Scaling the L2:

EL mempool
short term future

Csaba Kiraly - EF Geth
June 10th, 2025

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How blobs propagate in the mempool today?

Mempool transaction diffusion 101

a. Push
   i. Depends on **TX type** (!=3) and **size** (<4096 bytes)
   ii. Pushing to **sqrt**(peercount) peers selected randomly
   iii. **"Stable" random** peer selection, based on <**tx signer address**, self ID, and peer ID>

b. Notify and Pull
   i. Notify **all** (other) peers about tx: <txhash, type, size>
   ii. Pull **scheduling** policy

How blobs propagate in the mempool today?

Measuring blob diffusion from a single Geth node

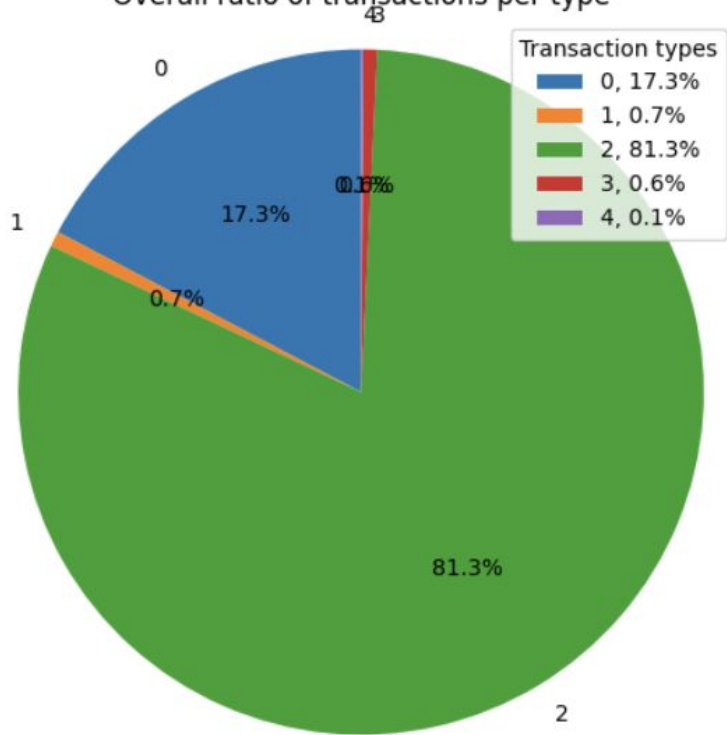- For any given TX:

     a.   Did we get it?
          i.   Push or pull, timestamped
     b.   Did we see our peers having it?
          i.   Their announcement, receive timestamped
         ii.   From 50 peers …. from 500 peers
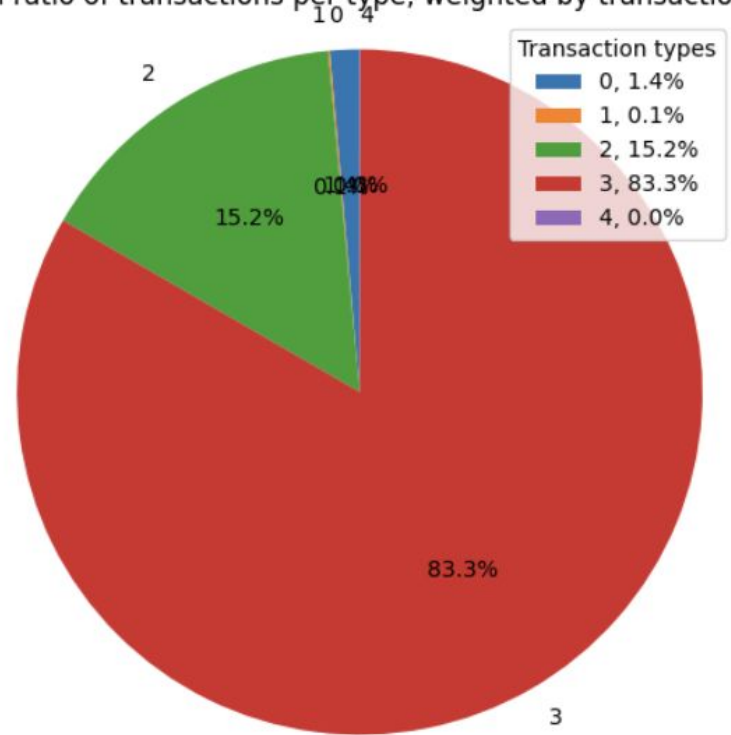   c.   Did we forward it?

