The Investment Case for Layer 1s: Big Value in the New Internet

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Solana: Timing is Everything

PM Notes:

1. It's always sunny in Solana Beach – Using a trailing network value to transaction (NVT) multiple of 55x and 80% year-over-year (YoY) transaction growth we find the long term value of 1 SOL to be $239 in our Base Case with 139% upside.
2. In our Bull Case, we use the same 55x NVT multiple and a 120% YoY growth rate to arrive at a price of $312 and 211% upside. In our Bear Case, we use the same NVT, but due to competing protocols with similar functionality, see transactions growing at only 40% YoY, a price of $165 and 65% upside.
3. No need to wait in line – Parallel processing of program instructions by separating code from data gives the network distinct speed advantage at 65k transactions per second (TPS) compared to other networks that process instructions one at a time.
4. On time, every time – Proof-of-history speeds up processing by centrally producing a publicly verifiable order of blockchain events so validators do not have to individually check and confirm with other nodes.
5. Crypto meets reality – Serum is a decentralized central limit order book (CLOB), backed by FTX, and a potential backbone that has the ability to set one global price for real-world assets like oil, stocks, and derivatives. We think it is an incredible opportunity on the Solana protocol that could make markets and facilitate capital formation in the real world.
6. In our view, Solana is a top layer 1 contender to host major projects since it is a high performance blockchain with quality, vetted validators, novel network primitives, and a rapidly growing developer and user community.

Category: Layer 1 Protocol

SOL/USD: 100.19

BTC/SOL: .00253

https://solana.com

Solana Block Explorer

Consensus Mechanism:

Byzantine Fault Tolerance (BFT)

Validator Selection Mechanism:

Proof-of-Stake (uses Proof-of-History)

Staking Yield: 5.81% APR

Circulating Token Supply:

333,567,997 SOL

Locked Token Supply:

65.29M SOL

Fully Diluted Tokens:

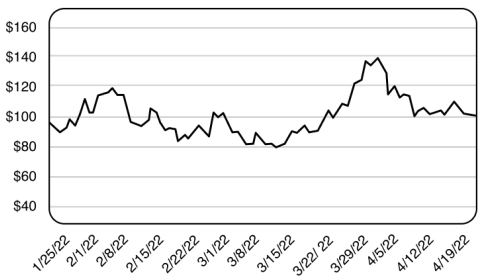
511,616,946 SOL

US$ Circulating Market Cap:

$33.42Bn

Crypto Market Cap Rank #: 7

SOL 90 Day Price



Model Assumptions

We consider that the SOL inflation percentage rate steadily declines by 15% YoY over the next ten years (dis-inflation rate) as defined by the network which ultimately targets a 1.5% inflation rate in 15 years after launch. The network burns 50% of all transaction fees. Daily and wrapped SOL transfers were measured over time.

INVESTMENT THESIS

NVT = Market Capitalization ($)/Transaction Volume ($); Solana Circ. Mkt Cap ≈$33.42Bn

	SOL	DOT	ETH	BTC	AVAX	ADA
Tx Daily Volume ($)	367.70M	61.24M	2.39Bn	28.18Bn	28.34Bn	15.30Bn
Tx 90 Day Avg Volume ($)	608.59M	164.87M	5.87Bn	16.00Bn	19.60Bn	30.97Bn
NVT (Daily)	90.89	293.84	148.63	26.71	.68	1.4
NVT (90 Day Trailing Avg)	54.92	89.13	49.14	53.10	.99	2.05
FD NVT	84.12	122.52	49.14	52.02	1.46	1.29
Circ. Market Cap ($)	33.42Bn	18.05Bn	354.60Bn	752.67Bn	19.39Bn	29.94Bn
FD Market Cap ($)	51.20Bn	20.20Bn	354.60Bn	831.85Bn	28.60Bn	39.96Bn

(Figure 1) Comparable L1s – NVT Multiples; Source: Coin Metrics, CoinMarketCap, Osprey Funds; Tx = Transaction, FD = Fully Diluted

Base Case – $239: For our base case, we used a trailing NVT of 55x and project a YoY 80% YoY transaction growth rate to maintain a linear trajectory and arrive at $239 SOL in three years for 139% upside. As a result, we estimate that the circulating market cap could grow by 160% as a result. SOL has one of the lowest NVT ratios across layer 1s and we believe it is undervalued as a result of its GameFi potential and future uptake of central limit order books (CLOBs) by decentralized applications (dApps) on the protocol.

1. Protocol gaming – We think that transactions will continue to remain on the same upward growth path as the protocol will serve a rich non-fungible token (NFT) gaming ecosystem with its native primitives that enable a seamless in-game experience where computational capability and fast on-chain settlement is paramount. GameFi is composed of play-to-earn where in-game objects are designed as NFTs to represent ownership (i.e. skins, money, physical items).

