



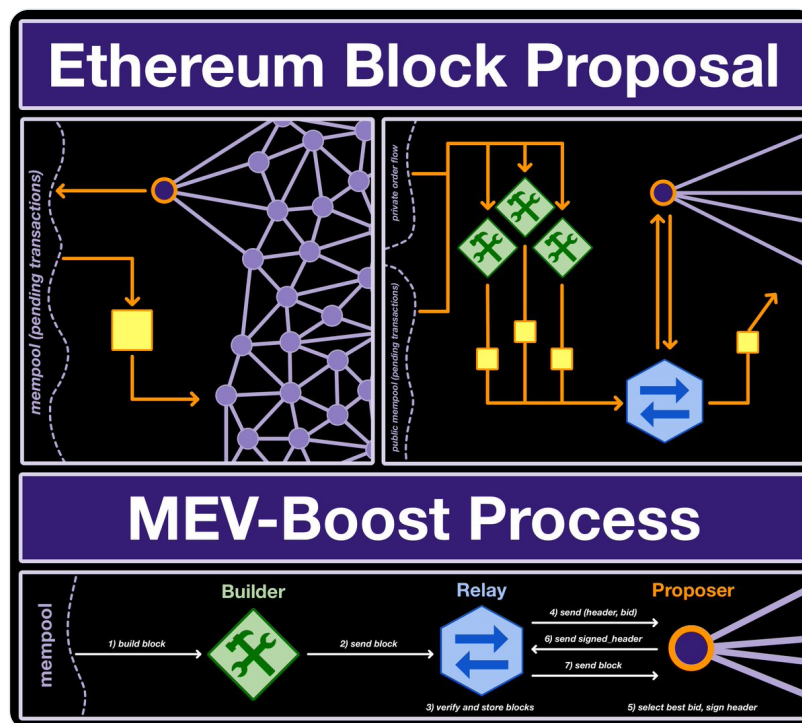
Haym @SalomonCrypto

Nov 16 · 25 tweets · [SalomonCrypto/status/1592762567952257024](https://twitter.com/SalomonCrypto/status/1592762567952257024)

(1/24) [@ethereum](https://twitter.com/ethereum) Fundamentals: Block Proposing and MEV-Boost


What is a block producer? What is MEV-Boost and why is it so important for today's Ethereum? Why do we need long term solutions and what do they look like?


Your guide to trustless block proposing.



(2/24) [@ethereum](#) is a distributed computing platform. A network of 1,000s of computers (nodes) coordinating using Proof of Stake (PoS) to keep the Ethereum Virtual Machine (EVM) in sync.

The EVM is the shared computing platform, the blockchain its history and \$ETH its lifeblood.

**Haym**  
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(1/25) [@ethereum](#): The Complete Story


What is Ethereum and why is it important? How does it work today and what's on the roadmap?


In the Ethereum endgame, why is [\\$ETH](#) so valuable?




A comprehensive mega-thread on the inevitability of Ethereum.



The graphic features the word 'Ethereum' in large purple letters with a white diamond shape behind it, and 'The Mega-Thread' in smaller purple letters below. At the bottom are three small images: a glowing yellow diamond on a dark surface, a cartoonish character in a space suit, and a network diagram with nodes and connections.

12:11 AM · Nov 15, 2022 

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(3/24) PoS is a huge topic, here's what you need to know for this thread:

- a block is a bundle of txns, which are executed in the EVM
- users send pending txns to the mempool
- once per slot, a validator is randomly selected to be a block proposer

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(1/29) [@ethereum](#) Fundamentals: Proof of Stake

We are post-Merge; Ethereum is now secured by validators, 32 [\\$ETH](#) at a time. At first glance, PoS is simple, but under the hood things get complicated.

The ultimate guide to the consensus mechanism at the core of the World Computer.

