

**Rating**

8/10 ☆

Snapshot	
Ticker	SOL
Current Price:	~\$238
Market Cap:	~\$72 billion
Circulating Supply:	~302 million
Token Type:	SPL
Sector:	Blockchain

Executive Summary

If you follow crypto somewhat closely, you've probably heard of SOL at some point in the last 3 months. It rocketed from \$40 to over \$250, attracted over \$14 billion into the ecosystem¹, caught a lot of media and investment attention, and has been the token I've personally been asked about the most. Does it deserve this new, high valuation? Let's take a closer look.

Solana is a lightning fast, low-fee blockchain that was initially created in 2018. Its primary goal is to provide a scalable layer 1 blockchain that can support mass adoption. To get an idea of just how scalable, we can compare it to Ethereum:

- Transactions per second of **50k+** vs. **13**
- Block times of **400ms** vs **13s**
- Average transaction fees of **\$0.00001** vs **\$40+**
- Throughput can scale as hardware improves and optimizations are made

Despite all the positives, there are a few popular criticisms of Solana that people like to throw out: it has gone offline twice (most recently on September 14th), developing on it is complex, a large number of tokens went to

insiders, and some claim that it is too centralized. We will explore all of these in this report.

Team Analysis

The big idea behind Solana, proof of history (discussed later), was thought up by founder Anatoly Yakovenko, a former Qualcomm engineer. His engineering background, combined with a crypto mining hobby, led him to the idea one night:

*"I had like two coffees and a beer, was up til 4 in the morning, and I realized that you can use the same hash function [as proof of work] but instead...we can measure how much **time** goes into the puzzle." - Anatoly²*

After this, Anatoly quit his job and took a few senior Qualcomm engineers and began devising the specs for what would become Solana. Today, Solana Labs, the Solana Foundation, roughly 1200 validators, and the community of users and developers help keep the network running.

Additionally, Sam Bankman-Fried, founder of fast-growing crypto exchange FTX, has backed Solana by integrating it into parts of FTX, investing himself, and founding the Serum project which has built an orderbook on Solana. Back in January when SOL was \$3, Sam famously tweeted:



Figure 1: Not a bad call³

SOL is now trading at over \$230. Solana and the applications built on top of it also feature many prominent investors, such as Chamath Palihapitiya, Jump Capital, Solana Ventures,

a16z, Sino Global Capital...the list goes on. The point here is that the team is very solid, and the ecosystem continues to attract talented developers and investors.

Fundamental Analysis

To make this section easier on the eyes, I've divided it into three sections: functionality, user experience, and ecosystem.

Functionality

Before we go any further, it's a good idea to understand, at a high level, what makes Solana **different** from other blockchains out there. Obviously, Solana can scale, but how?

Solana is a proof of stake blockchain, meaning that users who stake their tokens can earn yield for helping with security and consensus. That's standard for a proof of stake blockchain, but Solana's big differentiators are **proof of history**, which it uses combined with proof of stake, and **SeaLevel**. I'll quickly go over both.

Proof of history essentially adds a clock to the blockchain. Nodes (computers) in the Solana network use verifiable delay functions (VDFs) as a measure for time. Since these functions are known to take a constant amount of time and cannot be sped up without inventing new hardware, nodes can use them as a clock. Rather than having nodes communicate back and forth to agree on time, which takes time and compute resources, Solana nodes can say "I see that the last block was posted at a certain time. I have run this VRF x number of times since then, so I can calculate the current time myself." This method allows nodes to quickly decide on the ordering of transactions and create blocks. This comes with the additional advantage that, as hardware gets better and better, Solana's throughput should scale as well. The founder described this in a recent interview:

"Every time Nvidia doubles their cores, we double our capacity for TPS which doubles the amount of validators that can participate in consensus." - Anatoly²

Sealevel is yet another optimization made to the Solana network to help speed things up. Sealevel refers to Solana's ability to process transactions in **parallel**. Many blockchains, such as Bitcoin and Ethereum, work by executing smart contract transactions one at a time. Sealevel, on the other hand, allows many transactions to be executed at once because Solana transactions must specify which data on the blockchain will be read and/or altered. All transactions that do not *alter* the same memory in the blockchain get the go-ahead to be executed at the same time since we know that they won't attempt to modify the same thing at once.