- When to evaluate?

     Focus on "Block transactions", evaluate when we get the block with the TX
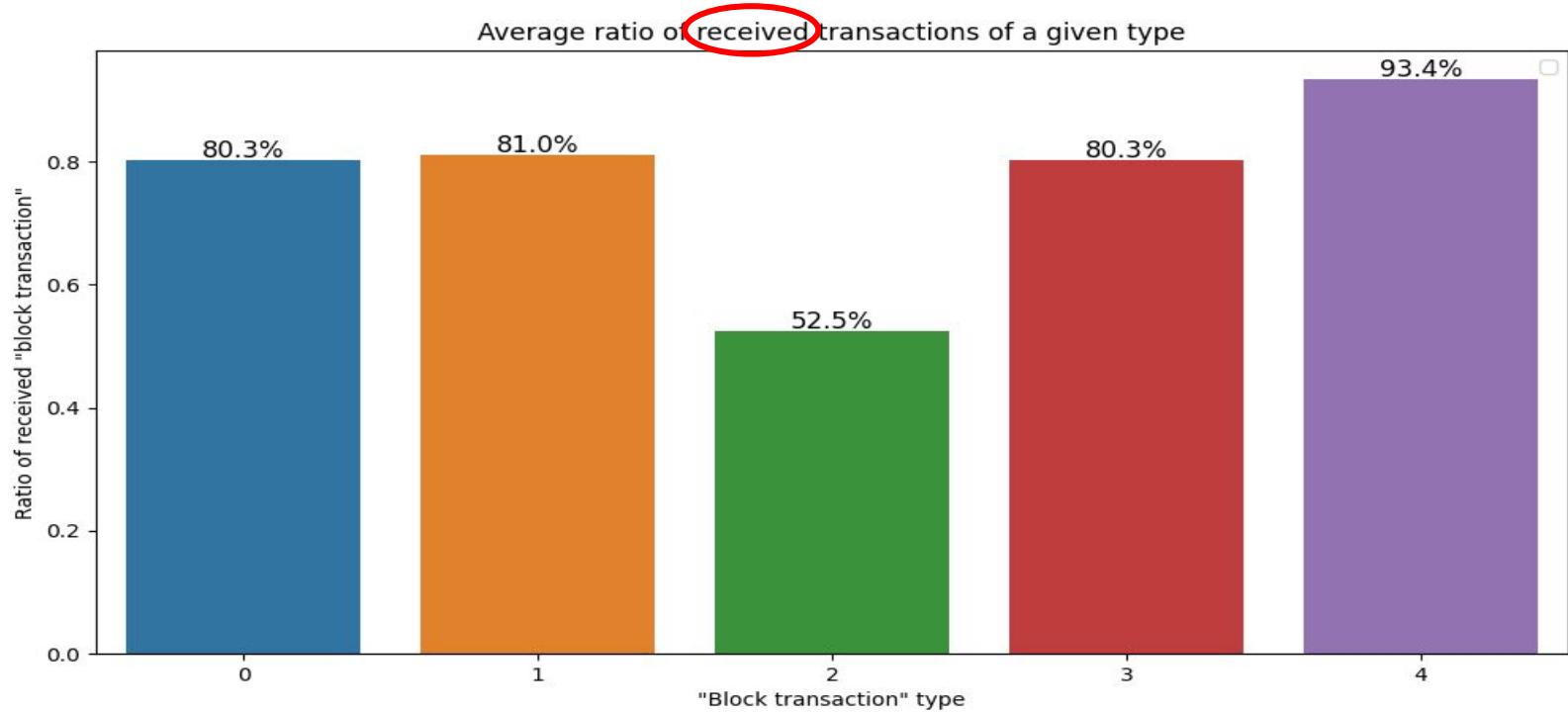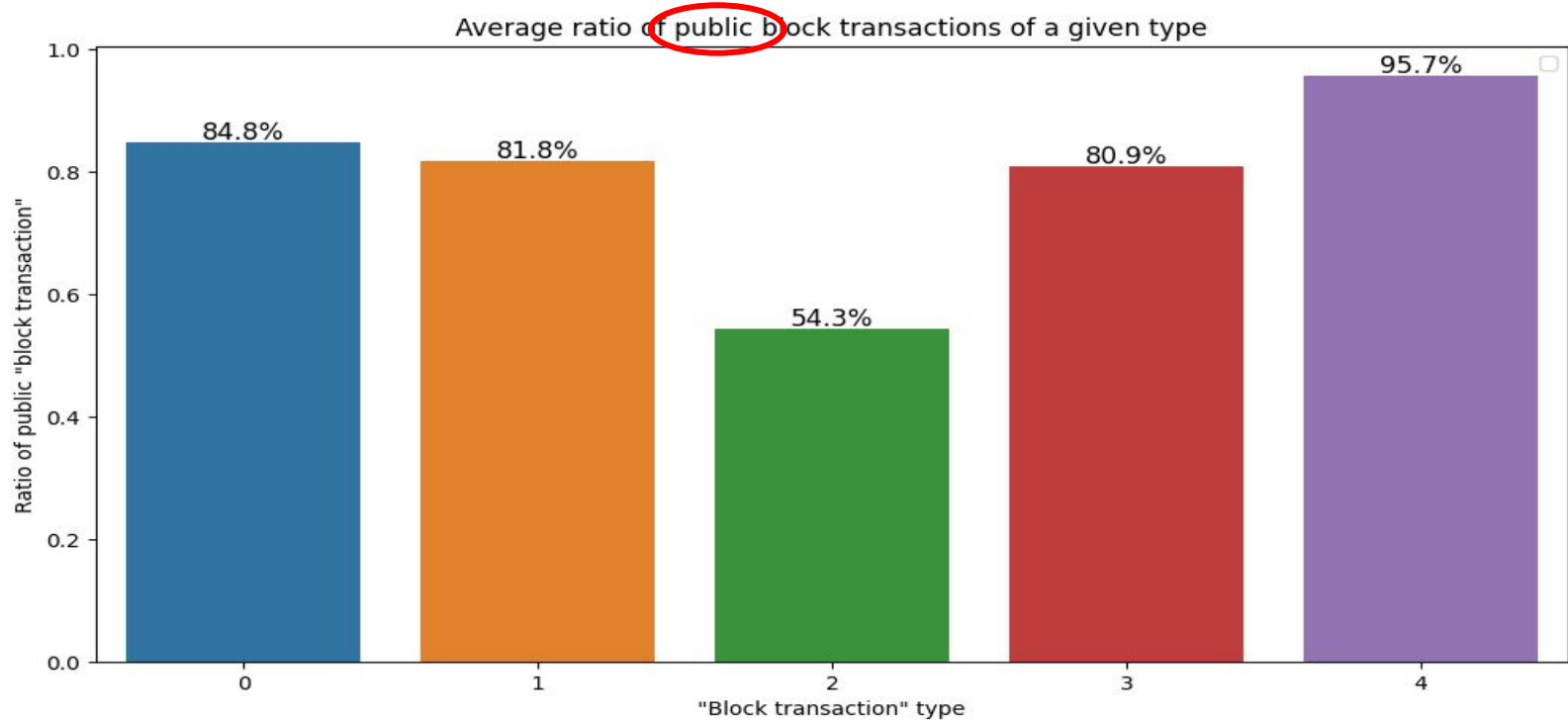
Overall ratio of transactions per type

