

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

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Polkadot: Killer Dapps, Apply Within

PM Notes:

1. Transaction growth? With 13 of 100 recently onboarded parachains, you haven't seen anything yet. We see upside of 436% and find the long term value of one DOT to be worth \$98 in our Base Case using a trailing network value to transaction (NVT) multiple of 89x on 2.8x year-over-year (YoY) transaction growth.
2. In our Bull Case we see 660% upside and a price of \$139 using the same NVT multiple of 89x and 240% YoY transaction growth. In the Bear Case we see slower transaction growth of 200% YoY with an implied price of \$50 at a 89x NVT multiple.
3. Primed for Growth, All Systems Go – Parachains are finally here. The potential for disruption is real. We have high expectations for Polkadot to span a whole new set of crypto primitives.
4. Fast, Cheap, Secure, Interoperable, Decentralized – what more do you want? How about tight tokenomics. We estimate that at an average lock rate of 52% staked DOT, inflation must achieve 10.78% to keep up with our transaction value base case assumptions.

Model Assumptions

We assume a predictable schedule of parachain auctions occur every two weeks for the next 3 years. We also consider the average total DOT locked in the first 13 parachain auctions to be 13.42M. We assume an average total DOT lockup in the first 26 auctions, a projected yearly estimate, to be 346.24M and discount the estimate by 20% assuming fewer DOT will be locked up over time on average as more auctions are held. We also use a conservative prior year 90 day average transaction growth multiple of 2.84x which assumes network transactions will continue to grow steadily at the same rate YoY for our Base Case. We recognize that fees from transactions and slashes from network misbehavior/misconfigurations are sent to the Polkadot Treasury where

Category: Layer 1/0 Protocol

DOT/USD: \$18.27

ETH/DOT: .00621

<https://polkadot.network/>
[Polkadot Block Explorer](#)
Consensus Mechanism:

Byzantine Fault Tolerance (BFT)

Validator Selection Mechanism:

Nominated Proof of Stake

Staking Yield: 14% APR

Circulating Token Supply:

987.58 DOT

Locked Token Supply: 631.31M DOT

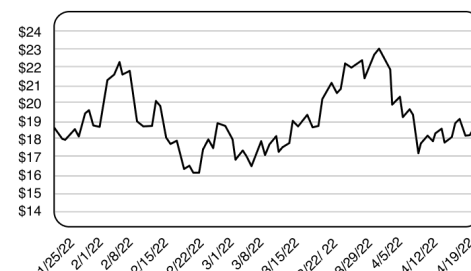
Fully Diluted Tokens:

\$20.20Bn

US\$ Circulating Market Cap:

\$18.05Bn

Crypto Market Cap Rank #: 13

DOT 90 Day Price


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they're slowly burned if unused; however the yearly burn is immaterial to network inflation economics at <1% of circulating supply.

INVESTMENT THESIS

Polkadot's 90 day average NVT, a trending predictor of longer term network value, shows its ability to settle > \$6Bn a day and demonstrates a convincing valuation relative to other layer 1s. We think the market may be undervaluing the network.

NVT = Market Capitalization (\$)/Transaction Volume (\$); Polkadot Circ. Mkt Cap ≈ \$18.05Bn

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

For example, consider the NVT ratio 90 day moving average (MA) has been trending downward since November 2021. The network's value is trading at a discount relative to transaction flow.

2.84x transaction growth multiple; NVT 90 Day Avg ~89x

Polkadot – Base Case	2022 - Year 1	2023 - Year 2	2024 - Year 3
Tx Daily Volume (\$)	61.42M	208.82M	710.00M
Tx 90 Day Avg Volume (\$)	164.87M	560.57M	1.91M
NVT (Daily)	293.84	293.84	293.84
NVT (90 Day Trailing Avg)	89.13	89.13	89.13
FD NVT	122.52	122.52	122.52
Circulating Market Cap (\$)	18.05Bn	49.96Bn	169.88Bn
FD Market Cap (\$)	20.20Bn	68.68Bn	233.52Bn
Circulating Supply	987.58M	1.10Bn	1.21Bn
Price (\$)	18.27	45.67	139

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

We recognize that only a few parachains have been onboarded to the main network so far and account for slightly over 10% utilization of the network's 100 slot limit, which is inherent in our growth projections. New parachains will be added to the network after auctions with additional flows of transactions as a result of usage. That's a lot of upside as new chains come online with no shortage of projects wanting to be involved. For example, in parachain



auctions 6 through 11 there were ten additional projects that bid on a slot but did not win.

