

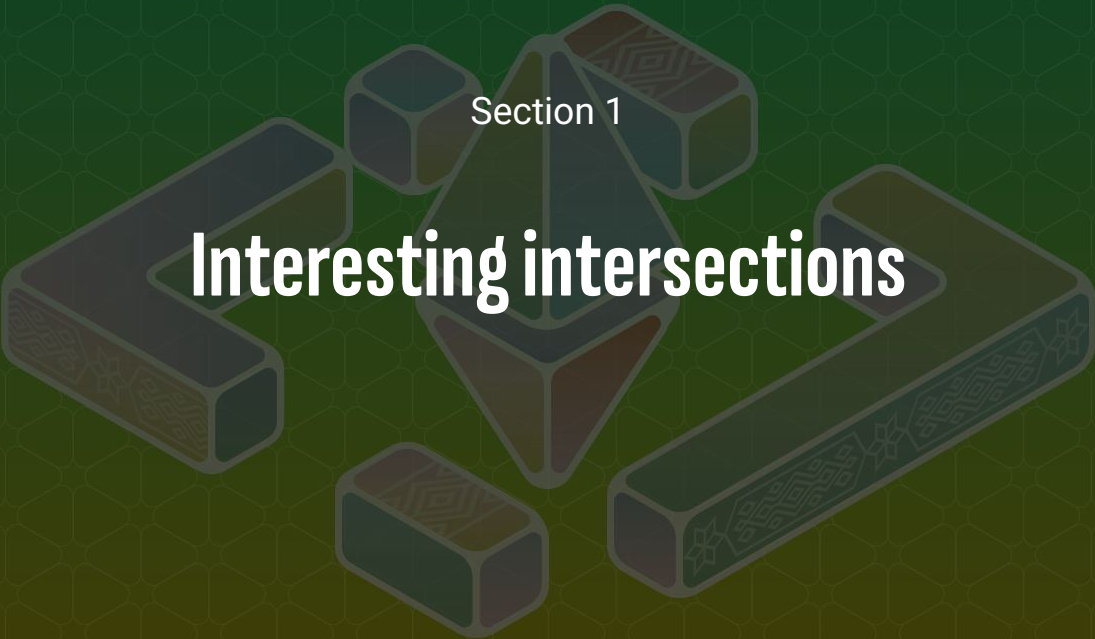


# Stateless-FOCIL

A quick TLDR

**@CPerez**

stateless-consensus

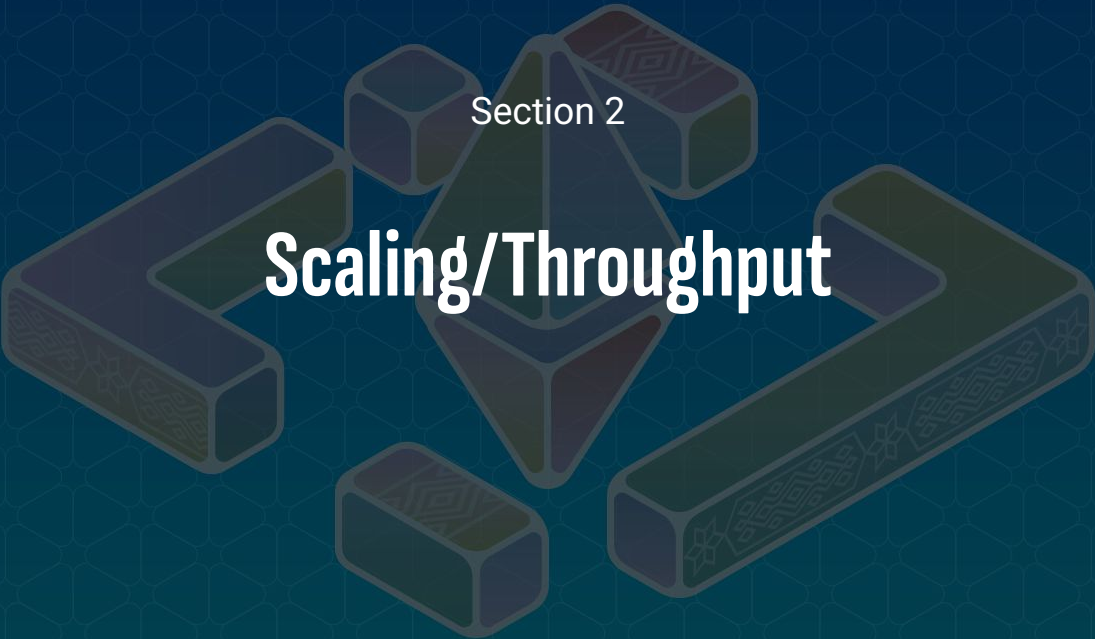
The background is a dark green gradient with a subtle, repeating geometric pattern of hexagons and triangles. In the center, there is a collection of isometric 3D shapes. These include a central pyramid-like structure made of several rectangular blocks, some of which are stacked. There are also several individual rectangular blocks of different sizes and orientations scattered around the central structure. The shapes have a metallic or stone-like texture with some faces showing intricate patterns like zig-zags or floral motifs. The lighting is soft, creating subtle shadows and highlights on the edges of the blocks.