## Ethereum Consensus



10:07 PM · Oct 10, 2022 

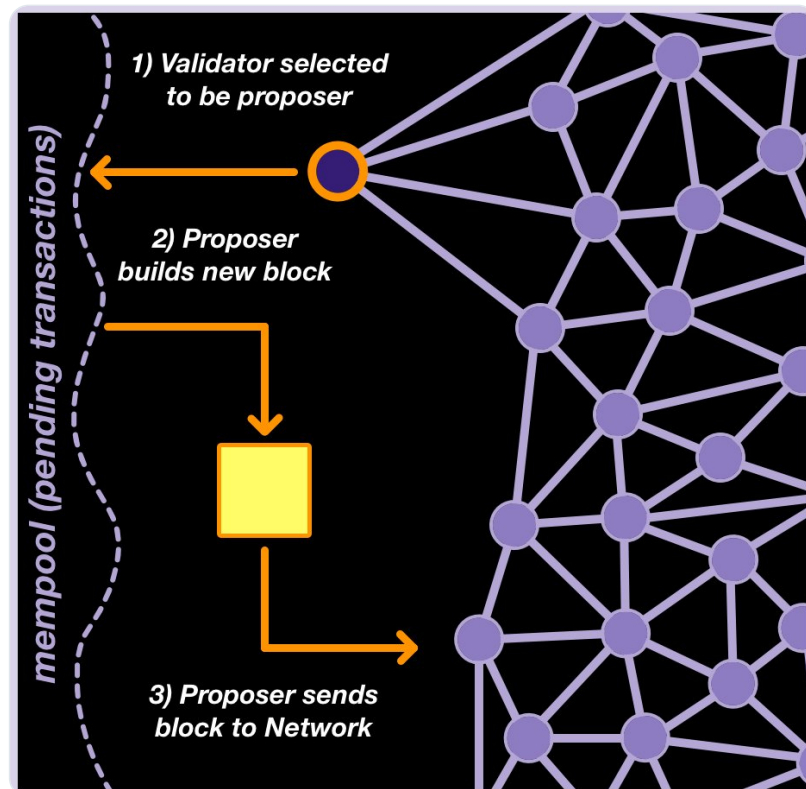
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(4/24) The way it works at the protocol level is simple: the proposer builds its own block. The vast majority of proposers will simply go down the pending txn list until their block fills up.

...but some are making better decisions, thereby making huge profits.



(5/24) MEV stands for Maximum Extractable Value, and represents the general principle that there is monetary value that can be extracted from the having special information, access or privileges in a system.

In [@ethereum](#), the block builder controls the vast majority of MEV.

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(1/15) MEV 101

This time with drawings!!!



1:31 AM · Jun 26, 2022

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(6/24) Here's a simple example. Let's say Alice wants to sell 100,000 \$ETH and Bob wants to buy 1 \$ETH. Alice's order is so large that it will move the price of \$ETH.

If the builder puts in Bob's order before Alice's, Bob will get significantly less \$ETH than if it goes after.

(7/24) A sophisticated block builder can do many things to profit from this scenario:

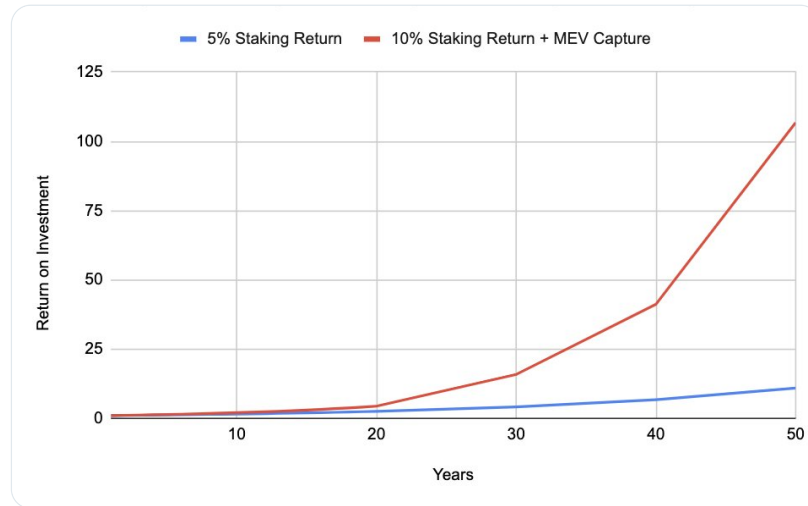
- take a higher tip from Bob to execute his txn first
- create and process a txn to sell some of its own \$ETH before Alice
- create and process a txn to buy more \$ETH back at a lower price

(8/24) There is a big incentive to become good at block building. The better you understand the mempool (and the better access to private order flow), the more you will earn from your staked \$ETH.