Base Case – \$98: In three years we see upside of 557% and project Polkadot's circulating market cap to be six times larger at \$119Bn, and 5.3 times the current price at \$98 per DOT using an NVT of 89x and transaction growth of 2.84x. Our projections are based on the belief that parachains will be an attractive protocol primitive that both entice and enable developers to build completely customizable projects at scale.

1. **New primitives:** At its core, Polkadot is a blockchain relay chain which manages communication amongst a web of independently built blockchains called Parachains, or shards of the network. Unlike other layer 1 protocols, the Polkadot blockchain, known as the Relay Chain, is purpose built only to coordinate and secure connected and independent Parachains. Often referred to as layer 0, a classification we endorse, the Relay Chain is a breakthrough in blockchain architecture.

Parachains do not operate in silos unlike Ethereum, Bitcoin and other similar protocols. Instead, security is shared and economic and transactional capabilities amongst other parachains are connected. For example, Acala is a parachain whose vision is to connect autonomous economies on Polkadot and supports a cross-chain stablecoin for borderless value transfer for all chains on the network. This includes the ability for users to govern monetary policies of the stablecoin. Astar is also building an application platform dedicated to DeFi, NFTs, DAOs and anything related to web3 / decentralized applications.

Take another example: a future identity verification chain may want to prioritize security while a gaming application may value speed. Ethereum 2.0 is a one-size-fits all solution and putting both on the same chain means that the technology constraints of homogenous sharding may force both the identity verification developer and the gaming developer to compromise in ways that make each product sub-optimal. If given a choice to have more optionality, on sound technology with enhanced security, why wouldn't a developer always choose Polkadot over Ethereum? That is where the vision has the potential to deliver on reality.

2. **Why Parachain? Strength in Unity:** When faced with the daunting prospect of having to bootstrap a network of validators from scratch, for instance like on an Avalanche subnet, development teams with novel blockchain based projects will be highly motivated to take advantage of the Polkadot Relay Chain and ecosystem. Interlinked parachains excel at communication amongst themselves while Layer 2 scaling solutions on Ethereum cannot interact in a similar manner since transactions are restricted to each individual chain.

Separate layer 2 solutions cannot interact, even for simple operations like exchanging transaction metadata and communicating between projects on another layer 2. It also creates headaches from a user perspective since separate accounts for each layer 2 solution must be created. Layer 2 solutions are separate chains from the Ethereum network, and while it may be faster to transact on them since these chains are not as congested, blockchain security suffers as a result. Layer 2s have fewer nodes supporting network processing and security activities. This can lead to security concerns and lack of decentralization, whereas Polkadot parachains participate in a shared security-as-a-service model across the entirety of the protocol.

3. **Code it up:** Polkadot supports EVM which is compatible with Ethereum's dApp ecosystem, and also WASM which is native to Polkadot. Any developer can use common languages like C++, Rust, etc. to program on the chain. Polkadot provides compatibility to any parachain that builds on it, which is comparatively harder to find on other layer 1s and dramatically lowers the barriers to entry for any new non-crypto native developers/ teams to jump on board.

Bull Case – \$139: We find upside of 660% by using a 89x NVT multiple and 3.4x transaction growth in our bull case to arrive at an implied price of \$139. Interesting parachains like Nodle that implement real-world use



cases will outcompete their counterparts like Helium which aims to achieve a similar type of IoT connectivity with its own protocol. Nodle is a Bluetooth low energy network that aims to connect millions of smartphones and IoT devices. It already has 5M daily active smart phones utilizing the network with millions more IoT devices and moves 100GB of data daily. In this scenario, we also see parachains as thriving ecosystems, slots filling up and crowdfunding exceeding our DOT contribution expectations. As a result, transactions grow by 20% more than in our base case with increased project activity. We see a clear preference into parachain usage over layer 2 Ethereum solutions by market participants due to customization benefits, as well as quick transactional and operational capabilities.

Bear Case – \$50: In our bear case, we use the same 89x NVT and see a scenario in which transaction growth on the network falls off its current trajectory to 2x YoY growth due to lower community enthusiasm than we expect. While we still see upside of 174%, Parachain DOT crowd funding averages fall and the initial excitement about new parachain launches wanes. Transactions, while still on a growth trajectory, slow as new project launches are not as large in scale and attract less activity overall. Identity projects like Ontology don't achieve initial growth expectations and falter slightly.

