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Deep Research

Algorand

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*Please see page 43 for required disclosures

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Project Overview

Algorand is a proof-of-stake (PoS) layer 1 blockchain that employs a unique consensus mechanism called Pure Proof of Stake (PPoS), which relies on random node selection to promote decentralization, security, and scalability. Algorand Foundation's mission is to empower a dynamic, inclusive, and borderless global ecosystem based on the Algorand blockchain technology. The Algo token is the native currency of the network.

The Problem & Landscape

- Over the past several years, several smart contract platforms such as Solana, Avalanche, and Near have emerged with the goal of solving the scalability issue plaguing the future of decentralized computing.

- Blockchains today have yet to solve the blockchain trilemma: achieving security, scalability, and decentralization without sacrificing at least one of them. Algorand has a unique approach that asserts to solve the trilemma through its unique Pure Proof of Stake consensus mechanism.

- Algorand is highly reliable – with near instant finality and experiencing zero downtime since its launch.

The Algorand Solution

- Algorand is a PoS network offering potentially scalable and secure blockchain infrastructure.

- Algorand's architecture is designed to merge decentralized and traditional finance and onboard the masses of users and institutions.

Fast / Scalable	Low Cost	Institutional Applications
Algorand smart contract platform operates at over 6,500 TPS and are final in under 3.7 seconds [1]	The security model hinges on randomness and therefore allows for low-cost txns	Semi-permissioned infrastructure suitable for KYC and AML laws

Algorand, Inc. Team

- Algorand was founded in late 2017 by Turing-award winner Silvio Micali. Algorand, Inc is a for-profit software company based in the United States, tasked with furthering the platform's development. It is worth noting that Algorand has recently experienced some turnover in leadership, with former CEO, Steve Kokinos and former Head of Marketing Keli Callaghan, leaving the company.

Silvio Micali	W. Sean Ford	Jing Chen	Paul Riegle	Michele Quintaglie
Founder	COO and Interim CEO	Head of Theory Research and Chief Scientist	CPO	CMO
• Has been on the faculty at MIT's Electrical Engineering and Computer Science Department since 1983 • Received Laurea in Mathematics from the University of Rome, and his PhD in Computer Science from UC Berkeley	• Sean was previously the Chief Marketing Officer at LogMeIn. Prior to this, Sean held leadership roles at Avid Technology, Zmags, Syncsort, and Oracle • BA in English from Williams College & MBA from Harvard Business School	• Jing is an Assistant Professor in the Computer Science Department at Stony Brook University • Jing received her Bachelor's and Master's degrees in Computer Science from Tsinghua University, and her PhD in Computer Science from MIT	• Paul has held a number of leadership positions including global product management at IBM, and project management at Carbon Black and a number of startups • BA in Integrated Science and Technology from James Madison University and an MBA from the University of Notre Dame	• Michele was previously Head of Communications at Fidelity Asset Management, Visa Inc, and United Technologies • BA in English Literature from Villanova University and graduate degree in Communications and Journalism from the University of Nairobi

Research and Development

Talented Research Staff

Yossi Gilad	Hugo Krawcyzk	Chris Peikert	Gary Malouf
Systems Research Head & CTO	**Head of ACE Program**	**Head of Cryptography**	**VP of Engineering**
• Was a postdoctoral researcher at MIT and Boston University. Before this, he was a research staff member at IBM.	• Contributed to the cryptographic design of numerous Internet standards. Previously a distinguished research staff member at IBM Research.	• World leader in latticed-based and post-quantum cryptography. Professor in the University of Michigan's Science and Engineering Division.	• Built and scaled engineering teams in both public companies and start-ups. Most recently held leadership roles at Wayfair and OfferLogic.

Algorand ACE (Algorand Center of Excellence) Program

- Algorand Centers of Excellence are multidisciplinary centers that advance blockchain innovation and research globally. They perform research, design educational programs, work on real-world use cases, and more.
- ACE programs run for 3-5 years and partner with top universities and non-profits to select ten teams to participate in the program.
- ACE has ten centers worldwide and has committed $50M of funds.

