

More slides about Ethereum block-space markets (alt. Mechan-stein) (alt. alt. Franken-ism)



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Thursday – August 22nd, 2024
Scroll Protocol Symposium

It takes a village...

- h/t Barnabé for being a great KOL.^{1,2}
- h/t Julian, Thomas, Francesco, et al. on extensive IL work.^{3,4}
- h/t Terence & Potuz on relentless ePBS work.^{5,6}
- h/t Elijah, Max, & Mallesh for talking about concurrent proposers for over a year already.^{7,8}



¹<https://efdn.notion.site/Block-construction-session-bd611621250f45948eff05fcf6a34067>

²<https://mirror.xyz/barnabe.eth/QJ6W0mmmyOwjec-2zuH6lZb0iEl2aYFB9gE-LHWIMzjQ>

³<https://ethresear.ch/t/fork-choice-enforced-inclusion-lists-focil-a-simple-committee-based-inclusion-list-proposal/19870>

⁴<https://ethresear.ch/t/uncrowdable-inclusion-lists-the-tension-between-chain-neutrality-preconfirmations-and-proposer-commitments/19372>

⁵<https://eips.ethereum.org/EIPS/eip-7732>

⁶<https://ethresear.ch/t/builder-bidding-behaviors-in-epbs/20129>

⁷<https://arxiv.org/pdf/2301.13321.pdf>

⁸<https://ethresear.ch/t/multiplicity-a-gadget-for-multiple-concurrent-block-proposers/14962>

Desiderata



- “*Block production is centralized, block validation is trustless and highly decentralized, and censorship is still prevented.*” – Vitalik¹
 - *block production is centralized*
 - ⇒ **design goal #1: encourage builder competition.**
 - *block validation is trustless and highly decentralized*
 - ⇒ **design goal #2: limit the value of validator² sophistication.**
 - *censorship is prevented*
 - ⇒ **design goal #3: preserve the neutrality of block space.**

¹<https://vitalik.eth.limo/general/2021/12/06/endgame.html>

²N.B., I notationally abuse the word *validator*.

Alphabet soup

(hope you like acronyms)



- We are going to describe a few existing proposals that are the building blocks¹ for Mechan-stein.
- Payload-Timeliness Commitee² + MEV-burn³ – (abbr. PTC)
- Execution Auctions⁴
- Fork-choice enforced inclusion lists⁵ – (abbr. FOCIL)

¹ pun intended

²<https://ethresear.ch/t/payload-timeliness-committee-ptc-an-epbs-design/16054>

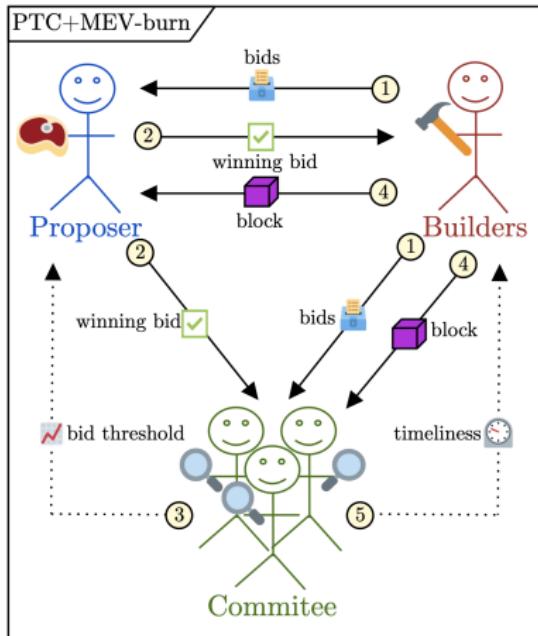
³<https://ethresear.ch/t/burning-mev-through-block-proposer-auctions/14029>

⁴<https://mirror.xyz/barnabe.eth/QJ6W0mmyOwjec-2zuH6lZb0iEl2aYFB9gE-LHWIMzjQ>

⁵<https://ethresear.ch/t/fork-choice-enforced-inclusion-lists-focil-a-simple-committee-based-inclusion-list-proposal/19870>