DEEP DIVE: AN INITIATION ON POLKADOT

The Polkadot network is fast, works in parallel, and can theoretically handle more transactions per second (TPS) (1 million TPS at full deployment) than any competing network, including Solana and Avalanche. Parachains that use Polkadot also remain completely independent while benefiting from an extremely high degree of design customization and flexibility. Polkadot is a standout project in the wider ecosystem of layer 1 networks and layer 2 scaling solutions by implementing some of the major improvements below:

1. Heterogenous sharding for project customization and network effects
2. Network sharding for parallel transaction processing / faster throughput, theoretically 1M TPS
3. Auction mechanism (bid-to-survive model) where stronger, value-based parachains endure
4. High staking rewards compared to other layer 1s
5. Ease of development to bolster future ecosystem growth

Carded at the Door

Distributed identity frameworks could be one way that Polkadot differentiates itself from other layer 1 offerings. ONTology is one example of an identity parachain taking advantage of the heterogenous sharding model so the project does not have to compromise in building a decentralized identity solution. ONTology also makes its identity solution available to all blockchains supported by Polkadot for the greatest reach. Their parachain includes authentication and authorization functionality to maintain a digital identity and ID-based credit scores for on-chain digital asset transactions. This is a great example of why a project would want to leverage Polkadot's framework to optimize architecture and gain scale in ways they would not be able to on other layer 1s.

Stake It 'Till You Make It

Polkadot runs using DOT as its native token. This is a proof-of-stake system where the economic rewards accrue to network value and transaction fees via inflation, rather than token scarcity. DOT holders both own and govern the wider network and earn fees based on user transactions. Total supply was initially determined at 1Bn DOT and is now 1.19b due to network inflation.



The staking inflation rate is key, since it is one of the highest when looking across other comparable protocols and is a nice kicker in addition to participating in the ecosystem in other ways to earn yield, like parachain auction bonuses, tokens, etc.

The annualized reward rate for delegating DOT is around 14%. To stake DOT and earn network fees, users are required to stake at least 160 DOT (~\$2880 @ \$18 DOT) and are bound to a lockup period of 28 days.

A balancer mechanism is coded into the Polkadot protocol to achieve internal inflation homeostasis. The network attempts to achieve an ideal staking rate of 50% of total supply to target a 10% circulating supply inflation rate and 20% reward for validators. The inflation curve of the network and rewards for validators drop off precipitously after the target of 50% staking has been reached to balance the network. ~53% of eligible DOT are currently being staked which is above the network's inflation target.

Network Architecture/Technical Features

Parachains have their own tokens and governance – again they exist as separate chains - but rely on the overall Polkadot system and Relay Chain for security in a security-as-a-service model, including transaction processing, block validation and finalization/consensus by nominators and validators. Ethereum transaction speed is limited since every node is required to validate every transaction that takes place on the chain. The Polkadot relay chain does this in parallel and creates blocks 10x faster. The ecosystem benefits from growth which seems like an obvious statement, but as more users connect, they bolster security and consensus mechanisms of every parachain, regardless of use case.

The relay chain provides some serious scalability advantages and can have compounding affect on future growth. Parachains can also connect via a bridge to external networks such as Bitcoin, Ethereum, or other layer 1 solutions. Ultimately parachains act as their own nation-states, “with their own communities, rules, economics, governance, treasuries and relationships with external chains.” This interoperability feature could easily make the network more valuable compared to other layer 1s by enabling communication with other chains to trade value, whether in gaming, finance, or education applications. Instead of a walled garden, it opens the ecosystem to rich possibilities. There are a few chains attempting to achieve external connectivity, but even fewer that are attempting broad reaching connectivity relating to any type of transaction among disparate ecosystems.

Easy Road to Code

Polkadot is built on Substrate, a framework specifically designed to build blockchains that was originally developed to be a modular solution to speed the development of Polkadot. It allows fine grained control over storage, economics, and consensus and allows developers to use common languages like C, Rust, and Go via its base layer, WebAssembly (WASM). WASM was built specifically so that anything compiled would appear the same in a browser, regardless of language. Separately the Ethereum Virtual Machine (EVM), built to run various smart contracts to simulate a physical machine, cannot handle as many wide ranging operations as WASM.

It also requires developers to pre-compile code which initially takes more time. WASM is more suitable for network participants running different types of hardware and supports Polkadot's no-fork upgrade capability for fewer disruptions.

Layer 2 projects on other competitor networks are tethered to the tokenomics of their individual protocols and must learn layer 1 native languages. Projects built on Polkadot do not have to conform to a standard set of requirements, constrained by the chain they're building on; instead, they have freedom to customize and tailor for their own use cases. Similar protocols don't offer this type of independence which is a key differentiator to the future growth of Polkadot.



Parachain Auctions – Going Once, Going Twice...

