Ethereum 2.0 – A Review of the Causes and Consequences of the Upcoming Update to Ethereum's Mainnet

Daniel Ramos, Gabriel Zanko, *MobileyourLife – Bogotá, D.C., Colombia*

Abstract

The upcoming launch of the Ethereum 2.0 mainnet, that will move the popular network from a Proof-of-Work consensus algorithm to a Proof-of-Stake model, is set to bring the second most popular cryptocurrency to a new level that is expected to fulfill the necessities of an ever-increasing userbase in terms of numbers and demands

***Index Terms* – Ethereum, blockchain, Proof-of-Stake, scalability, stability, security.**

I. Introduction

Since its launch in mid-2015, Ethereum has established a strong hold as the main altcoin in the market, thanks to their robust validation algorithm based in a Proof-of-Work mechanism, similar to Bitcoin, but also allowing for users to take advantage of the network in two ways: minting private tokens and creating smart contracts.

Private tokens offer new platforms a way to create cryptographic tokens that can be generated, destroyed, and distributed in any way defined by the parameters of the platform. From the conception of *utility tokens*, which offer access to specific functionalities of services within their corresponding platform (including tokenized assets and governance tokens), to the development of *security tokens* that give users an alternative to holding traditional stock, the idea of private currencies allows companies and platforms to customize the experience they offer to both long-time users and potential enthusiasts.

The other great attraction point of Ethereum smart contracts, which are agreements between two parties that do not know each other, and are only set to complete the related transaction once a condition or group of conditions defined at the beginning are properly met. These contracts are deemed extremely safe, since they are stored in the blockchain after they are approved, replicating them across the network, which protects them against malicious actions or tampering and makes them immutable, meaning that no alterations can be made to the conditions.

These factors helped in the creation of an environment that has grown ever since in terms of users (over 99 million unique addresses), applications (2,855 total Dapps on Ethereum)[1], and total use (1.21 million transactions completed per day)[2]. From this starting point, the demand for a more stable and scalable network has only increased, exacerbated by both the rise of the overall cryptocurrency market and the recent boom of the Decentralized Finance (DeFi) sector.

This lead the team of Ethereum to finally set a release date for the long-awaited update to the mainnet, and in this research document we will go through the list of changes that will take place with the update, along with taking a deep look at the causes for this massive change and the long-term consequences that it may bring to both the Ethereum network and the whole landscape of cryptocurrency as we know it.

II. Relevant Changes

The main changes that will come to the Ethereum mainnet are oriented towards improving aspects like scalability[3], in order to fulfill the needs of the increases in both their userbase and the number of daily transactions. Since the current version of Ethereum (1.0,

from this point on) can only handle 14 transactions per second, they are currently operating at a value very close to the maximum allowed, meaning that an increase in any of the metrics could cause a bottleneck that may prevent it from staying relevant.

ETH will transition from a single chain system to a sharded chain system of 64 parallel executing chains which converge on a coordination chain called the beacon chain, functioning as a scaling technology. This change will allow the network to support up to 100,000 transactions per second, which gives them enough ground to grow in the future. The beacon chain does not store any data, but it is the basis of the new consensus mechanism that will be implemented.

Ethereum 2.0 will move the mainnet to a Proof-of-Stake consensus algorithm, in which those users who stake largest amounts of ETH have more votes in the transaction validation process, rewarding a deeper involvement into the development of the blockchain instead of the processing power-based Proof-of-Work system it currently uses. The mentioned beacon chain does not store any data, but it is the basis of the proof of stake system, keeping track of the proof of stakes validators.

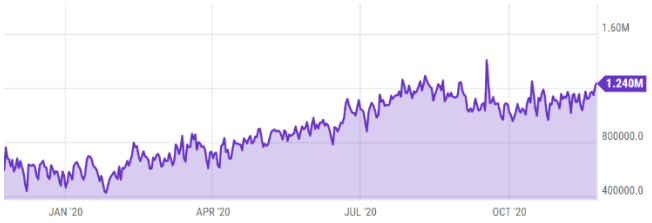

Figure 1. Ethereum transactions per day for the last 12 months. Note the upwards tendency since the beginning of the year and the oscillation near the maximum value (~1.2 million). Retrieved from ycharts.com

To become a validator in this new system, the user must commit an amount of 32 Ether and then validate blocks. If the blocks are validated correctly, they are rewarded with a percentage return from 2% up to 18% per annum, based on their underlying stake. On the other hand, if the blocks are validated incorrectly, they can get severely penalized in some cases loosing up to 100% of their staked amount, or reach a point their stake drops below 16 Ether and they get kick out of the validation pool.

