Heroglyphs Protocol

Incentives for Transforming Ethereum Validator Dynamics

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Abstract. We miss the fair crypto assets and distribution mechanisms such as Bitcoin [1] and Ethereum that moved away from Proof-Of-Work [2]. While we agree that it was probably a correct decision for Ethereum to move to an energy-efficient and sustainable Proof-Of-Stake [3] in order to protect the planet [4], which in turn enabled scalability and wider adaptation, we want to bring attention to the fact that proliferation of liquid staking protocols that make it easier for individuals to participate in staking (which is generally seen as a positive development for decentralization), may concentrate control in the hands of a few, which could potentially undermine the decentralized nature of the network. Likewise, the [redacted] is filled with speculation and unfair distribution of assets (aka memecoins and airdrops). [redacted]

1 Introduction

The success of liquid staking protocols highlights the burgeoning demand for accessible staking. However, liquid staking bifurcates the security of the Ethereum network between purely economic contributors, who supply ETH tokens, and validation contributors, who operate nodes. While liquid staking has made it easier than ever to become an economic contributor to Ethereum, it has also created incentives that centralize validation contributions.

The petroleum refinement process creates over a hundred specialized and valuable byproducts from the act of distilling crude oil. Similarly, Heroglyphs is a set of frameworks and tools for "refining" the waste byproducts of Ethereum transaction validation into an increasingly valuable and specialized set of on-chain operations

This paper outlines a new protocol whose use creates incentives for "complete validators," i.e., entities that are both economic and validation contributors, sometimes referred to as solo validators. We hope that such a system will decentralize validation operations by increasing the economic value of being a complete validator.

Heroglyphs has two main components – [redacted] and [redacted]. First, Heroglyphs is a protocol for [redacted] in [redacted] a heretofore [redacted] of Ethereum. Second, Heroglyphs comprises a set of smart contracts that can translate this [redacted] into a variety of on-chain operations, including but not limited to the creation, emission, transfer, and transformation of various tokens.

2 Aggregation and Centralization

In proof-of-stake (PoS) systems, node providers secure the network by staking tokens and validating network transactions. Liquid staking protocols (LST) like Lido enable users to delegate their tokens to node providers, which then validate network transactions on the users' behalf.

This model effectively bifurcates validation into distinct economic and validation contributions. By alleviating token holders from technical complexities, these protocols reduce barriers for economic contributors, potentially democratizing rewards from Ethereum validation. However, this approach creates incentives that consolidate validation contributions within a limited number of specialized node providers.

Consolidation occurs for two reasons. Firstly, pooling minimizes variance in Ethereum's staking rewards, resulting in a steady source of yield. Secondly, specialized node providers can capitalize on economies of scale associated with specialized hardware and software requirements.

The consolidation of validation contributors creates several risks for the Ethereum network. One risk is that the number of node operators decreases, potentially creating points of failure that could affect the network's integrity. Another risk is that consolidation reduces node diversity. Node operators often employ uniform hardware and software configurations across their nodes, which can lead to vulnerabilities in case of widespread issues or exploits. Last but not least, large node operators create a nexus of control that regulators will find hard to resist as a tool to enforce government financial censorship or speech restrictions.

3 Make Ethereum Cypherpunk Again

Conversely, increasing the number of independent complete validators can enhance Ethereum's resilience. Complete validators manage both the economic and technical aspects of validation and are thus fully responsible for their operations, not relying on third parties. This increases their resilience and reduces the risk of central control. A diversity of node operators increases the variety of security measures, software solutions, and geographic distribution of the network's security. This, in turn, makes the Ethereum network robust against any single vulnerability, exploit, or disturbance, whether technical or regulatory.

Encouraging complete validators, or small but independent node operators, can help distribute the network's validation power more evenly. This will require thoughtful incentives to encourage numerous and diverse complete validators to join the network, and perhaps community-driven initiatives to ensure a balanced distribution of power within the network.