   Take Star Atlas as an example – it is a play-to-earn game built on Solana that has a massive marketplace for ships, structures, resources (fuel, food, etc.), collectibles for players to trade with others and its own in-game monetary system to build a virtual economy. The gaming space has a massive total addressable market (TAM) in the next five years ($335Bn) and Solana is poised to grow as it becomes one of the main protocol serving the space with its ability to scale to millions, or even billions of users while maintaining low latency for players.

2. CLOB – Solana also offers Serum, a dApp specifically designed to offer central limit order book (CLOB) functionality that will provide the next evolution of asset on-chain price discovery. We think new entrants or existing users of other layer 1s will be drawn to the functionality combined with Solana's speed, composability and lower costs. While other decentralized exchanges (DEXs) associated with other protocols provide automated market marker functionality, a key differentiator of a CLOB is that it enables limit order, bid, and ask functionality like a traditional exchange. Sereum already accounts for $785M and 15% of Solana's total value locked (TVL).

   Liquidity can also be provided at different price levels for on-chain financial and non-financial assets that

allow for capital formation in the real world by interacting with only a smart contract. A decentralized CLOB can set one global price for any type of real-world asset. In comparison, DEX's built on other layer 1s rely on automated market makers (AMM) where a participant must provide liquidity to both sides and only at the market price – while the ultimate function is the same, it is a limited application. We think this is an exciting and promising idea that is far from fully realized with tremendous growth ahead.

Star Atlas already uses Serum to trade all in-game assets and Aurory, a RPG-style game, also utilizes the CLOB for a similar function. It is a decentralized exchange but also provides order book functionality that supports derivatives and borrow and lending activity. The protocol can also be utilized by other Solana programs in need of an order book / matching engine and provides the wider network with access to decentralized liquidity.

Bull Case – $312: In our bull case, it is possible to see transactions grow by 120%, or 50% more than the current rate, if Solana wins more market share than competing layer 1s. Again, we use a 55x NVT to arrive at an implied price of $312 with upside of 211%. Avalanche, in many ways, is also fast and cheap and hosts a CLOB called Dexalot that has strayed away from the AMM model. Solana and Serum must attract additional users from Avalanche's ecosystem and outcompete particularly from an institutional standpoint. In this scenario, we see Serum running hand-in-hand with GameFi to achieve major synergies, as games will leverage CLOBs for quick, in-game trading of objects and running virtual economies. The protocol most outperform in the GameFi space, hosting large, well known developers that can bring proven strategies, port players from traditional, non-blockchain channels and ultimately make high quality games with low user churn.

Bear Case – $165: In a more tepid scenario, we see the network's transaction growth rate halve to 40% but still with upside of 65%. While Solana will continue to gain users from a growing crypto pie in the next three years, other competing protocols, specifically Avalanche, will offer increasingly competitive dApps with similar functionality in the GameFi space. The net inflow of users migrating or onboarding to Solana is muted as a result, and we may see less enthusiastic uptake in both the gaming and CLOB spaces.

Solana – Base Case	Year 1	% Δ	Year 2	% Δ	Year 3
Transaction Daily Volume ($)	367,701,000	120	808,942,200	55	1,250,183,400
Transaction 90 Day Avg Volume ($)	608,586,771	120	1,338,890,895	55	2,069,195,020
NVT (Daily)	90.89	-	90.89	-	90.89
NVT (90 Day Trailing Avg)	54.92	-	54.92	-	54.92
FD NVT	51.20	-	51.20	-	51.20
Circulating Market Cap ($)	33,421,586,891	120	73,531,887,966	55	113,640,190,492
Circulating Supply	333,567,997	4.9	349,745,349	4	364,025,041
Total Supply	511,616,946	4.9	536,541,843	4	558,622,249
Fully Diluted Market Cap ($)	51,200,000,000	120	112,804,744,188	55	174,388,933,979
Price ($)	$100.19	110	$210.24	48.5	$312.18

(Figure 2) Solana – Base Case; Source: Coin Metrics, CoinMarketCap, Osprey Funds; Tx = Transaction, FD = Fully Diluted

We aggregated a few statistics to obtain the value of $USD moving through Solana's network. Unlike Ethereum or other layer 1s, transactions on Solana bundle multiple transfers and include other network activity so we didn't use straight transaction counts to represent transacted value. Instead, we isolated the two statistics below to focus on native daily token transfers. We also used these numbers to derive how we value Solana as a protocol.

1. Daily SOL Transfers
2. Wrapped SOL Transfers

Daily SOL Transfers is a measure of how much of Solana's native token is transferred daily. Wrapped SOL is a token that coverts SOL to the equivalent of Solana's decentralized finance (DeFi) token standard, SPL (Solana Program Library). Wrapped SOL can be exchanged, swapped and interact with other tokens on the network in a DeFi environment where much of Solana's activity occurs.