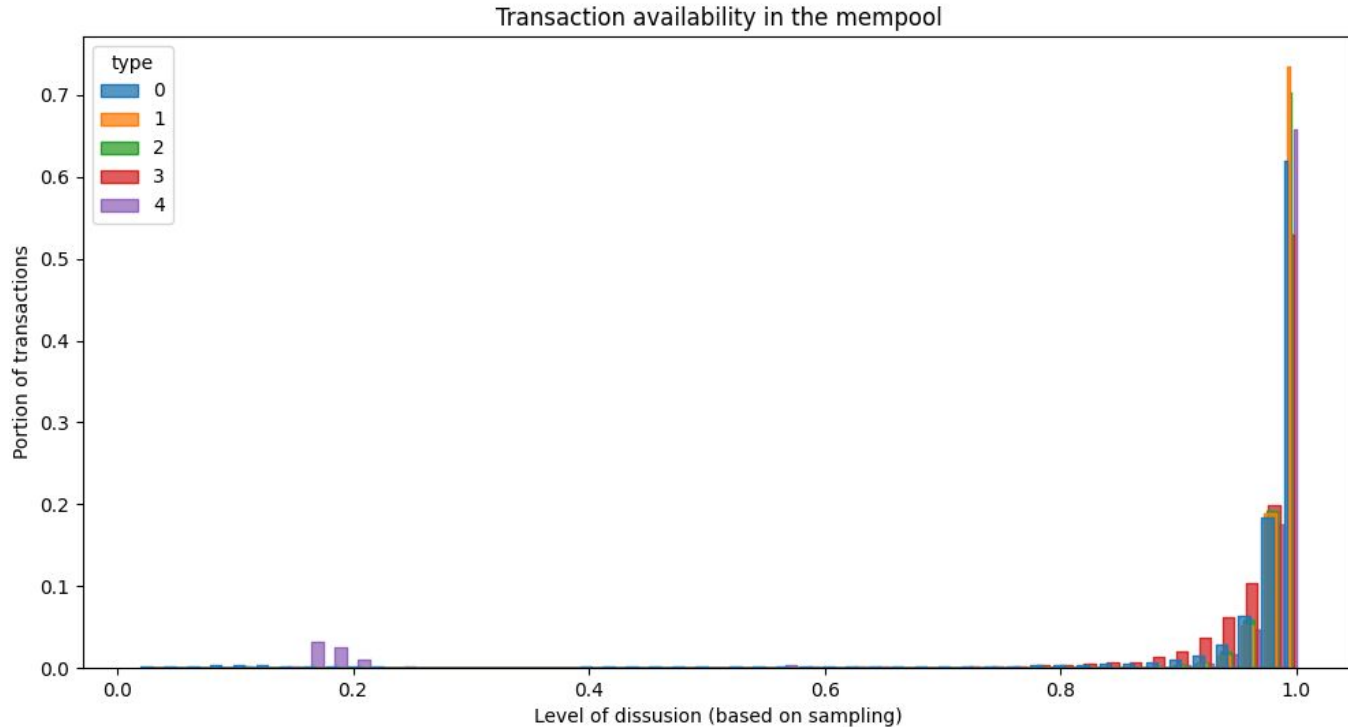Overall ratio of transactions per type, weighted by transaction size

