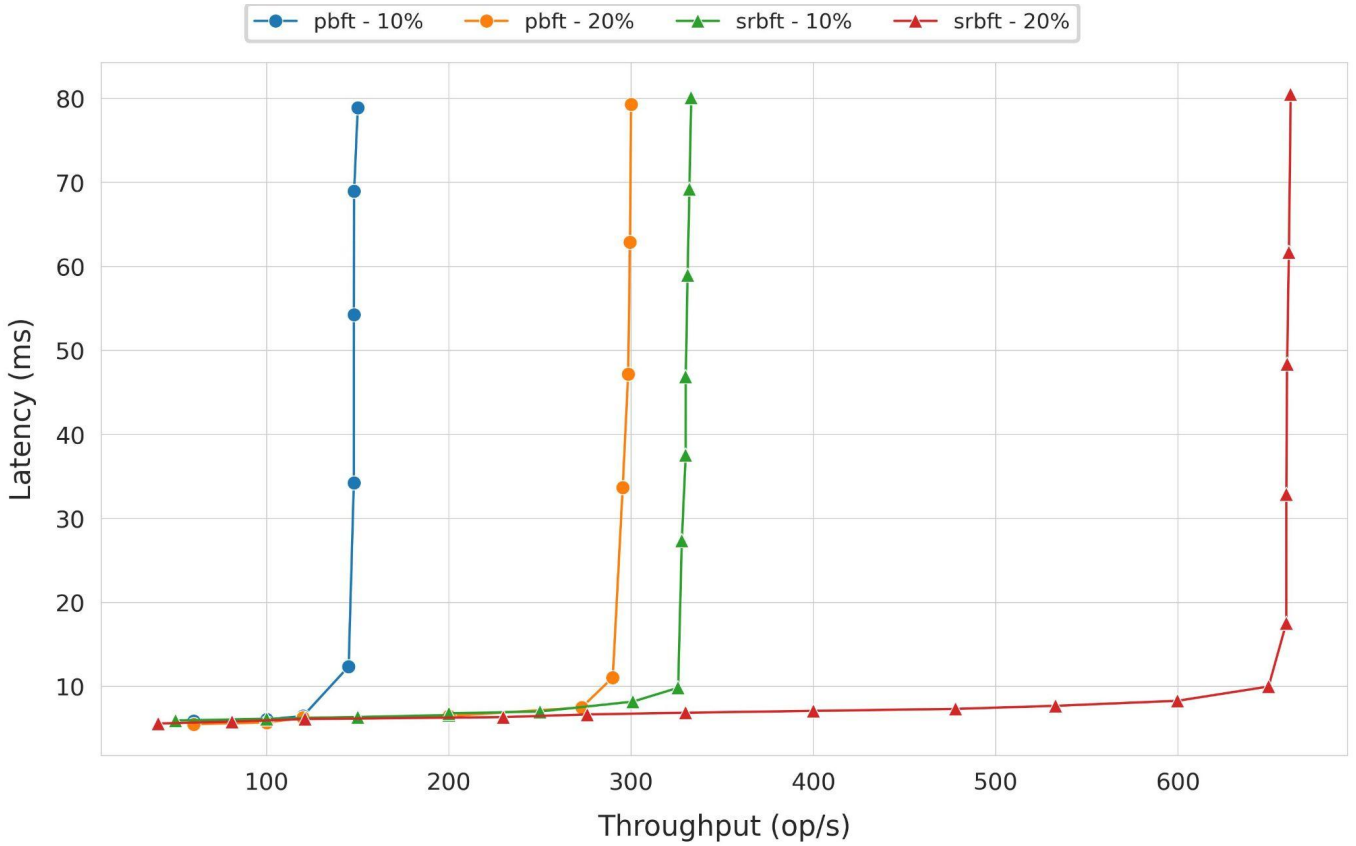
Throughput Comparison

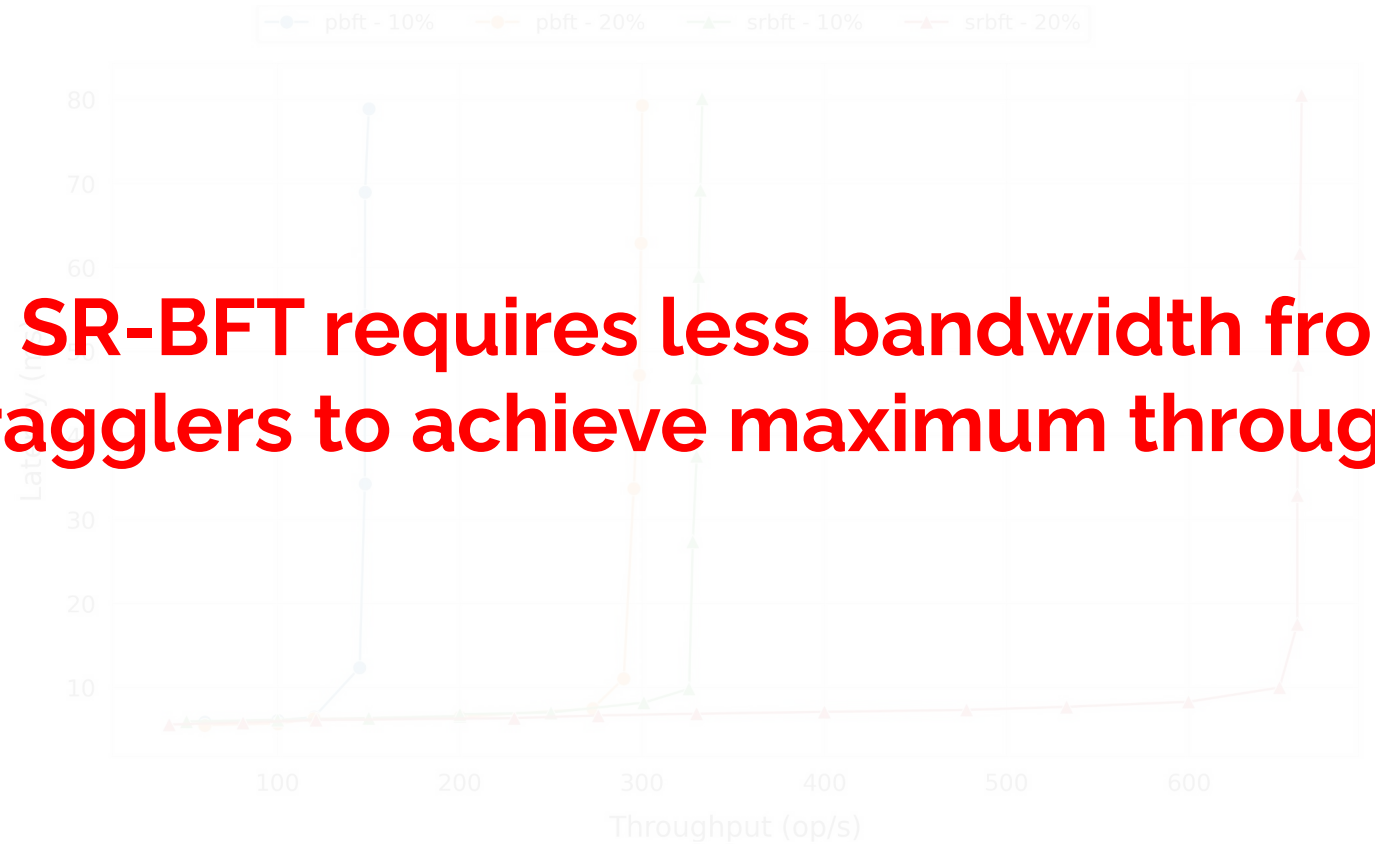


Throughput and Request Size



Throughput vs Latency





SR-BFT requires less bandwidth from stragglers to achieve maximum throughput

Lessons Learned

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- Fight “heterogeneity” with “heterogeneity”

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- Separate “data” and “control” planes

Future Works

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- Reputation-based leader rotation

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- Dynamic straggler detection
- Bandwidth-friendly state transfer

Questions ?