We see future adoption of Solana accelerating based on real advantages over traditional layer 1s focused on defining functionality inherently built into the network. True speed advantages are secured over competitor chains based on modifications to the underlying network structure and function. We believe more developers will ultimately be attracted in the long term as a large contingent will need a high performance blockchain at scale – Solana meets these criteria due to a thoughtful network architecture from inception.

DEEP DIVE: AN INITIATION ON SOLANA

Why Wait? Just Seperate

65K theoretical transactions per second is a good reason not to wait for anything on Solana. Solana programs, otherwise known as smart contracts on other protocols, separate program code from data with an implementation called SeaLevel. This model is different from Ethereum where smart contracts contain both code and data.

On Ethereum instructions from one smart contract can be run one at a time and transactions are processed in a sequential fashion. Solana can achieve much faster results since data can be simultaneously passed as input to programs. This enables many inputs to be sent at once and multiple copies of the program to run in parallel to increase performance. Multiple programs can also be processed at one time.

Everyone on the Same Page

Proof-of-history (POH) is an idea that revolves around the simple agreement of time – essentially trusting a timestamp when receiving a message. This might sound trivial, but it has been an issue for decentralized networks in particular. By centrally producing a publicly verifiable order of events, nodes do not have to check with other nodes to confirm agreement of time and event ordering.

The main protocol assigns every event and transaction a unique code, or hash, and broadcasts the information. It offloads the burden from each validator on the network to calculate a time stamp and centralizes this functionality within the system. Doing so is one of the main reasons for Solana's increased speed and transaction throughput compared to other layer 1s as the heavy lifting and processing of time and order happens separately from validators. Network lag is greatly reduced.

Best Baked in Batches

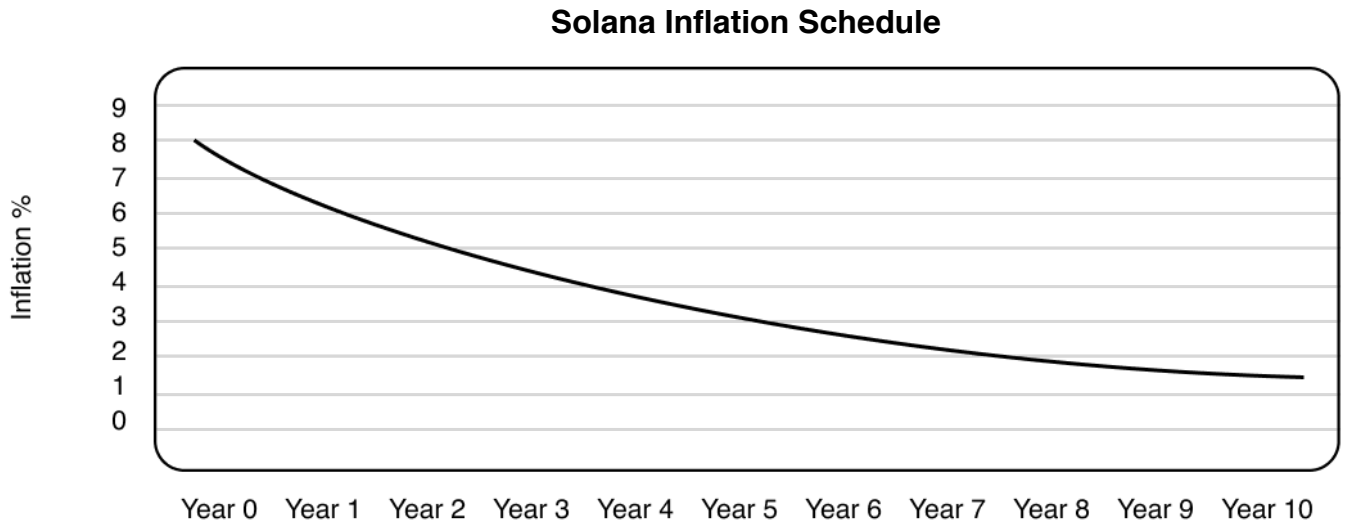
Transactions on Solana are meant to issue instructions to programs on the protocol. Each program is specialized to perform different functions for the network including for simple activities like transferring SOL. While Solana only has one transaction type, it differs from Ethereum where there are specific transaction types which can only be run sequentially. Each transaction on Solana can hold a bundle of instructions to direct programs to perform actions. Calling different programs that enable different types of functionalities in this way allows Solana to split work and simultaneously instruct many programs at one time.

For instance Solana has a main token program on the protocol where minting, transfers, and burning tokens take place. Accounts are created specifically to interact with a program on the network and can "transact" with the program to execute these actions in parallel, making the network faster.