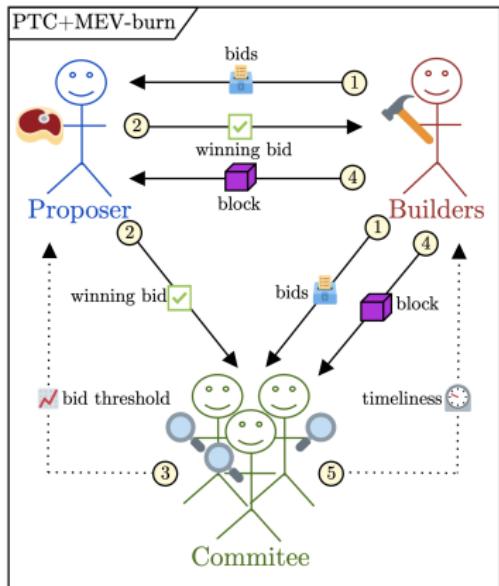
Payload-Timeliness Committee + MEV-burn (PTC)

(if it ain't broke don't fix it)



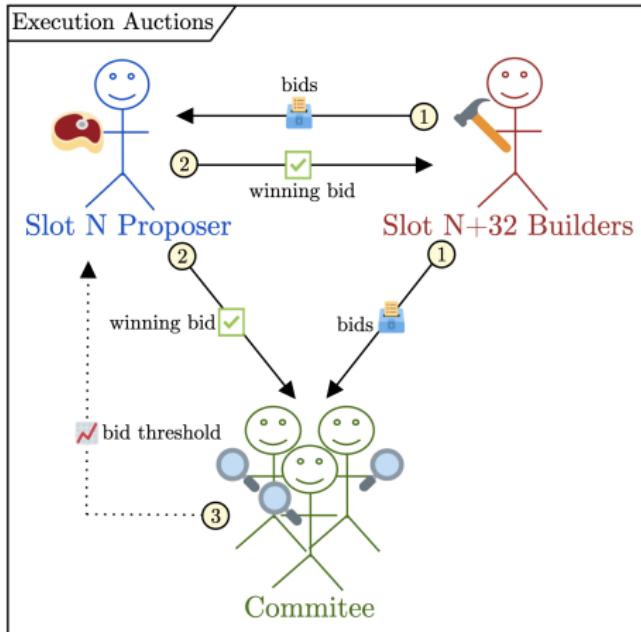
- 1 **The builder bids** in the auction by sending (block header, bid value) pairs to the proposer and the committee members.

PTC analysis



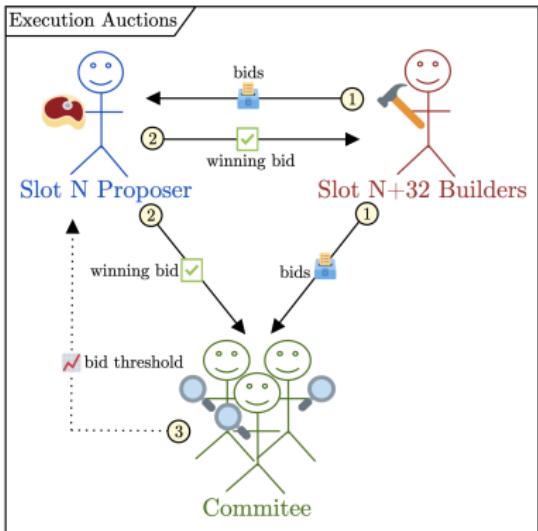
- PTC solves in-protocol fair exchange between builder and proposer.
- PTC primarily implements design goal #1: encourage builder competition.
 - JIT auction, MEV-burn for bid threshold enforcement, permissionless bidding.
- PTC marginally addresses design goal #2: limit the value of validator sophistication.
 - Democratize access to MEV, smooth variance of MEV rewards, suffers from the “value-in-flight” problem.
- PTC does not address design goal #3: Preserve the neutrality of Ethereum block space.
 - Small set of builders responsible for transactions (have exclusion discretion).

Execution Auctions



- ① **The builder bids** in the auction by sending bid value to the proposer and the committee members.