Algorand

Algorand Foundation Team

- The Algorand Foundation is a non-profit based in Singapore that commissions Algorand Inc and others to develop Algorand

Staci Warden	Deirdre Halligan	John Woods	Min Wei	Eric Wragge
CEO	COO	CTO	Head of Ecosystem Growth	Head of Business Development
• Previously held leadership positions at the Milken Institute, JP Morgan, and the NASDAQ • MPP from the Harvard Kennedy School. BA in Philosophy from Bates College and a PhD ABD in Economics from Brandeis University.	• Most recently served as Head of Global Affairs at Revolut. Previously served as COO for Coinbase Ireland and SaaS e-commerce technology company eDesk. • Graduate of the University of Limerick	• Previously worked as Chief Architect of Cardano at IOHK. John has also held roles leading software architecture and applied cryptography at a number of firms including Informatica and ConsenSys • Holds a Bachelor's in Engineering from Technological University Dublin	• Most recently Head of Partnerships at Blockchain.com. Previously cofounded a venture-backed startup, and held senior BD, product, and strategy roles at various technology and media companies. • Bachelor's in Engineering from Cooper Union and MBA from MIT Sloan	• Previously worked at JPMorgan for over 20 years, where he most recently served as the Managing Director in structured finance and head of Asset-Backed Securities for Northern Europe • BA in Economics from the University of Waterloo

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Pure Proof of Stake (PPoS)

- Algorand attempts to solve the blockchain trilemma by offering decentralization, scalability, and security through its Pure Proof of Stake (PPoS) consensus mechanism.

- PPoS requires a lower staking minimum than traditional PoS networks, distributes rewards to all token holders, and relies on randomness to mitigate the risk of adversarial attacks on the network, as opposed to staking and slashing.

- In PPoS, participation nodes are randomly selected to propose a block. The likelihood that a participation node is selected is directly proportional to how much Algo it has online – analogous to the number of tickets held in a lottery.

	Traditional PoS	PPoS
Overview	Users are required to lock up a designated amount of capital to become a validator. Block producers are generally chosen based on a combination of capital committed, age of capital committed, and randomness.	Everyone with a de minimis amount of a native token can produce blocks. Block producers are chosen via a cryptographic sortition process known as a Verifiable Random Function (VRF). Selected nodes are hidden from external observers, preventing adversarial attacks on a block-producing node.
Consensus Participants	Stakers (Example: ETH Node requires 32 ETH)	Anyone with at least 0.1 Algo
% of Supply Required to Launch Attack on Network	51%	34%[1]
Security Model	Cost to acquire 51% of network + Slashing Malicious Actors	Cost to acquire 1/3 of network + Randomness
Forkable?	Yes	No[2]

Relay and Participation Nodes

- The Algorand network supports two types of nodes to optimize for transaction throughput and decentralization: relay nodes and participation nodes. The difference between these nodes is configuration only, not software.

Participation Nodes

- Participation nodes run the Algorand consensus protocol and communicate with each other through relay nodes.

- These nodes propose and vote on blocks on behalf of the user's stake within the consensus algorithm.

- The requirements for a participation node are far lower than that of a relay node (100Mb broadband required). Participation nodes cost ~$500 a month.

- Algorand states that as long as enough of them run the consensus protocol honestly, the blockchain will not fork, even if all the relay nodes are compromised.

- At the time of this report, there are ~1400 participation nodes.

- Non-archival by default (only store the last 1000 blocks of the Algorand blockchain), but can be put in "Archival Mode" and become archival and store the entire Algorand blockchain.

Relay Nodes

- Relay nodes serve as network hubs and maintain connections to many other nodes.

- These nodes have high system requirements (1Gbps broadband symmetrical with low latency connection to the network).

- Becoming a relay node requires permission and coordination with the Algorand Foundation.

- The majority of relay nodes are run by the Algorand Foundation, Algorand Inc, and early backers, which poses some centralization risk. Additionally, due to the cost of running a relay node, without proper incentives, there may not be a lot of community members looking to run one.

- At the time of this report, there are about 100 relay nodes on the Algorand network.