Around 90% of the Solana network is broken down into mostly external calls to pull in data from outside sources to inform decentralized programs, token transfers, DeFi transactions on the Solana-based Serum DEX, and new accounts information on data and ownership. Additional network activity also consists of consensus activity. At current rates, Solana is processing 2.4k transactions per second which is inclusive of much of the above activity.

High Standards

Anchor is a Rust-based development framework for Solana that provides tools to build on the protocol. It makes working with repetitive tasks and nuances of Solana much easier, a defining quality amongst layer 1s, and is meant to attract many developers. Projects like the popular Serum DeFi platform were built with Anchor. Solana also has a fast runtime platform similar to Ethereum Virtual Machine (EVM) called Low Level Virtual Machine (LLVMs) where programs are run and instructions are executed.



(Figure 3) Solana's Inflation Schedule; Source: Solana Docs

The protocol hosts a vibrant DeFi ecosystem which revolves around the Solana Program Library (SPL) token standard. The protocol has one token standard, SPL, for both fungible and non-fungible (e.g. NFTs) tokens. Wrapped SOL is also on the same SPL standard to facilitate interaction with the rest of the DeFi ecosystem. It can later be unwrapped in a Solana wallet back to the protocol's native token, SOL.

Inflate and Delegate

Solana's network is inflationary, but that inflation rate decreases at a steady rate for the next 10 years. The network supply was set to an initial inflation rate of 8% and coded to target a long-term inflation rate of 1.5% in 15 years. Below is a model of the first 10 year predicted inflation curve with a 15% YoY dis-inflation rate over the same period.

The network's inflation schedule provides an advantage compared to most other layer ones since it creates conditions for network validators to earn around 6% delegating SOL and more than that if individuals run a validator, especially accounting for any network fees validators accrue. Solana focuses on "professional validators" to create a high performance and highly secured network. These types of validators run enterprise grade hardware with extremely fast connections and high uptime/availability. One of the criticisms of the network though is that it may not be as decentralized as other protocols, with fewer number of validators given a preference for higher quality operations and hardware.

From Mobile to Crypto

Team members include Anatoly Yakovenko who is founder and CEO who spent the last 20 years either creating his own VOIP startups or as a software engineer at Qualcomm and Dropbox. Greg Fitzgerald is co-founder, CTO and principal architect at Solana who also spent time most recently at Qualcomm in the Office of the Chief Scientist as a senior staff software engineer. Both focused on building cutting edge mobile platforms and recruited others from Apple and some of their prior firms to launch Solana Labs. The initial team has a mostly technical background which shows the deep consideration they had for how they initially architected the protocol. Like Ethereum, Solana has also established their own group to support their network called the Solana Foundation which provides grants, resources, and discounts on equipment for validators hosting nodes.

Solana Rennaisance

Solana has reached 1.6M followers on Twitter, has a 140k member following on Reddit and a 91k member base on Telegram. People are clearly interested in what the team is doing and what is happening within the ecosystem. New SPL tokens, a measure of new DeFi token issuance and activity taking place on the protocol, has doubled since June of last year. Daily new NFTs on the platform has also grown about 2.5x since. SOL transferred over the network has grown 55% in the same timeframe. Network fees related to protocol activity has also seen 5x growth. Active programs on the network, another measure or proxy for usage, grew by a very similar 5x multiple. The SOL token price also reached an all time high in November touching $258.93.

Risks, but Worth the Reward

On September 14th the network was flooded by a deluge of transactions from bots, overloading validators and crashing the network for 17 hours. Uptime is the most valuable statistic for any global network and if Solana aims to be one of the main layer 1 protocols, it must be accessible nearly all of the time (as an example, AWS has 99.9% uptime service level agreements). There are also 10x as many DApps built on Ethereum. If the protocol wants to establish itself as the Ethereum killer, or at least make significant inroads, it must outpace Ethereum's ecosystem growth. Additionally the network must attract a similar contingent of developers to produce these dApps.

Also in the recent Wormhole hack, hackers exploited a bug in a protocol that bridges Ethereum to Solana. An attacker was able to mint wrapped ETH on Solana's network that was not backed by deposits and bridged ~94k ETH to Ethereum, ultimately withdrawing the exploited proceeds. While it wasn't a direct bug in Solana's protocol, the Wormhole network was exploited which interacted directly with Solana. Bridging risk remains significantly high and will continue to, as exploits like the Wormhole hack remain in the collective crypto conscious for the long term.

Due to the nature of bundling many instructions, transfers, and consensus votes in individual transactions, it becomes harder for network participants to have a view into the real economic statistics of transaction flows and value moving through the network. While the network is seemingly transparent at first glance with statistics of transaction speeds and counts, network explorers would benefit from separating monetary transaction flows or providing an easy way to pull this data from the blockchain.

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