There are other technical aspects that differentiate Solana from other blockchains, but those two stand out. Let's move on to the user experience.

User Experience

I've been a Solana user since early this year, and it excels exactly where you'd think it would: high-speed, low-cost trading and gaming. Trading-wise, swaps cost less than a cent and are extremely quickly finalized, and the Phantom wallet is very user-friendly. Gaming-wise, Solana has a growing NFT community and opens the door for truly scalable games because of the low fees (I honestly haven't played any yet, but there are some great projects in development such as Star Atlas and Aurory).

Solana also provides a great environment for fast market data analysis (low latency and fast transaction finality should be a draw for high-frequency traders), on-chain orderbooks, and on-chain derivatives such as futures and options. Some of those are here already, and some are on their way.

Two major user-experience related downsides exist at the moment: the smaller variety of applications and the developer experience. Application variety should not be an issue much longer; the number of projects building on Solana and the amount of funding coming in should quickly expand the ecosystem. However, the development experience on Solana does present a somewhat high barrier to entry.

Solana uses the Rust programming language. The positive way to look at this is that far more people know Rust than Solidity (the smart contract language used by Ethereum, Avalanche, and other blockchains). There is a lot of great, existing tooling out there for Rust. The downside is that reaching the point of being able to understand Solana's account model, and how everything works in general, is a somewhat sizeable jump even for developers who are familiar with other blockchains. Interestingly enough, this is likely a reason we see less hacks, on-chain analytics, and number of projects overall on Solana than we see on chains that use Solidity; the programming language is very different, so you can't copy things directly over from Ethereum.

Developers can use tools like Anchor⁸ to make things easier, but at the end of the day you need to understand the low-level stuff that's going on. Everything is an account (even executable programs), every instruction has compute constraints, you need to declare (in advance) every account you plan to read from or alter, etc. It's obviously not impossible and it allows for highly optimized code, but Scott Sunarto⁴ said it well:

"It is very true that Solana optimizations are legit, often very clever...but what is being traded against, dear developer, is your time and your sanity."

Another positive here, however, can be found in an announcement from earlier this week. On November 9th, Neon Labs raised \$40 million to bring EVM-compatibility to Solana⁵, meaning that Solidity code would be able to run on

Solana. The project was funded by major names such as Jump Capital and Three Arrows Capital.

Ecosystem

Some quick suggestions on the ecosystem. I promise not to shill you the tokens I like here - these are legit projects that I think are good places to start interacting with the ecosystem.

- **Phantom Wallet:** A user-friendly browser wallet for Solana
- **Raydium:** A simple exchange for trading. If you've used Uniswap in the past, it should be pretty intuitive
- **DigitalEyes** or **Solanart:** NFT marketplaces. Not the best UI (actually, it's pretty bad), but they get the job done. FTX exchange also has a marketplace for Solana NFTs.
- **Audius:** Blockchain music streaming platform. I've never used it, but it sounds cool.

Tokenomics

Solana's tokenomics have been the source of a lot of controversy. Frankly, they piss a lot of people off. 48% of the initial token allocation went to insiders, including investors/VCs, the team, and validators. These tokens were sold at **under a dollar**. Many of these large holders are holding strong (a lot of SOL is staked and has been for a long time, even during the large

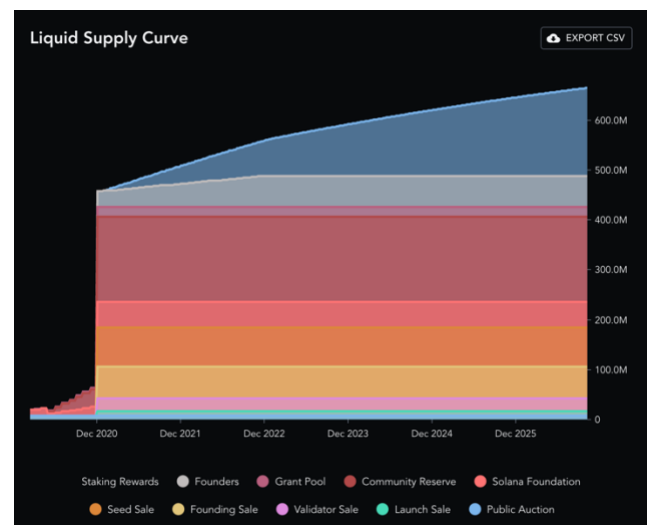


Figure 2: SOL Supply Schedule⁶

unlock in January – see **Figure 2**), but you can understand where some community pushback may come into play here, especially in the crypto industry with its decentralized ideals. Having a smaller group of people control much of the stake, and therefore validation power, can be a negative thing.