And herein lies the problem: left unchecked, MEV will centralize [@ethereum](#).

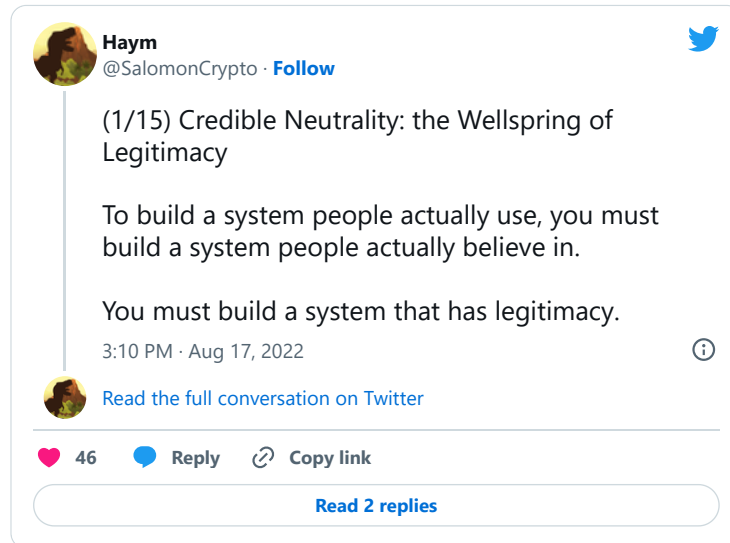
(9/24) The problem is that over time, the impact becomes bigger and bigger. This is the nature of compound interest, the eighth wonder of the world.

Left unchecked, the best block builders will capture more and more \$ETH, and eventually [@ethereum](#).



(10/24) Check out the thread linked in the 2nd tweet of this thread for a deeper discussion on the importance of decentralization, now we'll hand wave through.

Suffice to say that from decentralization flows credible neutrality. From credible neutrality flows the value of \$ETH.




(11/24) Fortunately, back in 2020 [@thegostep](#) and the team at Flashbots ⚡️🧠 foresaw this issue and began building.


Even before the Merge was complete and [@ethereum](#) finally switched to PoS, we already had a temporary solution up and running (and a full solution in the works).

(12/24) <NOTE>

Quick reminder how [@ethereum](#) nodes work. A node is a computer that runs two pieces of software, an execution client (managing the EVM) and a consensus client (managing PoS).

</ NOTE>

**Haym**  
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(1/16) [@ethereum](#) Basics: Nodes

At the end of the day, Ethereum is running atop IRL computers, each running the software that powers the World Computer. But what actually is a node? How does it relate to the different parts of Ethereum? How do all the pieces communicate?

### (Post-Merge) Ethereum Nodes

An Ethereum node is a real computer running software. Agents in the Ethereum network are called validators. One node can support many validators




Node (Hardware) → Node (Software) → Validators

A node is made up of two pieces of software (clients) that communicate directly via a JSON-RPC interface and externally via their own P2P interfaces.

**Consensus Client**


- Beacon chain
- Beacon state
- Execution chain
- Operational mempool
- P2P Interface






**Execution Client**

- Ethereum Virtual Machine
- Execution state
- Transaction mempool
- P2P Interface