As one effort to mitigate the risks inherent in the consolidation of validation contributions, HeroGlyphs introduces a system of rewards accessible only to independent complete validators.

4 Heroglyphs Protocol

4.1 Monetizing Free Real Estate

Blockchains, in theory, serve to monetize a global consensus state captured in blocks of transactions. In practice, [redacted]. "Also known as [redacted], [redacted] are a new way of [redacted] data or [redacted]. The information [redacted] includes images, videos, texts, audio, and more [6].

With the use of Heroglyphs, Ethereum has the opportunity to incentivize complete validators with assets whose value is [redacted] to ETH. Returning to our petroleum analogy, the demand for illumination (kerosene) was independent and uncorrelated with the demand for automobile transportation (gasoline). Similarly, the demand for [redacted] that will be unlocked by Heroglyphs will be at least somewhat uncorrelated from the value of ETH itself. This is in contrast with Ethereum's block rewards, which are comprised of ETH and thus serve to leverage exposure to ETH for validators today.

Ethereum validation creates two types of value: block rewards and information privileges. Economic contributors, by delegating their ETH to liquid staking protocols, retain most of the block rewards that accrue to validators. However, they lose any influence over the network's validation operations or decision-making processes. Third-party node operators, in contrast, accrue these crucial information privileges, which can lead to various types of abuses, such as bribery, collusion, and targeted attacks.

Let us not underestimate the power of a validator's information privileges, as they constitute the fundamental governance rights on a blockchain using PoS. These powers include the ability to hard fork the chain itself, as we saw happen with the miner-induced Bitcoin Cash fork, and the ability to censor transactions.

[redacted], in the context of Ethereum 2.0, also known as the Beacon Chain, refers to [redacted] can include in the blocks [redacted]. This [redacted] is typically [redacted], [redacted], [redacted].

[redacted] is a symbol of the information privileges that are exclusively accessible to those with control over validation operations. Reimagining how we use [redacted] is not just a way to leave a digital mark. Rather, it is a way to create value from one of validation's 'waste' byproducts, thereby incentivizing economic contributors to become Complete Validators, reducing the consolidation of validation operations and enhancing Ethereum's resilience.

5 Two modules–encoding and translating

Heroglyph consists of two modules – one for encoding information and one for translating it. Heroglyph's framework allows validators to encode valuable information in their [redacted], specifically to create a token, define properties, and identify recipient wallet addresses. It is important to note that [redacted] itself is a passive data element; it contains no executable code nor does it engage computational resources that could alter the blockchain's state. This ensures that its

use does not impose additional burdens on validators, whether they are newly assuming their roles or are established in their practices.

Heroglyph then works to translate [redacted] written in this way to subsequently mine the token to the recipient addresses according to a predefined emission schedule.

This mechanism highlights a critical truth–entities like Lido, which manage validation operations, retain all associated information privileges while economic participants retain only their share of the block rewards.

Heroglyph makes tangible the otherwise abstract and intangible validator privileges and powers by creating transferable value from the refinement of [redacted]. This process not only increases benefits to complete validators but also increases the opportunity cost of not participating as a complete validator. After all, the entity engaging in this form of mining—by manipulating the [redacted]—is also the sole entity endowed with validation operations.

6 [redacted]

[redacted]

6.1 Merge and Hybrid Mining on PoS

One way to understand Heroglyphs is as a framework for injecting some of the benefits of Proof of Work (PoW) validation into a network that has Proof of Stake (PoS) at its core. The initial use case will be a fairer way to mine and distribute tokens.

The concept of fair launching has recently garnered significant attention, highlighted by platforms such as Pump.fun, which have achieved considerable traction. The principles underlying fair launching trace their roots back to the Proof of Work (PoW) mechanism utilized by the Bitcoin blockchain, which pioneered this method with the inaugural distribution of its coins. Notably, even Satoshi Nakamoto, the anonymous creator of Bitcoin, was required to mine his initial holdings, emphasizing the egalitarian nature of this distribution method.