Focusing on the future, large token unlocks are over which is a good sign. Over 500 million SOL is outstanding, which is *almost* all of it. SOL does have inflation set around 8% per year to compensate stakers for helping secure the chain. This will decrease slowly, eventually hitting 1.5% per year in 10 years. A part of each transaction fee is burned as well, which offsets some of the inflation, but the fees are so low that inflation will outweigh the burning. For a token like SOL that is intended to be actively used to pay for transactions, the level of inflation seems right. Overall, aside from the arguably bad initial distribution, the tokenomics look good.

Technical Analysis

Here's where we can look a little bit more short-term and evaluate the recent price run for SOL. SOL has outperformed BTC by a long-shot over the last few months, but SOL is also now a top-5 market cap token. Expecting it to 5x in the span of 3 months like it just did, at this point, is very unlikely. However, we can still look at the shorter-term future here before touching on the longer-term future towards the end of the report.

Solana has made the jump up to the top 3 blockchain by TVL (total locked value – the sum of all assets residing on the blockchain. See **Figure 3**). However, in the past week, Solana has shown weakness versus BTC and is the only chain in the top 5 by TVL to **lose** TVL in the past week. A lot of this weakness is likely caused by people taking profit – Solana did about a 5-6x to get into the top 3 tokens by market cap at one point, so it's expected that some people will take some profit. Markets are cyclical.

If the bull run continues – and currently, it looks strong – SOL looks to still have room to grow. The chart looks rough right now and TVL is also on a dip, but the case for Solana's TVL flipping BNB's (Binance Smart Chain's) TVL is compelling. Keeping BNB's TVL constant, if Solana's TVL caught up and its market cap moved with it, the price of SOL would be just over \$300. TVL is something to keep an eye on.

Risks

SOL, like every investment, does not come without risks. Note that Solana is technically still in its beta phase...but when you already support \$14 billion, you can't really call it a beta anymore. There are four major risks to go over: downtime, development, competition, and the "overly-centralized" argument.

1. Downtime: Solana went down for six hours in December of 2020 due to an issue with block creation (which was fixed), and it recently went offline on September 14th, 2021, for 17 hours. The cause of the most recent attack was







Name	Protocols	1d Change	7d Change	TVL ↓	Mcap/TVL
1  Ethereum	288	+0.91%	+5.51%	\$182.17b	3.08586
2  Binance	153	+2.93%	+3.51%	\$21.46b	4.96645
3  Solana	32	+2.45%	-3.02%	\$14.47b	4.92537
4  Terra	10	+3.62%	+0.05%	\$11.2b	2.14795
5  Avalanche	62	+1.12%	+14.47%	\$10.18b	1.91931
6  Tron	5	+3.07%	+6.04%	\$6.45b	1.22187

Figure 3: Solana's TVL vs other chains¹

essentially a denial-of-service attack. Bots, in an attempt to purchase a token that was being released on a decentralized exchange, flooded the network with transactions and caused validators to crash. After fixing the bug, the community decided to restart the network (hard-fork it), which required at least 80% of stake to restart their nodes with the upgraded software. The bug was fixed and, it turns out, had been in the process of being fixed prior to the crash.

Neither of these instances of network downtime resulted in lost funds, other blockchains have had similar issues in the past, and things like this become less likely to happen as Solana deploys upgrades to the chain. Despite that, things like these are enough to keep some people away from leaving valuable on Solana. Downtime is a risk you must be willing to take until there is a longer track record of constant performance.

Development: I'll keep this one short. Like I mentioned above, coming to grips with Solana's methods of implementing accounts, programs, and transactions in low-level Rust code can take some time. Jumping in as a Solidity developer is not easy. On the bright side, the tooling should only get better, and there is already a large Rust community since it is used for many non-blockchain applications.