2:30 AM · Nov 8, 2022

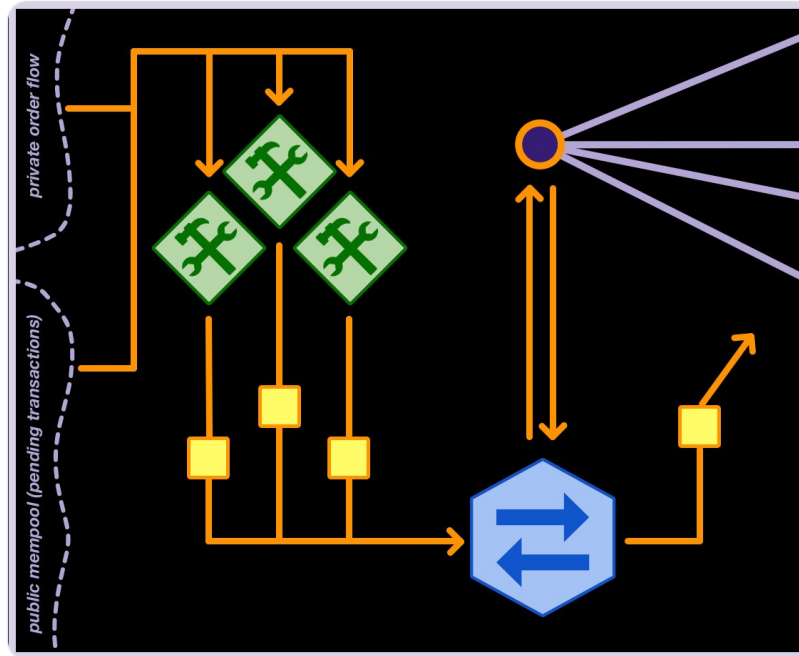
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(13/24) MEV-Boost is an extra piece of node software that gives it the ability to source blocks from a block relay. It will always be able to build blocks itself, but it can look at headers and take blocks from specialized block builders...

...builders who will pay to be picked.



(14/24) Think about our example. Say a block builder knows Alice is going to move the market and can calculate that by selling before and buying back after, he can lock in an extra 50 \$ETH.

He might be willing to bid up 49 \$ETH to be picked, as he will still lock in a profit.

(15/24) The purpose of this system is to disassociate the difficult, knowledge/capital/experience-heavy work of building blocks with the financial rewards for proposing them.

Every proposer can share in the returns offered by MEV simply by picking the best bid during their slot.

(16/24) MEV-Boost is an incredible product and a huge step in decentralizing [@ethereum](#), but MEV-Boost is not perfect.

In order to understand why, we need to dig a little deeper into how MEV-Boost actually works (not too deep).

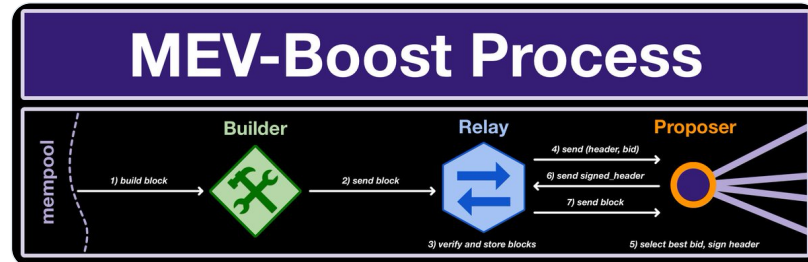


(17/24) First, we must introduce ourselves to the three players:

Builders, responsible for crafting the most profitable blocks possible for each slot.

Relays, responsible for acting as the intermediary.

Proposers, which are the [@ethereum](#) validators proposing the block.



(18/24) The problem with MEV-Boost is the relay, an entity that has to be trusted not only by the builder but also by the proposer.


The builder must trust that the relay will keep his block secret until after the proposer has paid the builder's fee.


(19/24) The proposer has to trust that the relayer has confirmed the block and the bid are valid, without being allowed to see the underlying transactions.

The former is particularly important, as an invalid block will result in slashing.

(20/24) Fortunately, we have solutions; we'll briefly discuss two.

But I want to take a moment to recognize that while MEV-Boost isn't perfect, it's a HUGE leap forward. With MEV-Boost, ALREADY plug-and-play node operators (like myself [@Rocket Pool](#)) are experiencing MEV yields.

**Rocketscan**  
@RocketscanIO · [Follow](#)



Smoothing pool gets a 42.6 ETH proposal  
[rocketscan.io/proposal/49669...](https://rocketscan.io/proposal/49669...)


Slot	4966945
Epoch	155217
Date	Oct 22 10:29:00
Graffiti	RP-GL v1.6.5
Node	0xAFEBae00478b2997E0F8F264b144be74bd3c7f95
Minipool	0x1A2195A244ee1904d7834C41F0cdcdABF624bC3
Validator Index	430592
Validator Pub Key	0xb1ca084bd2394f39a6462770650aa37...