Execution Auctions analysis

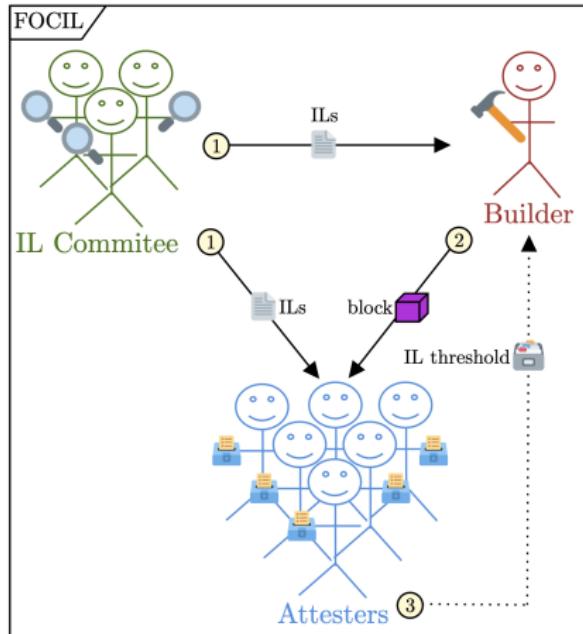


- Execution Auctions solve in-protocol fair exchange between builder and proposer.
- Execution Auctions primarily support design goal #2: limit the value of validator sophistication.
 - Value-in-flight problem reduced by running the auction a priori.
- Execution Auctions do not address design goal #1: encourage builder competition.
 - Makes the best “average” builder win every slot and only resell at a premium.¹
- Execution Auctions do not address design goal #3: Preserve the neutrality of Ethereum block space.
 - Small set of builders responsible for transactions (have exclusion discretion).

¹ <https://arxiv.org/pdf/2408.03116>

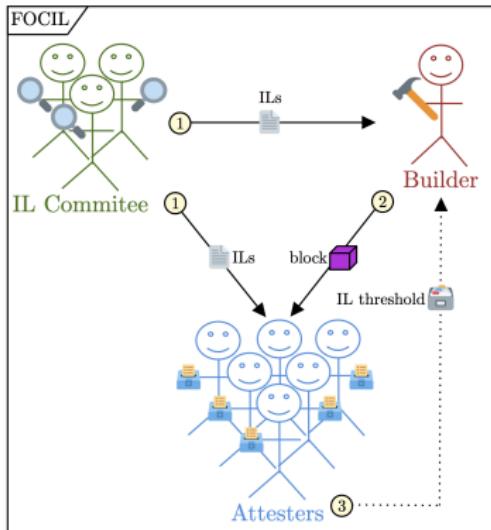
FOCIL

(teamwork makes the dream work)



- ① **The IL committee publishes** their inclusion lists to the builder and the attesters.

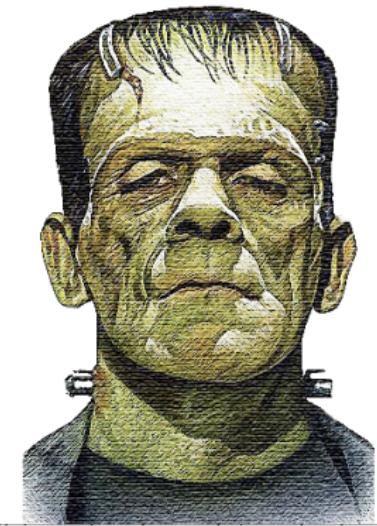
FOCIL analysis



- FOCIL increases the protocol's neutrality by allowing multiple validators to express their preferences in the block co-creation.
- FOCIL primarily contributes to design goal #3: preserve the neutrality of Ethereum blockspace.
 - Block template co-creation increases preference entropy over block contents. Constrains builders' ability to exclude.
- FOCIL addresses neither design goal #1: encourage builder competition nor design goal #2: limit the value of validator sophistication.
 - FOCIL is agnostic to the exact block production process beyond enforcing a block template.

Mechan-stein

- *Observation:* each of the above proposals primarily addresses one of the cited design goals, but none address all three simultaneously.
- ...
- **Thought experiment:** what if we combine them?