Competition: Solana's value proposition is obviously its scalability and low fees. There's not a lot out of chains there with full-blown smart contracts that can compete *and* are already seeing major adoption. However, a threat looms in the form of zk-rollups (scaling solutions built on Ethereum) and eventually Ethereum 2.0.

The tech for each of these is different, but Solana will want to continue drawing in developer talent that can build applications and games to draw in users that will stick, and to help Solana find a niche (or a few) where it can

thrive. I've recently heard multiple developers openly discuss whether they should learn Solana's Rust-based code or Starkware's Cairo language, a language for developing zk-rollups – there is certainly competition here.

Security is another issue: like I mentioned earlier, Solana will have to prove its reliability against zk-rollups, which inherit the high security of Ethereum. I won't get too deep into this and, again, the tech is fundamentally different, but Solana will have to compete to gain and maintain market share.

Centralization Arguments: The cost to run a Solana validator is high. There are expensive [hardware requirements](#) and a cost of about 1.1 SOL/day for voting, so you need a solid amount of SOL for your yield to offset that fee plus the hardware costs.

Solana also only has one blockchain software client, meaning that all validators run the exact same code. Contrast this with Ethereum, where there are multiple clients written in different programming languages, which helps in the case that one client finds a bug that causes it to halt the validators running it. The rest would continue to work until the bug can be fixed.

Points like these, combined with the large initial distribution to institutions/VCs, have led many to label Solana as a more centralized blockchain. Keep in mind that decentralization is a spectrum and there are various ways to measure it. One way is to ask, "what would it take for someone to be able to successfully attack the network?" We've seen that finding bugs in the software client can halt the network, but let's suppose all the bugs are gone. What would it really take to attack or halt Solana? We can consult the Nakamoto Coefficient.

The Nakamoto Coefficient measures how many different parties (validators, in the case of Solana) would need to be "captured" to gain

control of the network. In many proof of stake systems, controlling more than 33% of the network can allow you to attack it.

Solana's Nakamoto Coefficient is currently 19: it would take capturing the 19 validators with the largest stake in order to gain a 33% share of the network. Comparatively, Bitcoin and Ethereum's coefficients sit between 3 and 5 due to high concentration of mining power in specific mining pools.

I will note, however, that the cost of running a non-validating Ethereum node is very low (and will still be once they switch to proof of stake). Plus, in proof of work Blockchains like Bitcoin and currently Ethereum, miners can quickly remove their power from mining pools that are being attacked if they realize an attack is happening. Staking lacks this ability due to, typically, locking staked tokens for a certain number of days.

Solana, and other blockchains, hope to continue to grow more decentralized over time. "Centralization" wise, the two things to keep an eye on for Solana are (1) if/when another software client comes out, and (2) how the Nakamoto Coefficient changes over time.

Rating Summary

I've rated SOL as an 8/10 due to its long-term potential and the people backing it. The scalable technology combined with the money flowing in to fund projects, brain-power moving into the ecosystem, and absurdly high goals set by people like Sam Bankman-Fried (see [here](#)) point towards a very bright future for Solana. Obviously, it must compete with Ethereum and Ethereum layer 2s, as discussed above, but I believe that Solana will always have a place, especially in the gaming industry (and likely high-speed trading as well).

Why not a 10/10 then? Execution risk. Solana has a lot going for it right now, but it must be

able to successfully roll out new games built on top of it that really gain adoption, adapt to new hardware to continue scaling, continue to further decentralize its validator set, and keep bringing new, high-performing companies and projects into the ecosystem to keep things going. It must do so while competing with new technologies like zk-rollups as well.

How to Buy

You can buy Solana on almost every exchange at this point, which makes it easy. Coinbase or FTX are two easy ones to use.

Citations

¹ <https://defillama.com/chains>

²

https://www.youtube.com/watch?v=GU2_Q5yXJpk

³

https://twitter.com/SBF_FTX/status/1347964322459262977

⁴

<https://2501babe.github.io/posts/solana101.html>

⁵

<https://www.coindesk.com/business/2021/11/09/neon-labs-raises-40m-to-bring-evm-functionality-to-solana/>

⁶

<https://messari.io/asset/solana/profile/supply-schedule>

⁷ <https://solana.com/validators>

⁸ <https://github.com/project-serum/anchor>

Links

Website: <https://solana.com/>

CoinGecko Listing:

<https://www.coingecko.com/en/coins/solana>

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