Understanding Proof of Stake

What is Proof of Stake?

Even those new to Ethereum have likely heard the terms Proof of Stake (PoS) and Proof of Work (PoW). Known as "consensus mechanisms," they are ways of proposing new blocks and gaining "consensus" from participants to add them to the Ethereum blockchain.

Background

There are significant differences in process for PoW and PoS, which are important to understand.

In PoW, contributors are known as "miners" and they compete to propose new blocks in the chain, a process which requires significant computational work. The winning block must then be verified and approved by a majority of miners before it can be added to the chain. In the PoS model, contributors are known as "validators," and to make block proposals they must lock up 32 Eth of their own money, essentially putting their "stake" in the proposal. For every round of contributions, a subset of validators is randomly selected, then a single validator is randomly chosen to make the contribution. Two-thirds of validators must agree that the block is valid for it to be approved. If two-thirds consensus isn't achieved, the block is rejected and a portion of the validator's 32 Eth investment is "slashed" as a punishment for misbehaving.

Since its launch in 2015, Ethereum has operated as a PoW platform. While PoW has proven effective for the platform's launch and growth, it does carry some liabilities, such as extremely high energy costs due to the amount of work needed to mine new Ether, a common criticism of Ethereum to date.

Ethereum is now on the cusp of moving to a PoS system. This move, known as "The Merge," has always been a critical part of the Ethereum roadmap and has some significant implications for business use, as well as platform performance as a whole. It's important to note that building a scalable and decentralized PoS system was an extremely complex undertaking which called for fundamental innovations in cryptography, as well as extensive research. These requirements made it impossible to launch Ethereum as a PoS platform from the outset. Other projects made the move to PoS much earlier, but with those moves came compromises in security, decentralization, and scalability. Ethereum refused to make those compromises. Instead, developers dedicated the time needed to get it right and help ensure the long-term health, functionality and growth of the platform, all critical factors for business users.

QUICK TAKEAWAYS

Proof of Stake (PoS) refers to the process by which Ethereum validators can propose new blocks to the Ethereum blockchain. It requires staking personal Ether on the proposal and presents a risk of losing that staked Ether if the proposed block is rejected.

The move from Proof of Work (PoW) to PoS is known as "The Merge" and represents the most significant upgrade in Ethereum's history. Yet, it is only one step on the Ethereum roadmap, with many more updates to come.

PoS systems are dramatically more energy efficient and deliver improved security, both of which help make Ethereum a stronger, more robust and increasingly valuable business tool.

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Moving to a PoS system represents the most important upgrade in Ethereum's history and offers many key benefits for the ecosystem. The most significant of these benefits is a drastic reduction in power consumption. In fact, the Ethereum Foundation estimates that The Merge will slash the platform's energy use by a whopping 99.95%, which addresses the environmental criticisms that the platform has endured and makes working on Ethereum an increasingly attractive option for businesses of all types.

The move to PoS also has implications for decentralization, a defining characteristic of Ethereum, and all blockchains. Despite the focus on decentralization, the PoW approach to mining has some tendencies toward centralization, due primarily to the hardware investments required to mine at a meaningful scale. Significant mining operations require millions of dollars in equipment, which naturally excludes the average hobbyist or enthusiast and concentrates the mining industry among a small number of big companies with deep pockets.

With PoS, anyone can run their own staking node from home using a household computer. The process is easy, and while it's still a significant investment for an individual, it doesn't require institutional levels of capital or fancy hardware, which opens up the doors for more involvement from a diverse set of users. That said, it's important to understand that PoS systems don't eliminate the risk of centralization. Those with more funds have the ability to stake more and thus can carry more weight. However, staking in a PoS system has a lower cost of entry than mining on a PoW system, and this encourages broader participation and decreases the risk of centralization. This adds up to a stronger, healthier and fairer platform that is more resistant to outside forces, which increases its usefulness for many kinds of applications.

Security is another important point for businesses. PoS systems are considered more secure against certain kinds of cyberattacks than PoW systems. Additionally, as validators lose their investment when they misbehave, there's a stronger incentive for them to only propose quality blocks, versus questionable ones that could put the chain at risk. Lower security costs are another key benefit that comes with the move to PoS. The cost of security in a blockchain network is the amount paid to miners/validators to run the nodes that provide network security. In a PoW system, hardware expenses, electricity and miners' time contribute to high costs. With PoS, costs for running and securing the network are much lower, which means Ether can be issued at a lower rate to help keep inflation down.

It's important to note that while the move to PoS is viewed as Ethereum's most significant upgrade to date, it is not in any way the final goal or evidence of platform completion. The Merge is but one step – albeit an important one – on the Ethereum Roadmap, and the platform will continue to evolve and mature after it occurs, with many more upgrades planned. For business users, the most important takeaways are that PoS systems are more energy efficient and deliver improved security. This all contributes to a stronger, more robust Ethereum ecosystem that has much to offer the business world and continues to become an increasingly viable and valuable business tool.

HOW DO I FIND OUT MORE?

Watch: The EEA's Webinar on Ethereum's Transition to Proof of Stake and Network Updates

Browse: The Ethereum Foundation's Proof-of-Stake pages

Read: The Ethereum Foundation's background on The Merge

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