Mechan-stein

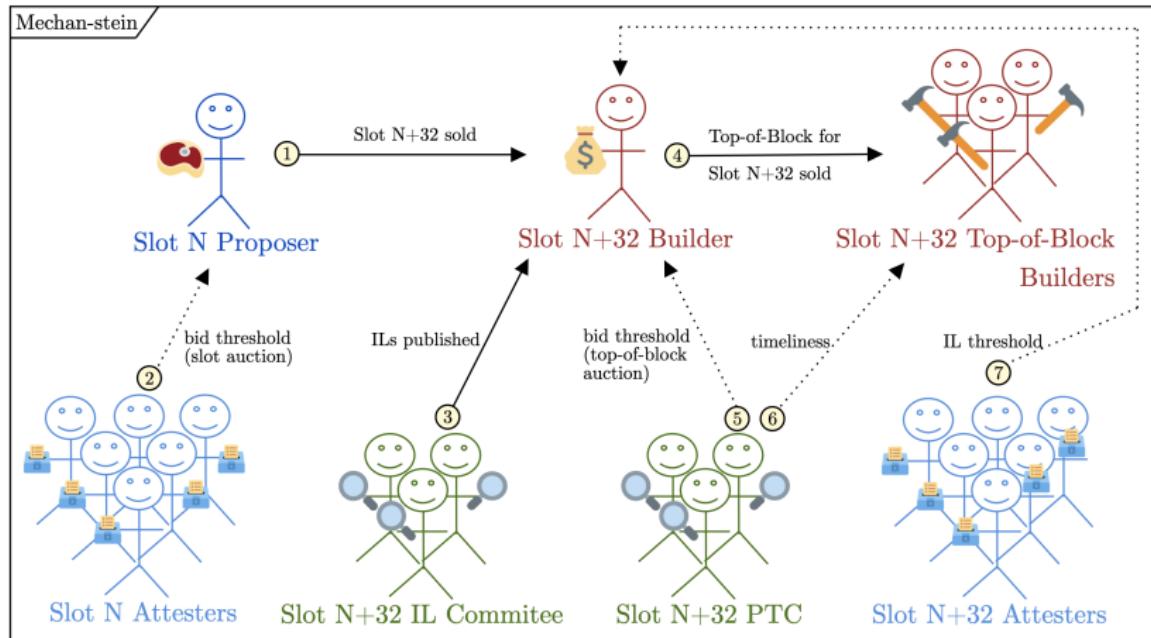
(caveat emptor)

- One small caveat: the JIT auction needs to be a *different item* than the a priori auction.
- **Auction 1 during Slot N** sells the block proposing rights for Slot N+32 and is conducted by the proposer of Slot N.
- **Auction 2 during Slot N+32** sells the Top-of-Block to a (potentially different) builder who specifies the specific set of transactions to be executed first in the block. This auction is conducted just in time by the builder/winner of Auction 1.



¹<https://x.com/malleshpai/status/1748026472923623619>

Mechan-stein

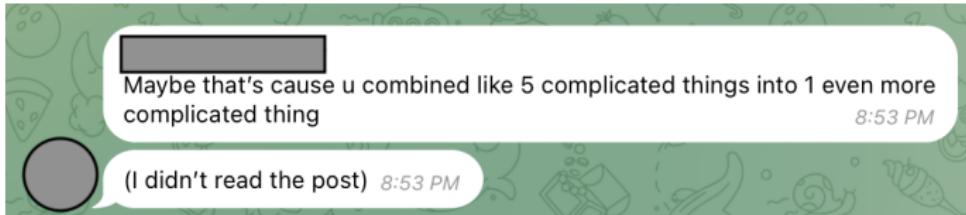


① **The Slot N proposer auctions off the Slot N+32 proposing rights.**

Mechan-stein analysis

- Mechan-stein addresses design goal #1: encourage builder competition.
 - Permissionless, JIT, Top-of-Block auction helps mitigate the risk of multi-slot MEV.
- Mechan-stein addresses design goal #2: limit the value of validator sophistication.
 - The proposer becomes an auctioneer far ahead of time and an IL committee member (which intentionally doesn't carry much economic weight).
- Mechan-stein addresses design goal #3: preserve the neutrality of Ethereum block space.
 - Many participants co-create the set of constraints enforced on the builder of each block.

Mechan-stein critique #1



- Obviously, the complexity is a concern here (I listed it 3× in the post).
- Counter-point: building a decentralized, permissionless, credibly neutral blockchain under massive economic forces isn't easy.
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- Just because other proposals (e.g., Braid) don't *explicitly* give power, doesn't make that power go away – it probably expresses itself *implicitly* (read: more concentrated).¹

¹I find Phil's reasoning on this incredibly clear: c.f., <https://www.youtube.com/watch?v=SBOGdofF4u8&t=620s>, and the discussion of deterministic vs probabilistic arbitrage.

thanks :-)



<https://ethresear.ch/t/mechan-stein-alt-franken-ism/20321>