Section 1

# Interesting intersections

# Scaling/Throughput - Networking - Mempool Health - AA



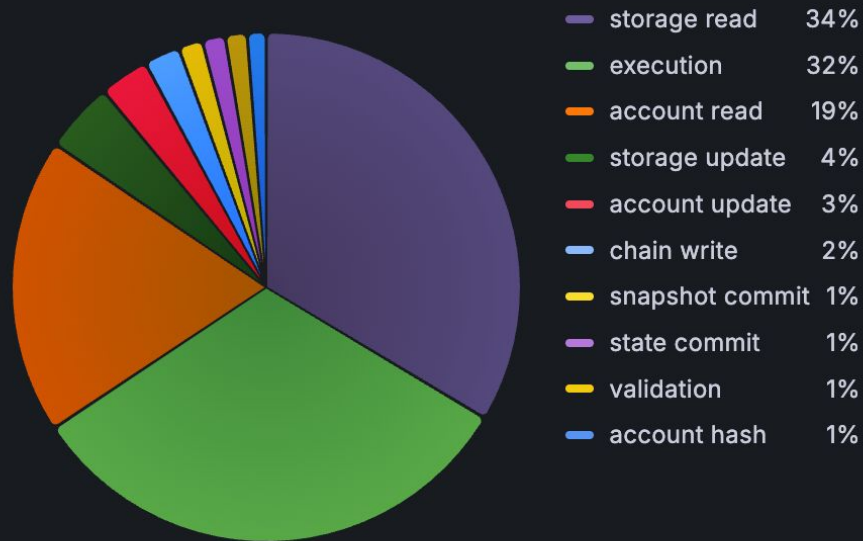
An isometric illustration of several interlocking geometric blocks, including rectangular prisms and a triangular prism. The blocks are rendered in a dark blue color with lighter blue highlights and shadows, giving them a three-dimensional appearance. Each block features a different pattern: some have a grid of small squares, others have larger squares, and some have a repeating geometric motif. The blocks are arranged in a cluster, with some overlapping and others standing alone. The background is a dark blue gradient with a subtle, repeating pattern of small, light blue geometric shapes.

Section 2

# Scaling/Throughput



## Block processing(q=0.5) by mean



## Scaling/Throughput

- Stateless or partial-stateless validators will save 100% of block execution time.
- FOCIL decouples throughput from local block building. Without FOCIL, throughput would need to be set at the level of a local block builder.



## Decoupling throughput from local building

■ Proof-of-Stake ■ Economics ■ protocol-research-call



barnabe

2 Mar 25

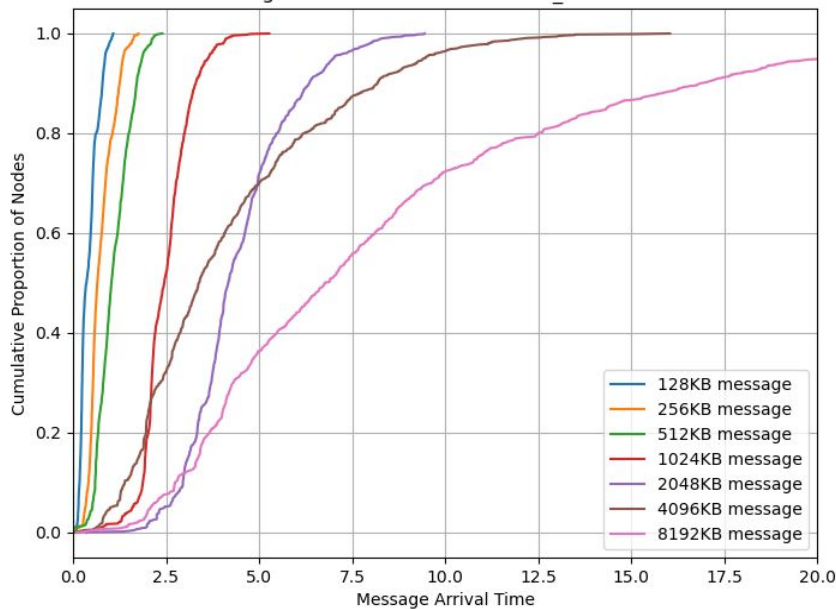
Many thanks to Alex Stokes, Ansgar Dietrichs, Carl Beekhuizen, Caspar Schwarz-Schilling, Dankrad Feist, Data Always, Drew van der Werff, Eric Siu, Francesco d'Amato, Jihoon Song, Julian Ma, Justin Drake, Ladislaus von Daniels, Mike Neuder, Nixo, Oisin Kyne, Parithosh Jayanthi, Potuz, Sacha Saint-Leger, Terence Tsao, Thomas Thierry, Tim Beiko, Toni Wahrstätter for their comments and reviews (these are not endorsements). I bothered a lot of people lol.

