Title:

MEV in l2 & sidechains early exploration

Team:

[Alex Obadia](), [Lakshman Sankar](), [Vaibhav Chellani](), [tcb0](), [Marcello Bardus](), [Forrest Norwood]()

Flashbots contact:

[@alex]()

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Background and Problem Statement

As Ethereum's layer 1 becomes increasingly used, many applications are looking to move to outer layers of Ethereum in order to operate more efficiently (high tx throughput, lower tx fees). Each of these layers have different tx ordering rules from layer 1, different consensus mechanisms and different entities executing the ordering. Intuitively, it seems a lot of existing MEV transaction flow could move to these layers and makes MEV on such layers worth studying in further detail.

In addition, a key property of Ethereum today widely used by most applications in DeFi is atomic composability: the ability to compose smart contracts together and execute multi-contract interactions atomically in a single transaction. However, atomic cross-layer composability does not seem to be achievable. In the case of DeFi, this implies potentially significant liquidity fragmentation which should be a large source of MEV (fragmented liquidity ==> more price dislocations ==> more arbs). However, the mechanics of how it will be captured, and how layers will interact with each other is not clear at the moment.

This initial FRP is an exploration of these themes to start wrapping our heads around the multi-chain, multi-layered world.

Plan and Deliverables

Since this is a rather large topic, we will prioritize l2s with the most adoption and/or with technology and architecture relatively mature and speced out. The goal of this FRP is to come up with 2-3 deeper questions we'd like to study further and share the early results of our exploration in a post(s) that covers:

- what will the liquidity landscape look like once l2s are adopted?

- survey of cross-l2s solutions (Optics, Hop, Connext, Exfil)

- survey of different protocol architectures (cross-L2 liquidity pools vs isolated ones)

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- survey of different protocol architectures (cross-L2 liquidity pools vs isolated ones)

- what are potential scenarios for how adoption of l2s will progress?

- how will l1 gas prices and l2 gas prices behave? can we model some rate of convergence between the two?

- what does the content of eth1 blocks look like when l2s are adopted?

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- what does the content of eth1 blocks look like when l2s are adopted?

- is there a need for transaction ordering preferences within l2s?

- is there a need for transaction ordering across l2s (ie. can we anticipate a need for it)?

- study cross-l2 arbs

- study probabilistic MEV & risk-scoring/weighting in an asynchronous world of l2s and shards, across different mechanisms of finality and ordering

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- are there new forms of MEV enabled/disabled by l2s?

- pockets enabled by low tx high tps

- l2 architectures with MEV mitigation technology

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- l2 architectures with MEV mitigation technology

- analogous designs

- compare how this problem resembles cross-shard composability

- compare how this problem resembles cross-chain composability

- compare how this problem resembles cross-shard composability

- compare how this problem resembles cross-chain composability

References

- [Cross-rollup DEX with smart contracts only on the destination side - Layer 2 - Ethereum Research](#)

- https://twitter.com/gakonst/status/1311342880146042881

- [Optics | Celo Documentation](#)

- https://twitter.com/ConnextNetwork/status/1363933825802248194

- [Cross-shard DeFi composability - Sharded Execution - Ethereum Research](#)

- https://hop.exchange/whitepaper.pdf

- https://twitter.com/matchaxyz/status/1400483371067723780?s=21

- https://github.com/perpetual-protocol/perp-arbitrageur

- [dAMM, an L2-Powered AMM. A DeFi-friendly L2 AMM | by StarkWare | StarkWare | Medium](#)

Output

- [Unity Is Strength: A Formalization Of Cross-Domain MEV](#)

- [The Tradeoffs of Cross-Chain Communication](#)

- A draft article on L2 MEV written by @tcb0

, @forrestnorwood

, @marcellobardus

and @obadiaa

Out of the effort behind FRP-16, Flashbots is now doing research on L2 MEV, MEV on other chains and cross-domain MEV.