Ethereum Merge complete. What's changed?

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The Ethereum network expanded the Bitcoin-conceived idea of a decentralised blockchain and added new functionality to the blockchain. It introduced programmable applications and smart contracts that would automate decisions and transactions. Smart contracts are self-executing pieces of code that create conditions for a certain action to take place. This means that it is the code that decides whether an action can take place or not, not a company or individual. This was a major breakthrough. Instead of having to rely on a centralised institution, or the subjective judgement of a person, the code would execute the transaction after certain code-determined conditions were met. Instead of having to trust a company or individual to conduct a transaction, the Ethereum network created a decentralised peer-to-peer network architecture where trust was decentralised. Ethereum developers say their main goal was to create a settlement layer for the internet of value.

What are the main use cases for Ethereum today?

Today, many entrepreneurs are using the Ethereum blockchain to create decentralised applications (dApps) which utilise Ethereum's smart contracts and data storage. Over the past three years, the most notable application areas have been in non-fungible tokens (NFTs), decentralised finance applications (DeFi), stablecoins and decentralised autonomous organisations (DAOs).

Users of the Ethereum network must pay in Ether to use the blockchain. For example, in order to buy an NFT, the buyer must have a crypto wallet and (most often) own some Ether to buy these tokens. In the area of DeFi, many new protocols are being built to create decentralised peer-to-peer networks for lending, borrowing, insurance, credit, asset issuance, asset management, automated portfolio management etc. Many of these protocols have been built on the Ethereum blockchain.

What is the Merge?

The Merge is part of an upgrade to Ethereum, which has been years in the making and was finally successfully executed on 15 September 2022. The first phase of the upgrade took place in December 2020 when the consensus layer of the blockchain, called the Beacon Chain, went live. This was a new parallel blockchain that ran alongside the Ethereum Mainnet and was tested heavily until it was merged with the Ethereum Mainnet.

The Merge has changed the way transactions are verified on the Ethereum blockchain. The transaction validation process has moved from Proof-of-Work (PoW) to Proof-of-Stake (PoS). In PoW, the process was handled by owners of expensive computer equipment (the miners) who raced to solve complex mathematical problems and, as a reward, received newly minted Ether and part of the user transaction

fees. In PoS, the transaction validation process is handled by owners of Ether and validators who are then randomly chosen to validate transactions and secure the network. The more Ether the validator owns, the greater the likelihood of being chosen as a validator.

What does the Merge mean for an investor in Ethereum?

For an investor, the Merge creates a yielding asset as Ether holders can now earn rewards through staking and participating in the network consensus. Although staking has been available on the Beacon Chain, staked Ether cannot be withdrawn yet. In early September 2022, there were 13.5 million Ether staked on the Beacon Chain by over 422,000 active validators, meaning that nearly 11% of Ether supply was staked.

Pre-Merge yields paid to validators to validate the transactions of the network were around 4-5% per annum, but this is expected to increase as future rewards will also include the net transaction fees previously paid to miners. Transaction fees are the payments made by users of the Ethereum blockchain for the right to use the platform. As the number of validators increases, the validator portion of the yield is expected to come down. However, as the usage of Ethereum increases, the net transaction fees are likely to increase.

Many industry participants estimate that the combined staking reward and transaction fee will increase the real yield generated by the network to 5-7% per annum. Due to the potentially deflationary nature of Ether, the yield could be even higher. Holders of Ether not willing to stake their coins will not generate any staking rewards.

Will the move to PoS create a deflationary asset?

In the long term, potentially yes. This is another main benefit of the Merge. As the Ethereum network needs less computational power to secure the network, the number of new Ether issued per year is expected to decline from an annual 4-5% supply growth to a net issuance of 0.5% per annum. Assuming the demand for Ether remains the same, a decline in supply could potentially lead to an appreciation in the price of Ether.

Ether does not have a set maximum supply limit. Its supply is collectively agreed with developers and other market participants. With PoW the miners received a reward for approving the transactions and mining the blocks but were also paid user transaction fees (gas fees). In August 2021, the Ethereum network implemented the Ethereum Improvement Proposal (EIP-1559) which proposed that a proportion of gas fees be burned and permanently removed from the token supply. This has resulted in approximately 50% of historical Ether rewards (roughly $8.6 billion) having been burned as of September 2022.

Will PoS solve the issues of high transaction fees and network congestion in the Ethereum network?

One of the reasons users became attracted to other Layer 1s in 2021 was the high transaction fees (gas fees/user fees) charged by the Ethereum network. In some cases, dependent on the network congestion, buying a cheap NFT might cost up to $100 in gas fees. This is because, at its current decentralised capacity, the Ethereum network can only handle approximately 15-20 transactions per second, which is clearly

a problem for some applications and leads to congestion in the network. In comparison, Visa, a major payment processor, can handle up to 1700 transactions per second. This became a challenge in 2021 when the usage of NFTs increased significantly. Gas fees depend on the network demand relative to the network's capacity.

Ethereum's move to PoS will not yet significantly reduce gas fees. Another upgrade is required for this to happen. In 2023, the network is expected to go through 'sharding', which is the act of splitting the network's data into smaller portions to enhance capacity and improve scalability.

According to the creator of Ethereum, Vitalik Buterin, the upgrade to Ethereum is only 55% complete after the Merge. Four more major upgrades are needed (the surge, the verge, the purge and the splurge) for the network to achieve the very best transmission speeds which would make Ethereum one of the fastest blockchain networks available.

Will the PoS make the network more secure?

Many Ethereum proponents argue that PoS will make the network more secure as everyone with Ether can participate in the network validation process. One must have 32 Ether to become a validator, but everyone can stake their Ether on the staking pool. However, while the number of validators on the Beacon Chain was diversified (over 422,000 validators) pre-Merge, the largest validator, Lido Finance (a DeFi protocol), controlled over 30% of the transaction validations. On top of that, three exchanges (Coinbase, Kraken and Binance) controlled another 30% of validations. This raises questions about centralisation and censorship and cannot be ignored. We calculate that a potential direct 51% attack on the Beacon Chain would have cost over $11 billion in early September 2022 when there were more than $13.5 million of Ether staked with an Ether price of $1620.

Does the Merge make Ethereum more ESG-compliant?

On the environmental front, the move to PoS is a major positive. It is expected that the Ethereum network's energy consumption will reduce by over 99%. This is because the miners' energy-consuming graphics processing units (GPUs) will be replaced by validators' servers. The move to PoS will significantly reduce the carbon footprint of the network and make the asset more appealing for ESG-conscious investors.

When can I withdraw my Ether from staking?

Until now, Ether-stakers have not been able to withdraw their Ether from the Beacon Chain. We expect that the next smaller upgrade on the network, called the 'Shanghai upgrade', will enable unlocking of staked Ether and will take place in early 2023. We also expect there will be rules that limit the exits of validators to prevent massive amounts of Ether being withdrawn at any one time and making the network more vulnerable to attacks.

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