Section 3

# Networking

The background features a collection of isometric geometric shapes, including a central pyramid, two large L-shaped blocks, and several smaller rectangular blocks. These shapes are rendered in a dark, muted color palette with subtle gradients and are set against a dark purple background with a faint, repeating geometric pattern.

Message Arrival Times for D=8 & D\_announce=0



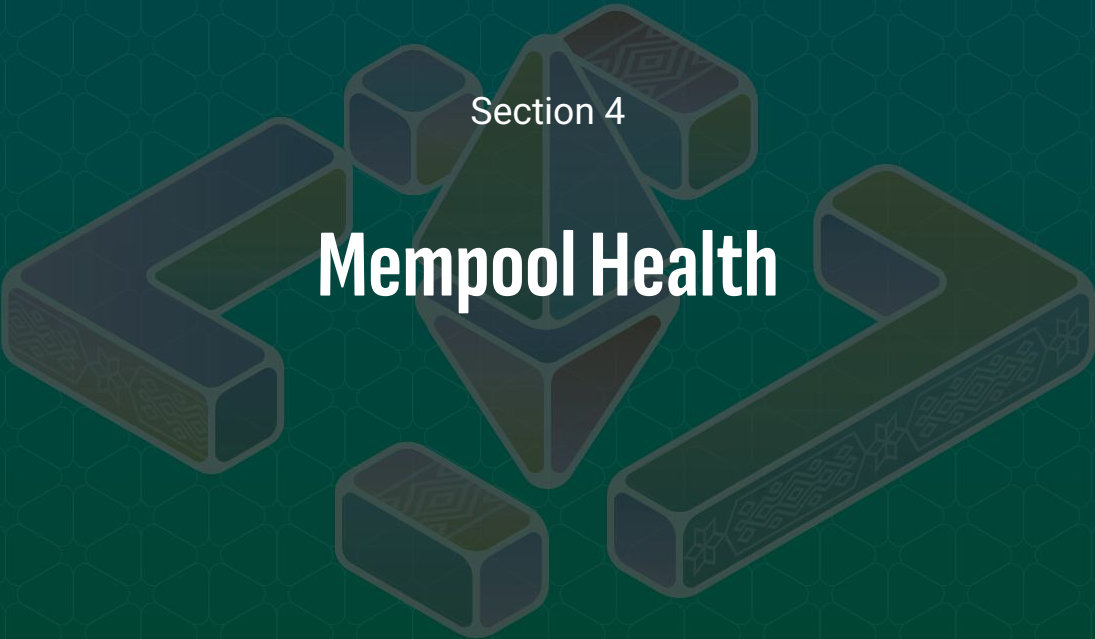
## On Bandwidth Requirements For Validators

### Summary

- With Inclusion Lists, we recommend:
  - 50 Mbps download and 25 Mbps upload for users using MEV-boost
  - 100 Mbps download and 50 Mbps upload for local block builders
- Without Inclusion Lists, if a local block builder does not have enough bandwidth, we recommend that they fill up enough of the block to match their bandwidth constraints. E.g. no blobs.

## Networking

- Concerns aren't massive. Specially since ZKEVMs have tiny proofs (~128-256 KiB).
- Concerning if we move towards any tx-proof entangled submission requirements (See AA later).
- BALs (statediffs) will also take up some size.
- ILs don't need to linearly follow the gas limits. Thus they will stay small, not impacting block-size/IO constraints.



Section 4

# Mempool Health



# Public Mempool health

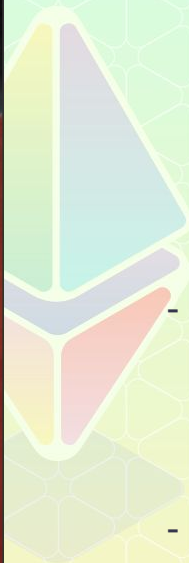
When a client is fully stateless, it loses the precious ability of checking transaction validity.

- Enough funds to pay to even trigger the call.
- Correct nonce is set (not re-used).

Without these, the node can be flooded with invalid txs, and it will forward them and happily include them within the IL.



## Partial statelessness + FOCIL



- The small tradeoff of storing the account-related information allows a fully-compatible Stateless-FOCIL. Preventing IL poisoning and guaranteeing mempool health.
- Inline with the idea of partial-stateless nodes from Vitalik (selective state retention of my interest).
- You can be a **“Partial Stateless” Includer!**



Section 5

# EIP 7701 – Account Abstraction



- VOPS requires the node to store the account-trie state.
- AA requires access to “arbitrary state” to check tx validity.
- There might be workarounds we can take.
  - Facilitate proof construction via protocol changes.
  - Reduce proof size to save on Bandwidth.