- Relay nodes are all archival (store the entire history of the chain)

Relay and Participation Nodes

- Participation nodes communicate with each other through relay nodes which serve as network hubs
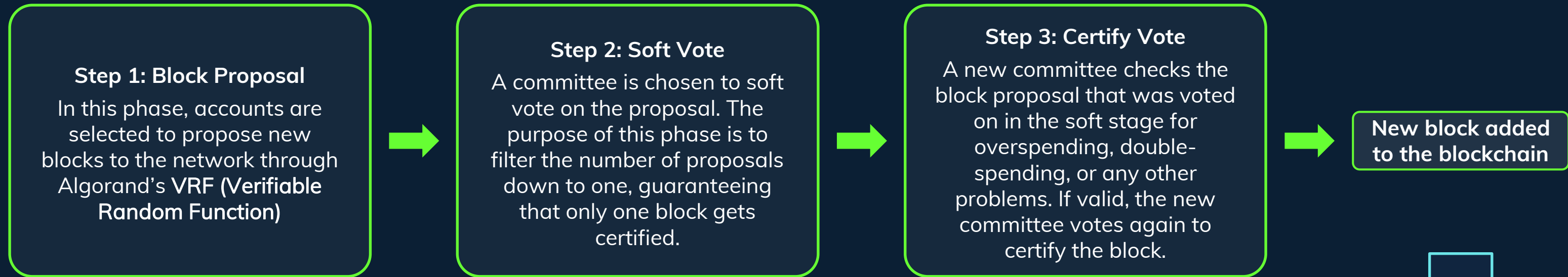
Source: FSInsight, Algorand
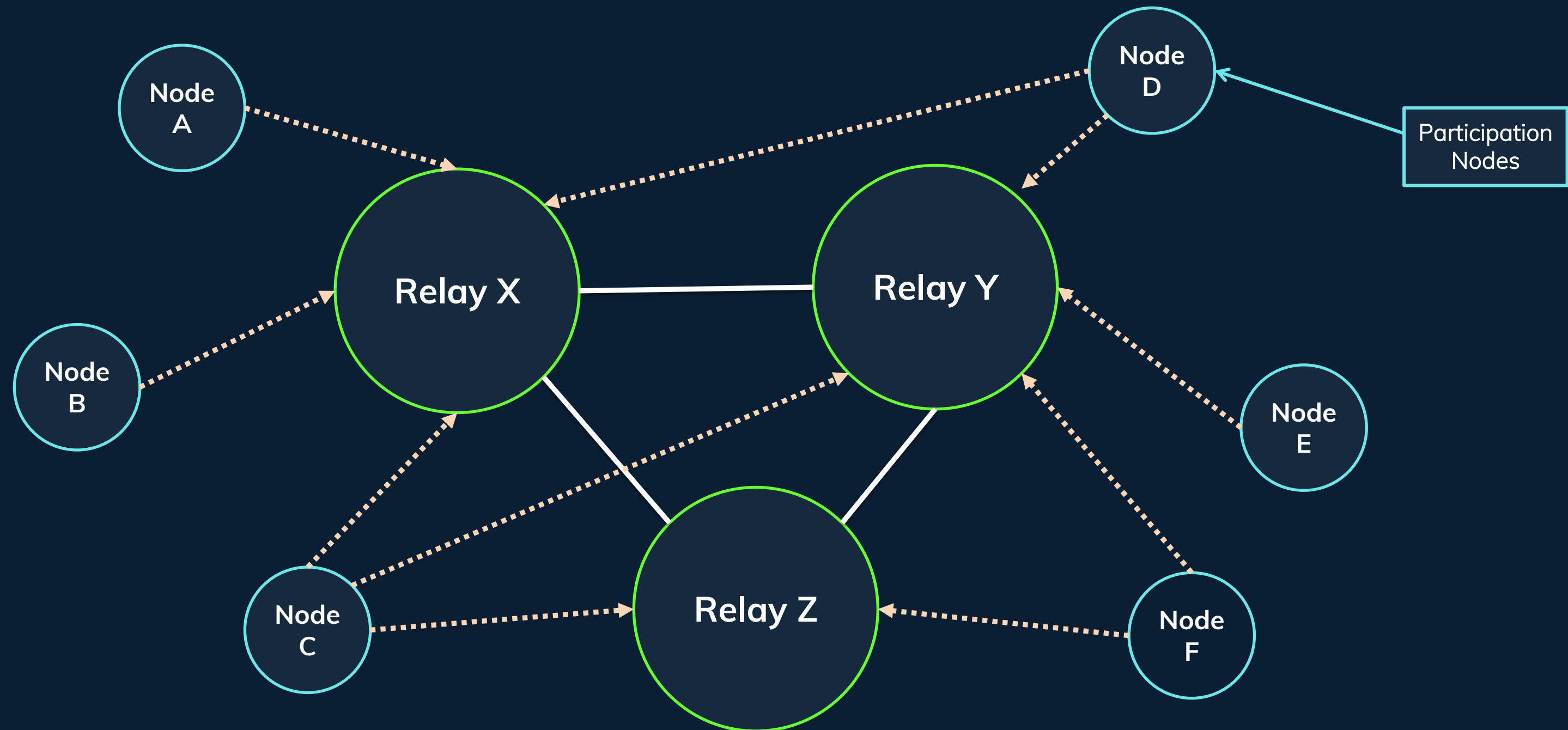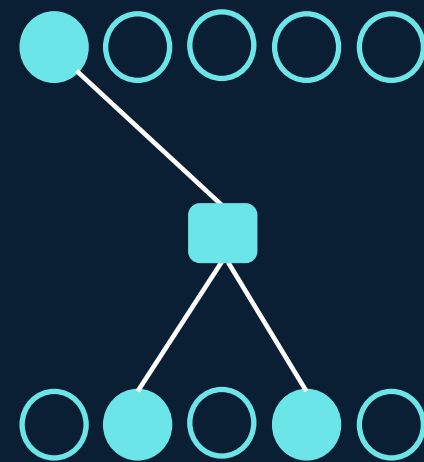
PoS Validator Node Requirements