**Execution Block**


Block	15802456
Fee Recipient	Flashbots: Builder
Extra Data	Illuminate Democratize Distribute
Base Fees	0.16402 ETH
Priority Fees	0.0203196 ETH
Extra MEV Profit	42.5920652 ETH
Total Reward	42.6123848 ETH
Base Fee	14.7761638 gwei

TX	FROM	TO	VALUE
0xb67...	Flashbots: Builder	Rocket Pool Smoothing Pool	42.6123848 ETH

9:57 AM · Oct 22, 2022

 87

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(21/24) The first solution is to add the concept of MEV-Boost and into the core [@ethereum](#) protocol. This would remove the need for relays and allow us to cryptographically verify everything without leaking blocks early.

We call this idea Enshrined Proposer-Builder Separation.

**Haym**  
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(1/26) [@ethereum](#) Roadmap: Proposer-Builder Separation

The Merge was successful, [\\$ETH](#) is Proof of Stake! As the era of miners closes, we find ourselves entering a new meta: the age of MEV

Your guide to existential threat facing Ethereum... and the plan to vanquish it



The diagram illustrates the Ethereum architecture and the proposed changes for Proposer-Builder Separation (PBS). On the left, 'Ethereum Nodes' are shown connected to a 'Consensus Layer' and an 'Execution Layer'. In the center, 'Block Proposers' and 'Block Builders' are shown, with arrows indicating their interaction with the Consensus Layer. On the right, a purple box labeled 'Ethereum Roadmap' features the Ethereum logo and the text 'Proposer-Builder Separation (PBS)'.

11:38 PM · Sep 15, 2022

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(22/24) A second idea, proposed by [@sreeramkannan](#), leverages new ideas about the nature of \$ETH to transform the trusted components of MEV-Boost into untrusted systems secured by [@ethereum](#).

This is another place where the thread from tweet 2 is helpful.



<https://www.youtube.com/embed/ywJNXIUSgQw>

(23/24) Both of these solutions require some modifications of the MEV-Boost model. Most importantly, MEV-Boost risks a market of block builders that censor transactions (for whatever reasons).

Fortunately, there are lots of good ideas for solutions.

<https://notes.ethereum.org/s3JToeApTx6CKLJt8AbhFQ#Hybrid-PBS-can-we-use-proposers-only-for-inclusion-of-last-resort>

(24/24) But let's not get too far ahead of ourselves; we are barely post Merge.

There is a lot more to build before we move on from MEV-Boost.

More of a long-form reader? Try this:



**Haym**  
[@SalomonCrypto](#)



## Block Proposing and MEV-Boost


Block Proposing and MEV-Boost | Haym

(1/24) @ethereum Fundamentals: Block Proposing and MEV-Boost What is a block

(1/27) @ethereum Fundamentals: Block Proposing and MEV-Boost What is a block producer? What is MEV-Boost and why is it so important for today's Ethereum? Why do we need long term solutions and what ...  
<https://typefully.com/SalomonCrypto/xichoZL>

Like what you read? Help me spread the word by retweeting the thread (linked below).

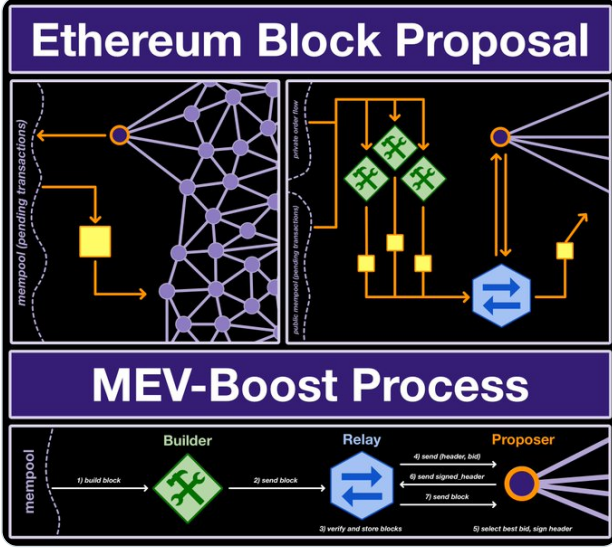
Follow me for more explainers and as much alpha as I can possibly serve.

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(1/24) @ethereum Fundamentals: Block Proposing and MEV-Boost

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Your guide to trustless block proposing.



6:12 AM · Nov 16, 2022

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