Differences with Ethereum

While Sei features full EVM compatibility, there are some differences between Sei's EVM and Ethereum itself.

EVM Differences

Unlike Ethereum mainnet which is on Cancun for its execution layer, Sei uses the Shanghai version of EVM. This means that features like blob transactions are not supported on Sei.

Opcode Differences

PREVRANDAO

Since Sei doesn't rely on the same pseudo-randomness way of determining the next validator like Proof of Stake (PoS) Ethereum does, it doesn't really have theRANDOM artifact that can be set asPREVRANDO 's return value. In SeiPREVRANDAO is set to return the hash of the current block time. For strong randomness guarantee needs in contracts logic, it's advised to use external verifiable oracles (as is advised on Ethereum itself).

COINBASE

Coinbase address on Sei is always set to (the EVM address of) the global fee collector.

State Root

Since Sei uses AVL-tree instead of Merkle Patricia Trie (MPT) for data storage, Sei doesn't have per-account state root. The global state root is the AVL-tree root which is also not equivalent to Ethereum's overall state root (which is a MPT root)

Block Hash

The block hash on Sei is computed based on the block header in Tendermint data format, and is different from Ethereum's block Hash as a result.

Base Fee & Tips

Sei supports all transaction types. However Sei's base fee does not fluctuate due to block congestion. Base fee will always be 0 on Sei - all fees will go to the validators (i.e. tips) and none will be burnt.

Block Limit

Sei has a gas limit of 10M on pacific-1, compared to Ethereum's 30M.

In addition, Sei also has a byte size limit of 21MB, whereas Ethereum doesn't have byte-denominated limits.

Non-EVM Transactions

On Sei there exists non-EVM transactions which may update states accessible by EVM transactions. The simplest example would be bank balances, which may be updated by both native Cosmos bank send transactions and EVM send transactions. As a result, if certain offchain applications only parse EVM transactions, they may find certain state changes unattributable to any EVM transaction.

Finality

Sei has instant finality, meaning that commitment levels of "safe", "latest", "justified", and "finalized" on Ethereum are all the same thing on Sei.

Pending State

On Ethereum the block proposer would execute its proposed block first (and update its local state) before broadcasting the proposal to others (the updated state would be marked "pending" until the node is accepted by other nodes).

However, on Sei, the block proposer would broadcast first and only execute the proposal if it's accepted (i.e. every node would execute the block at roughly the same time), so Sei does not really have a window when "pending state" exists.

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