There are a total of 100 parachain slots that are auctioned off on a known, regular schedule so parachains can connect and utilize the Polkadot network. These slots enable parachains to bid, either through crowdloans or through their own funds, to win auctions to utilize the network for two years. After 96 weeks, these projects must bid again to gain use of another slot. Additionally, parathreads, which are exactly like parachains in that they are their own blockchains, pay per block instead of bidding on slots in auctions and are not as capital intensive to launch. The timed lease and pay per block model are the ultimate selector of on-chain value, as projects must provide a level of value to:

1. Outbid other parachains vying for a spot – eventually auctions will become more competitive over time as there are only 100 slots; and
2. Attract or generate enough capital to bid and win auctions or pay per block to continue their use case/survival as a project.

The Polkadot auction process is novel and is the ultimate driver to attract quality projects, as it sets the stage for a bid-to-survive model accretive to future quality network use cases in the long run. Parachain and parathread projects also offer bonuses for crowdloan contributions and distribute native tokens for DOT contributed to their projects so users can participate in their growth.

This sets Polkadot apart from other protocols and creates a rich environment for projects to incubate and compete for space, as weaker parachains will be separated from those that generate true/lasting value for the wider network and are economically endorsed by its users.

Transaction Speed... Don't Blink

Architecture really meets reality in Polkadot's transaction speeds. Polkadot makes big claims that, if true, deliver on the scale problem that has hampered legacy blockchains so far: Forget Bitcoin at 7 transactions per second (TPS). At theoretical maximum, with all nodes in operation for maximum sharding, Polkadot currently estimates the ability to process 1,000,000 TPS. Compare that to the Visa credit card network that currently does around 1,800 TPS on a theoretical maximum of 65k. Other layer 1s like Solana and Ethereum after the implementation of sharding claim future TPS of 65k and 100K respectively.

Teamed Up

Polkadot has a deep bench. The project founder is Dr. Gavin Wood – Co-Founder and CTO of Ethereum. He is joined by industry veterans Peter Czaban and Robert Habermeier. In addition to Polkadot, the team has created the Web3 Foundation: a large, Swiss-based, research organization staffed to work on developing the Polkadot protocol and Parity. Parity is a German/UK based 150 person company that is building applications and the application developer tools using Polkadot (though 30% of the workforce is remote across 9 countries, highlighting the scope of this effort). This is an A+ team.

Growth by the Numbers

Polkadot Reddit touted 40k members at the end of April. Discord had 22k and YouTube was at 44.5K members. Polkadot's official Twitter account now boasts 1.2m followers. Social media shows people's interest in the network has been increasing, but does the same show in ecosystem metrics? Unequivocally, yes. It is estimated that there are now 350 teams building on the protocol, up 30% from last year. During 2021, these teams raised a combined \$650m in early stage funding for Polkadot-specific projects. Polkadot, and its sister chain Kusama, had 3 million user accounts created by the end of December.



Better the Second Time Around

Polkadot was conceived by Gavin Wood, who was also an important figure in building Ethereum before Polkadot. He was CTO and co-founder in Ethereum's early days and invented Solidity, Ethereum's programming language for smart contracts. He was critical to Ethereum's early development but decided to part ways in 2016.

Wood believed he could create a system that would iterate on Ethereum's shortcomings in network architecture and design to achieve scalability, security and speed that was superior, including the idea that Ethereum transaction speed was limited by the idea that every node is needed to validate every transaction that takes place on the chain.

Kusama was also launched by Wood in 2019 which is devised from an almost identical codebase as the Polkadot protocol. It serves as the sister chain to Polkadot and was originally conceived as a test network with faster slot leasing schedules for testing before a parachain migrated to Polkadot for go-live. Over time Kusama has developed its own ecosystem and some projects have even decided that the network economics are preferable and are happy staying on the Kusama chain.

Future – Making Crypto Inroads

The future of Polkadot is no doubt a bright one. Millions of user accounts have been created while many parachains are building an incredible variety of applications with more to come. Parachains have recently launched, completing the implementation of Polkadot's original vision and has created a deluge of applications just now starting to implement their own solutions. Polkadot has massively improved on many layer 1 chain limitations including shared resource inflexibility and uncustomizable network economics.

While Ethereum still maintains the lion's share of base protocol dominance, Polkadot has a true shot at making inroads in adoption. Polkadot has delivered on its most important vision when parachains launched. This functionality IS Polkadot, a heterogeneously sharded chain. People believed in the vision before and continue to now that the original vision was fully delivered. Its possibilities in the layer 1 world are vast, especially with its native ability to connect and interact with distinct chains in the crypto ecosystem. Could it be the layer 1 solution to ultimately rule them all? Yes, but regardless of the outcome Polkadot can still thrive in a multichain world.



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