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Solana vs Ethereum: a current comparison

In 2015, the Ethereum blockchain was the first network to introduce smart contracts and became the basis for numerous decentralized applications (dApps). In the meantime, competing networks such as Solana have emerged, which impresses with its fast and cost-effective transactions.

From financial applications to blockchain-based art creations and alternative social networks. "Smart contracts" enable self-executing processes whose conditions are written directly into the program code. This allows automatic and transparent transactions on blockchain networks without the need for intermediaries.

The challenges of scaling: the battle for efficiency

Ethereum was the first blockchain with smart contract functionality and formed the foundation for the first ecosystem of decentralized applications. However, the high level of activity quickly led to bottlenecks: Transactions became expensive and took a long time. This significantly increased the demand for alternatives.

Developers responded to the problem by introducing new technologies and adapting existing networks. While Ethereum focused on layer 2 solutions to improve scalability and transaction costs, new blockchains such as Solana emerged in parallel. These offer fast and inexpensive transactions from the ground up without having to rely on external scaling solutions.

The Solana network uses the innovative Proof of History (PoH) consensus mechanism. Here, transactions are ordered by cryptographic time stamps before they are processed. This enables the network to process thousands of transactions in parallel without having to wait for confirmation from individual nodes. In contrast to Ethereum's limit of around 12 transactions per second (TPS), Solana thus achieves several thousand TPS.

| Metrics (as of Aug 2024) | Ethereum | Solana |
|--------------------------|----------|---------|
| TPS | 12 | 1'500 |
| Cost per transaction \$ | 1.5 | 0.003 |
| # Network nodes | 13'900 | 4'400 |
| # Daily transactions | 1.1 Mio. | 34 Mio. |

The blockchain trilemma describes the challenge of ensuring decentralization, security and scalability at the same time. While Solana achieves high scalability through its innovative consensus mechanism, the increased resource requirements for nodes lead to less decentralization. Ethereum, on the other hand, places more emphasis on decentralization and security, which is reflected in the larger number of over 13,900 nodes, but at the expense of scalability.

Putting Ethereum to the test: How layer-2 networks and Solana are conquering Web3 adoption

If you observe user activity on the various blockchains, you can see a fragmentation between everyday "retail users" and larger players. While the majority of users prefer low transaction costs, larger players place more value on the decentralization and security of Ethereum.

Specifically, Ethereum's transaction volume has shifted strongly to the cheaper layer 2 solutions, which have now reached an all-time high, while Ethereum's basechain has stagnated in terms of the average number of transactions over the last two years.

Solana, on the other hand, not only impresses with its speed and low transaction costs, but also with its clever integration of applications outside of Web3. The Solana Phone and the Blinks technology

introduced this year, which enables the seamless connection between users and blockchain applications through simple, shareable links, are two innovations that increase Solana's attractiveness for entry into Web3.

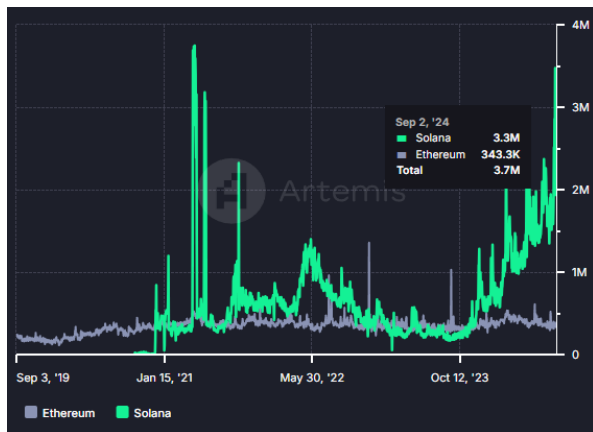


Figure 1: Daily active addresses on Ethereum and Solana / Source: Artemis

Financial players prioritize decentralization

Institutional applications, on the other hand, require a high level of security. Ethereum's proven success in terms of stability and decentralization continues to make the network the preferred choice when it comes to topics such as tokenization. Among the initiators of such projects are well-known financial titans such as BlackRock and Franklin Templeton. Both launched tokenized funds for US government bonds that pay out the annual interest directly on the blockchain. Of the almost USD 2 billion tied up in such protocols, 74% is accounted for by the Ethereum blockchain.

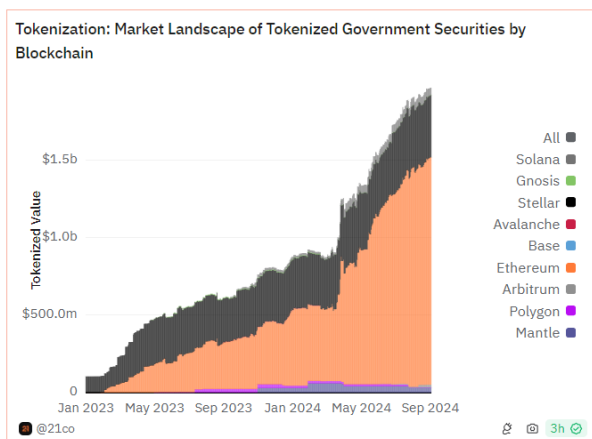


Figure 2: Assets in tokenization projects by blockchain / Source: Dune, 21.co

Central banks are also experimenting with applications on Ethereum. The Swiss National Bank (SNB), for example, has been testing foreign currency trading directly on the network in collaboration with the Bank for International Settlements (BIS) since 2020.

Technology allows more than one winner

As the future of Web3, similar to Web2, will be based on multiple platforms and networks, a diverse, interoperable ecosystem is emerging that fosters collaboration and innovation. Solana has the edge when it comes to user adoption and activity, while Ethereum continues to maintain its position as the preferred platform for decentralized settlement infrastructures with higher transaction sizes.

Both blockchains have the potential to grow independently of each other and expand the market as a whole. Ethereum's strategy of focusing on layer 2 solutions poses economic challenges, as only a small portion of the fees generated there flow back into the Ethereum network. In light of these developments, Ethereum is under increasing pressure to justify its market capitalization, which is almost five times that of Solana.