

What are Flashbots?



Flashbots is a research and development organization that works to mitigate the negative externalities of Miner/Maximum Extractable Value (MEV) extraction techniques and avoid the existential risks MEV could cause to stateful blockchains like Ethereum. The organization's primary focus is to enable a permissionless, transparent, and fair ecosystem for MEV extraction.

What Is MEV?

Miner/Maximum Extractable Value (MEV) represents the amount of money one can extract from the blockchain by reordering, inserting, or censoring transactions. Different DeFi implementations leak MEV when users send transactions to their systems, and as a result, bot operators and miners make profits by searching for and capturing the leaked value.

This revenue extraction process has been taking place for years. That is why in January 2020, the Flashbots organization decided to create an MEV website explorer that helps track MEV transactions. The summer of 2020 saw new DeFi projects create many new arbitrage opportunities that led to the skyrocketing of MEV values. This resulted in many negative consequences on Ethereum, from high gas fees to reverted transactions from chain congestion.

Enter Flashbots

What are Flashbots?

Due to blockchain congestion, the Flashbots organization came up with a process that allowed all participants (users, bot operators, and miners) to benefit from MEV opportunities. The organization designed and implemented a system to allow bot operators to send transactions directly to miners. Miners would then include these transactions in the next block if they are profitable. As a result, users were assured their transactions would be executed, and miners got to earn additional fees for including the transactions into blocks.

Flashbots appeal to:

- Users and bot operators looking for fast access to block space without worrying about overpriced or reverted transactions.
- Users and bot operators looking for sniping, front running, back running or sandwich protection for their transactions.
- dApps and protocols that need to solve issues with advanced use cases. For instance, sending a basket of transactions at one time for atomic execution.

Think of Flashbots as an enhancement to the Ethereum protocol that adds a network layer for users to send private transactions to miners. These transactions are not in the mempool, so other participants cannot see them. Normally users will submit their transactions to a private transaction pool plus a fee, and miners will include these messages in the next block. However, to make the auction process work, the Flashbot team had to create a go-ethereum client (Geth) client software patch known as MEV-Geth. Also, an MEV relay acts as a transaction bundle relayer. Combining these two enhancements prevents gas wars and failed transactions, and eliminates front-running vulnerabilities.

Who Uses Flashbots?

Two parties participate in Flashbot auctions: Searchers and Miners. Let us go over how to use Flashbots as either party.

Searchers

As a searcher, you will submit transaction bundles directly to relayers instead of the traditional Ethereum P2P network. Transactions submitted directly to the Flashbots relayer are private and cannot be seen by the rest of the network. You can pay for the service by increasing gas or a direct ETH transfer to the miner's address (which is conditional on the transaction processing).

What are Flashbots?

As a searcher, you need to do the following to access the Flashbots network:

- A private key that is used for identification
- A way to interact with the Flashbots network. Flashbots runs a relay and you will send bundles to relay.flashbots.net.
- A "bundle" for your transactions

Miners and Pool Operators

A miner will collect all the searcher bundles and produce a block. Miners traditionally run the Geth client and order transactions by gas price. However, miners connected to the Flashbots network run a version of the mev-geth client maintained by Flashbots. The mev-geth nodes will evaluate bundles using the first price sealed bid auction, and then the system will pick the most profitable bundles to place at the top of the block. The miner can evaluate all the bundles received and combine those which do not conflict to produce the most profitable block possible.

Miners will have full access to bundle content and can reorder, steal, and censor bundles sent to them by searchers and relayers. Therefore, searchers need to keep in mind that not all miners are honest.