Transaction types
- 0, 17.3%
- 1, 0.7%
- 2, 81.3%
- 3, 0.6%
- 4, 0.1%

Transaction types
- 0, 1.4%
- 1, 0.1%
- 2, 15.2%
- 3, 83.3%
- 4, 0.0%

Received vs. Public

Average ratio of received transactions of a given type

Received vs. **Public**

Average ratio of public block transactions of a given type

Diffusion ratio (0..1) of transactions in the mempool

Transaction availability in the mempool

Transaction "diffusion speed" in the mempool

Transaction availability in the mempool before block inclusion
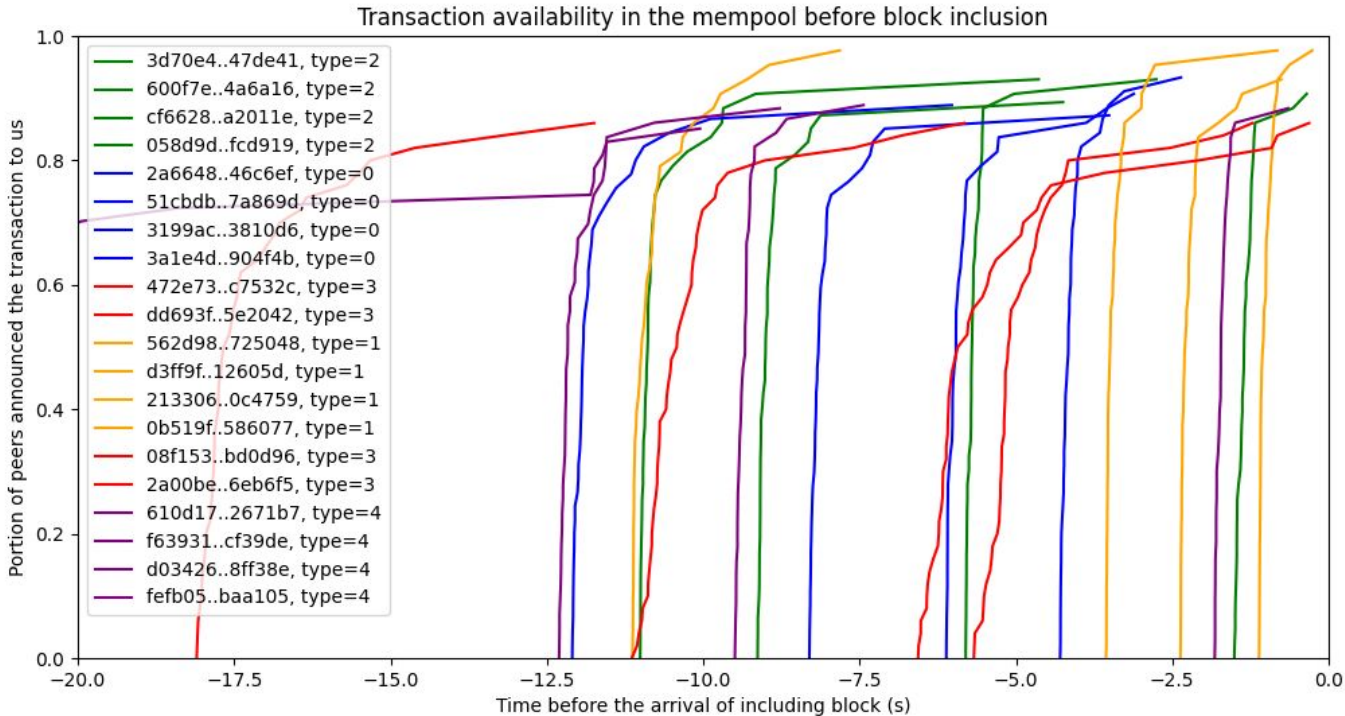
Transaction "diffusion speed" stats