The switch in the consensus algorithm is currently known as "Phase 0" of Ethereum 2.0 and will be implemented in the announced release date of December 1st .However, this phase will not implement any of the core functionalities associated with Ethereum, including smart contracts, DeFi and transactions. Phase 0 is set to launch when 16,384 stake a combined 524,688 ETH (approx. 200 million dollars).

After the launch and the intentional length of 2 years for phase 0, Phase 1 is set to include ETH transfers and sharding, and Phase 2 will re-implement smart contracts at their full functionality in the same way we currently handle them in Ethereum 1.0, with an intermediate phase (1.5) incorporating the existing Ether One chain to the new Ether Two chain. The whole process is expected to last for "a couple of years", according to Ethereum's co-founder Vitalik Buterin[4], who also specified that scaling for data being available before scaling for general computation. This, we assume, is to give the "new" mainnet enough time to properly adapt to the changes.

Figure 2. Total market capitalization of the cryptocurrency market in periods of 12 months for the latest months of 2017 (above) and to this day (below). Analysts are comparing the behavior in both scenarios to predict a similar boom but reject the idea of another bubble since the market has matured enough. Retrieved from coinmarketcap.com

III. Causes and Reasons

The main cause for this improvement, as we have already mentioned, is the need for scalability. These changes were expected for a while now, since the daily number of Ethereum transactions has been approaching the maximum allowed in a constant way since January 2020 (Figure 1). The availability of a much larger number of transactions per seconds not only allows for a more stable network, but also opens the gate for clients that demand higher throughput from the blockchain.

Another aspect that may have motivated the implementation of the long-awaited change is the boom in cryptocurrency seen during the year. In another one of our research documents, where we reviewed the reasons behind mass adoption of DeFi services at the institutional level[5], we covered topics like the COVID-19 pandemic and BTC's third halving, which were events that have caused great rises in the value of the overall cryptocurrency market, while also building sentiment towards this technology as a viable alternative to fiat currencies, traditional banking and current economic systems.

This rise in the market could very well be the reason for the network approaching to the maximum number of allowed transactions per day, which could explain the timing of the launch. Even if some are comparing the current rise of the market to the one seen in late 2017 before the "crypto winter" of 2018 (Figure 2), analysts are taking a more positive position towards this rise, given the maturity of the market and the fact that the reasons behind this climb are more long-term oriented than what we saw back then[6].

IV. Long-term Consequences

Besides the direct changes we may see, there are relevant analyses to be made regarding the consequences of this transition in the following years.

IV.a. ETH's value

The first big change that will be noticeable in the coming months after the launch, and later after the release of each subsequent phase, is a rise in the price of ETH caused by the increase in number of transactions. Similar rises have been seen when comparing the values of daily transactions and value for the same period of time, so a correlation could be inferred between the metrics. Combined with other external factors, the transition with Ethereum 2.0 could represent the most important event in the history of the network since its conception in terms of value and market presence.

IV.b. Adoption and popularity

The eventual rise in price will work as a flag for investors and potential users to consider giving more importance to Ethereum, broadening its reach while the mainnet capabilities become more suitable for the influx of users.

Further down the line, with the implementation of the full functionalities of smart contracts, it is very likely that the number of Ethereum-based tokens and platforms also sees an increase, with more projects creating ways to adapt these functions to the services they plan to provide. This may bring a new wave of discussions to the reach these tokens can have, similar to the situation with security tokens in the recent years.

IV.c. Other collateral effects

Both of the mentioned effects might also cause positive trends to show up in other sectors of the market, like the DeFi sector, which would see great increases in Total Value Locked (the total of tokens stored in contracts at the time, multiplied by the value of each token) with every rise in both the value and number of users of ETH, since the vast majority of the DeFi platforms use ERC-20 tokens.

The derivatives market could also be positively affected, while also work as an indicator of the effects of the changes, since a potential rise in open interest for ETH futures would not only mean a spike in activity for the sector, but also show that the derivatives market believes in a strong tendency for the upcoming months.

V. Conclusion

Although uncommon, the implementation of Ethereum 2.0 work as a reminder of the ever-evolving nature of cryptocurrency when compared to other economic systems and services. Despite the fact that the concept of blockchain has remained nearly untouched since its conception in 2007, the ways it is implemented keep moving forward, maintaining the pace of their userbase and, much like the case we reviewed in this document, anticipating themselves to potentially fruitful events or situations, showing a commitment not only to their own longevity, but also to the users that have trusted them for many years, along with bringing a new light for different consensus algorithms and the usefulness of Proof-of-Stake specifically.

Whether Ethereum 2.0 will mark a new stage for the network or for the whole market remains to be seen but, as the release of Phase 0 approaches, a multitude of technical analyses will take the time to find potential errors in time, so the integration and transition from the current state of the mainnet to the future one can occur without risking the investment of their clients.

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