In this way, PoW provided a fair mechanism for distributing bitcoins to users. Even Satoshi Nakamoto, the anonymous creator of Bitcoin, was required to

mine his initial holdings, emphasizing the egalitarian nature of this distribution method.

Heroglyph allows users to create tokens and specify their total supply, specific emission schedule, and initial distribution. What makes these tokens special is that this specific type of blockspace value is exclusively mineable by complete validators. A token launched in this manner thus helps to level the playing field between large node operators and complete validators.

7 Transforming Validator Dynamics

One primary concern with PoS as an incentive distribution framework is the potential for wealth concentration. Some commentators have raised concerns that validators with larger stakes have a disproportionately high chance of being chosen to validate new blocks and thus earn more rewards. The larger one's stake, the more power and earning potential one possesses, potentially leading to an oligarchy of validators.

However, the real issue is that a validator's control of a network does not depend on their consistent and steady contribution to the network's security. In PoW, miners have to continuously invest to replace depreciating hardware and to secure a steady supply of electric power. In other words, without additional contributions to the security of the network, their information privileges over the blockchain will decay and accrue to other miners. While PoS does entail some hardware and software economies of scale, the biggest capital cost—the actual ETH tokens themselves—do not require additional reinvestment.

As a result, small-scale validators or solo validators have very little chance of increasing their influence over the Ethereum network, since the share of information privileges held by larger validators does not decay over time as it does in a PoW system.

Heroglyph mining ensures that all complete validators receive rewards for their participation, regardless of whether they are selected as block proposers. This counters the economic advantage that larger operators currently hold by providing smaller validators with a stronger economic foundation from which to operate.

In short, control over [redacted] is equitably held by validators, irrespective of their stake size. Refining [redacted] into a valuable validation byproduct establishes an incentive system that incentivizes decentralized validation operations.

8 Conclusion

Our goal is not to overthrow liquid staking. Rather, we wish to increase Ethereum's security by helping to reverse the consolidation of validation and associated information privileges in a small number of validators.

With the advent of Restaking, staking in general and economic contributors in particular are becoming so saturated that we're getting closer and closer to

overpaying for security. This explosion of demand is being concentrated in a small number of node operators, creating a single point of failure risk.

We stand before the public and the pantheon of cyberspace, where we have found a home. We are compelled to address what we see as a brewing crisis that will tear at the integrity of Ethereum itself. This latent crisis has long been ignored but is universally acknowledged. We believe it requires not only recognition but swift, bold action.

Crypto promised a revolution. So far, it has devolved into a coliseum of speculators. However, restoring the health of Ethereum's security ecosystem requires more than idle discourse and bellyaching. Effective solutions will require that we mobilize our community through its rapidly changing culture. In other words, we believe it is crucial to champion our cause in those arenas where visibility is paramount, thereby diminishing the costs of inaction and harmonizing the incentives of all participants within our ecosystem.

We live in an era where meme culture has moved from our community's fringes to the core of mainstream consciousness. Even politicians and their operatives have been busy auctioning NFTs and other tokens to advance the cultural appeal of their causes.

Thus, we propose that the absurdity of our times mirror the gravity of our challenges. Let us use the most ludicrous elements of crypto's culture to address and rectify its most serious afflictions. With hope as our banner and unity as our march, we commit to this path, resolved to forge a future where Ethereum stands not only as a testament to innovation but also as a beacon of security and democratic integrity.

Here's to the ridiculous becoming the sublime, to the satirical solving the solemn.

References

1. Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System", (2008)
2. Vitalik Buterin, "Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform.", (2014)
3. Vitalik Buterin, "A Proof of Stake Design Philosophy", (2016)
4. Alex de Vries, "Cryptocurrencies on the road to sustainability: Ethereum paving the way for Bitcoin", (2022)
5. Lido: Ethereum Liquid Staking, (2020)
6. Ledger Academy, "Bitcoin Inscriptions", (2024)
7. Vitalik Buterin, "What else could memecoins be?", (2024)
8. NounsDAO, "https://nouns.wtf/vote/249", (2023)