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The Merge – a milestone event in the DeFi universe

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On 15th September 2022, Ethereum, the world's second-largest cryptocurrency network by market cap, went through "The Merge", transitioning from the Proof-of-Work (PoW) to the Proof-of-Stake (PoS) consensus mechanism. Even though the Merge does not expand its network capacity and reduce its gas fees immediately, the network upgrade acts as the prologue for further progress in the Ethereum Roadmap.

Proof-of-work (PoW) is the consensus mechanism that was adopted by the Ethereum mainnet since its genesis and that is currently employed by Bitcoin, the oldest and largest cryptocurrency network by market cap. The "work" in PoW refers to mining, where miners expend a great deal of energy, in the form of computing power, to build blocks on the blockchain. Subsequently, miners broadcast their winning block to a network of nodes, who then validate included transactions and block templates to meet the consensus rules.

Proof-of-Stake (PoS) is the consensus mechanism adopted by Ethereum after the Merge and other popular blockchains such as Solana, Polkadot and Cardano. In PoS, Ethereum can be seen as a distributed database of nodes that run software to verify new blocks and the transaction data within them. In order to reach a consensus on the network, the majority of nodes must be in agreement. Nodes are run by validators, who are normally chosen at random each time a new block is to be added. To date, Beacon Chain has over 430,000 validators. To fulfill the participation requirement of a validator, one must deposit 32 ETH. In return for securing the network, validators will earn ETH as reward. Compared to PoW, PoS has less ETH issued in order to incentivise the participation of the validators.

From a sustainability standpoint, the new PoS system has better energy efficiency and consumes roughly 99% less energy than the computation heavy PoW system. As a result of the Merge, an estimated 0.2% of future electricity consumption can be reduced worldwide.

The recent upgrade provides both users and developers in Ethereum with stronger security. The Merge discourages attacks by bringing about significant increases in both economic thresholds and difficulties. To put numbers into perspective, an attacker would have to spend USD35 billion to attack the network in PoS, which is around 3.5 times more than what would be required in PoW.

Validators are responsible for ensuring that newly propagated blocks over the network are valid and occasionally creating new blocks themselves. Due to the lower barriers to entry, individual validators without sophisticated hardware can stake ETH and hence secure the network from home, expanding the ETH validator network and thus reducing centralization risk.

The PoS system comes with an incentive mechanism to reward good validators and penalise bad validators. “Slashing”, as commonly heard, refers to the action of penalising bad validators with a loss in their staked ETH deposit.

Amongst all attacks, the 51% attack is one of the most maliciously named ones. This happens when over 50% of the nodes are compromised, allowing the controlling parties to alter the blockchain. Just a week after the network enhancement, critics pointed out that ETH is more centralised as only around 33% of validators, as compared to 51% of miners in PoW, are able to gain control of the ETH network in PoS. To counter this argument, ETH Foundation stated that the 33% or 34% attack merely refers to the theoretical worst-case scenario. Given the geographic distribution of the Ethereum community, a realistic threshold for an attack would be 66%.

Currently, Lido, a liquid staking service provider, controls the most staked ETH, followed by Coinbase, a cryptocurrency exchange. Together, Lido and Coinbase control about 43% of Ethereum validator pools as of the time of writing.

There are numerous decentralized applications (dApps), decentralized finance (DeFi) protocols and non-fungible tokens (NFTs) on the Ethereum blockchain. Among all the blockchains, Ethereum ranks at the top based on cumulative revenue since launch.

TradFi analysts use traditional methodology and logic to understand the cryptocurrency market. Below are some of the approaches:

- Same as other asset, expectations for higher future interest rates (the discount rate) and slower economic growth affect (the growth rate) affect the valuation of the risky asset class
- There are different schools of thought regarding the valuation - discounted cash flow on staking yields; asset/ business market capitalisation; price to sales ratio (P/S) or revenue growth based on income to miners, stakers and liquidity providers, etc.
- Analysts like to take into account the correlation of cryptos with other asset classes such as Equities (S&P 500, NASDAQ, etc.), Fiat Currency (USD, GBP, etc.) and Commodities (Gold, Silver, etc.)
- There are several broad-based indices measuring the performance of a basket of recognised cryptocurrencies, serving as benchmarks of the cryptocurrency market. The selected cryptos usually fulfill certain threshold, such as liquidity and market capitalization.

Miners played a significant role in the Ethereum 7-year PoW era. Along with the rising energy cost and falling hardware prices, the merge affects their bottomline inevitably. They produced more than one-third of ETH in circulation today. As their role on Ethereum comes to an end, they turn to mining other proof-of-work coins, such as ETH Classic and EthereumPOW.

The future development of Ethereum will focus on addressing developers' concerns around gas fees, scalability, and throughput. On Ethereum's road map are four other independent phases happening in parallel, namely the "surge, verge, purge, and splurge" — all of which target to make the network more scalable, private, and secure.

Ethereum is more scalable by introducing "sharding", a horizontal scaling technique that stores the data across different networks and provides secure distribution of data storage requirements. The technique enhances Ethereum by reducing the computation effort, improving latency, and allowing the network to process a larger volume of transactions faster. "By the end, Ethereum will be able to process 100k transactions per second (TPS).", stated by Buterin. The ETH founder also predicts gas fees - the cost of carrying out a transaction on the Ethereum blockchain - will drop in the future owing to "rollups"—a Layer 2 technology that processes transactions off-chain but leverages Ethereum's security.

It would be exciting to see how other Layer 1 blockchains will evolve and how other Layer 2 blockchains, such as Optimism, Arbitrum and Starkware will race for market share. Winners take all.

About the Author

Kenneth Kwong, CFA, is a member of FinTech and New Economy Committee at CFA Society Hong Kong. Prior to becoming a web3 practitioner, Kenneth started his career as a Management Trainee at HSBC, where he gained experience supporting large corporates and small and medium-sized enterprises, managing loan portfolios across industries, and developing governance frameworks and policies. He learnt cryptography in Peking University in 2016.