Transaction availability in the mempool

Transaction "diffusion speed" stats

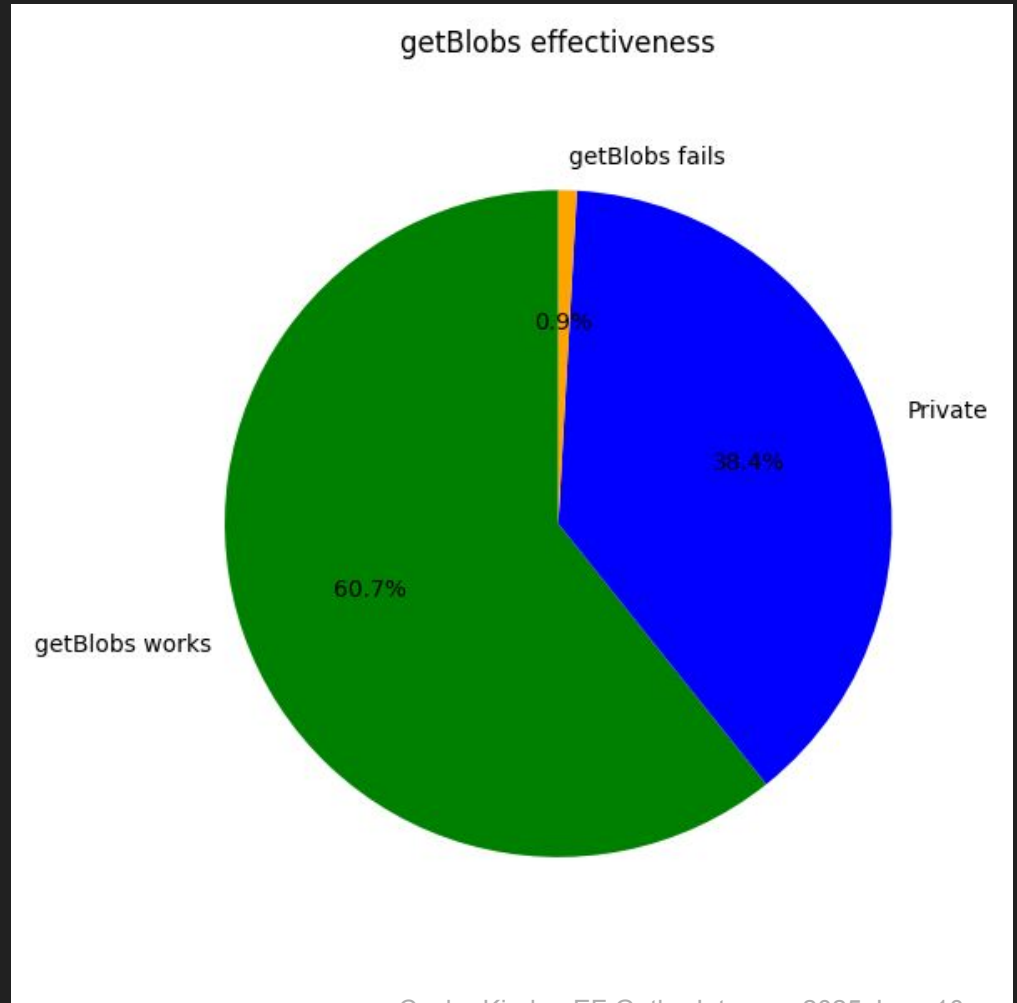Blob transaction spreading in the mempool
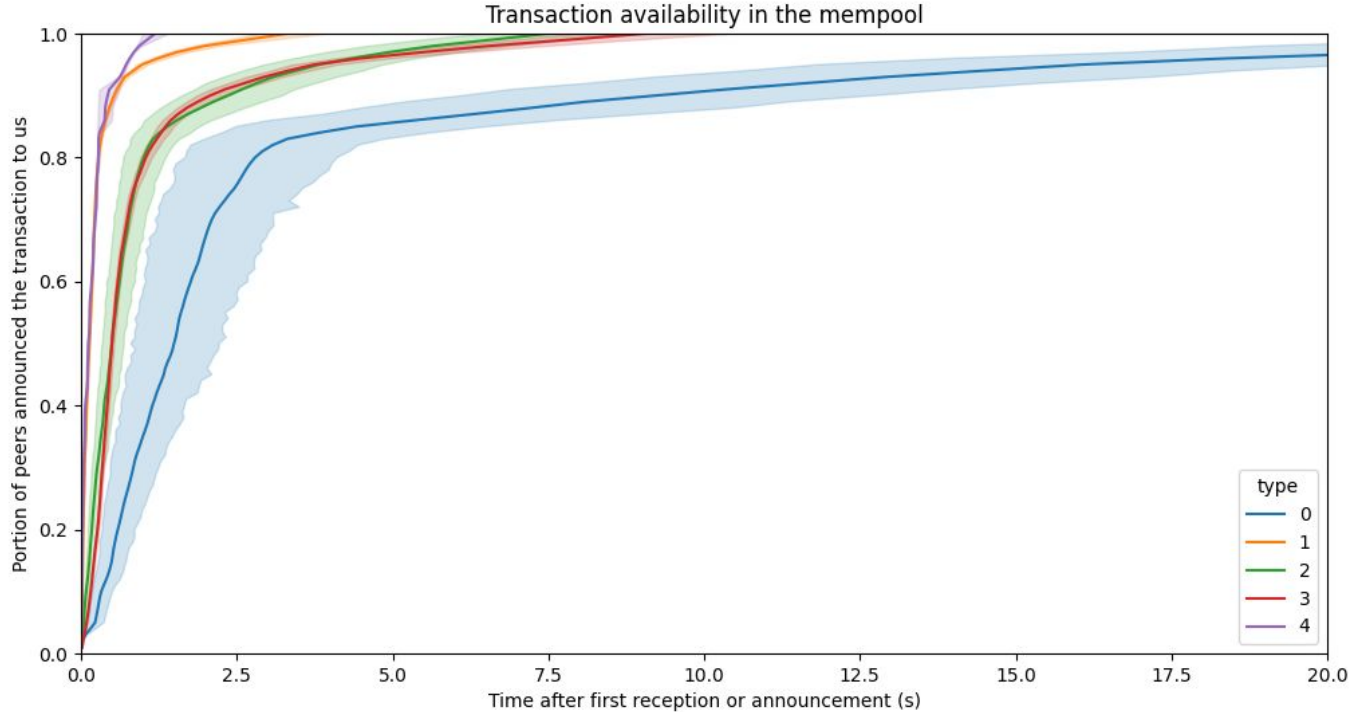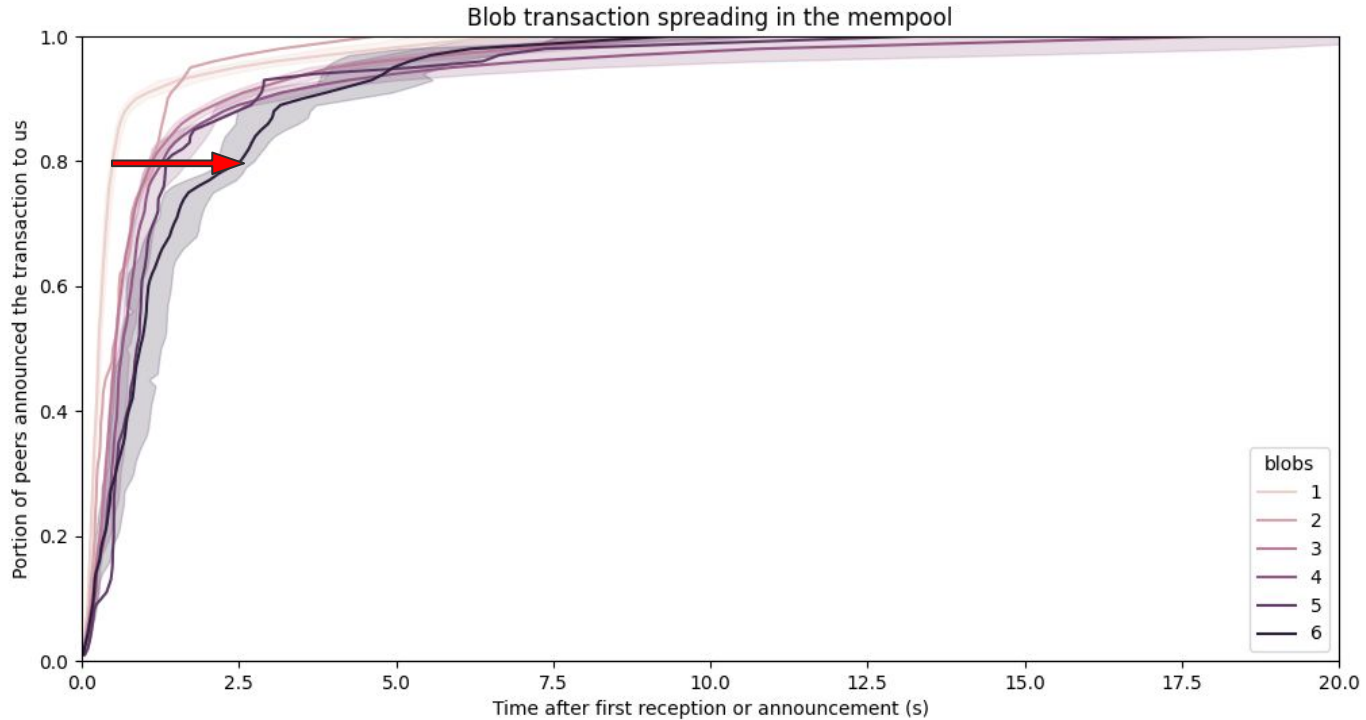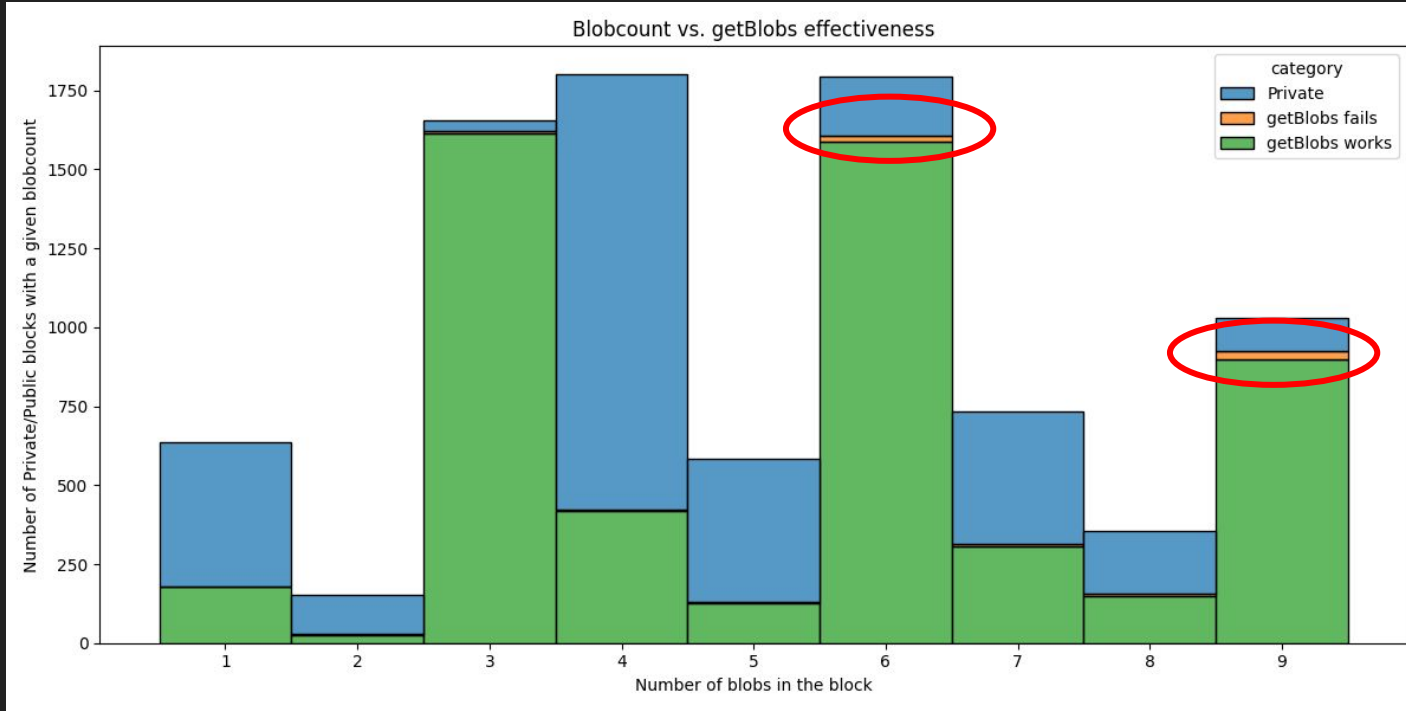
GetBlobs effectiveness

Private: it simply can't work,
choice of builder

Works: our node had all the blobs by the time of block arrival

Fails: all blobs are public, but we miss some

getBlobs effectiveness

getBlobs fails

0.9%

Private

38.4%

60.7%

getBlobs works

How would this scale with blob count?

Not enough info here

But it feels OK

11 KB/sec/blob

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How blobs should propagate in the mempool **tomorrow**?

Fully synched vs. "sharded" (implicitly or explicitly)

Today

- the mempool feels basically **fully synched**

Tomorrow

- If we scale **WITHOUT changing** anything, it will be **implicitly sharded** (segmented)

    - Current policy is **TX sender address based sharding** (not yet applied to blobs)
    - We have **no practical experience** yet of how this would play out
    - We just know **it will happen** as an interaction of resource limits, announcement and pull scheduling policies

How blobs should propagate in the mempool **tomorrow**?

We can also introduce

- **Explicit horizontal sharding**, based on
  - TX hash
  - TX sender address
- **Vertical sharding**, based on blob segmentation and encoding
- **Sampling** in the mempool

Public mempool advantage (or what you miss with private blob feeds)

- pre-diffusion in the mempool (goes to DA and DAS through getBlobs todady)
- sampling in the mempool?
- CR