- PoS networks require upfront costs to run a node. Participation in consensus on Algorand is more accessible than most other networks with a minimum required stake of just 0.1 Algo.

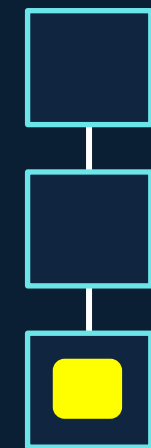| Network	Processor	Required Minimum Stake	Required Minimum Stake ($)	Memory	Storage
Ethereum 2.0	CPU > 2.80 GHz	32 ETH	~$52,000	16 GB	> 100 GB
Binance Smart Chain	12 Core CPU	10,000 BNB	~$3,300,000	48 GB	2 TB
Solana	CPU > 2.5 GHz	No Minimum	No Minimum	128 GB	500 GB
Cardano	2 Core CPU > 2 GHz	340 ADA	~$140	12 GB	50 GB
Polkadot	CPU > 4.20 GHz	120 DOT	~$800	64 GB	80 - 160 GB
Avalanche	CPU > 2 GHz	2,000 AVAX	~$40,000	> 6 GB	> 200 GB
Algorand	2 Core CPU > 2.50 GHz	0.1 ALGO	~$0.03	4-8 GB	100 GB
Near	CPU > 2.80 GHz	3.59 Million NEAR	~$8,500,000	16 GB	200 GB
Tezos	CPU > 2.0 GHz	8,000 XTZ	~$9,400	4-8 GB	60 GB

PPoS Consensus Requires 3 Major Steps

Step 1: Block Proposal

In this phase, accounts are selected to propose new blocks to the network through Algorand's **VRF (Verifiable Random Function)**

Step 2: Soft Vote

A committee is chosen to soft vote on the proposal. The purpose of this phase is to filter the number of proposals down to one, guaranteeing that only one block gets certified.

Step 3: Certify Vote

A new committee checks the block proposal that was voted on in the soft stage for overspending, double-spending, or any other problems. If valid, the new committee votes again to certify the block.

New block added to the blockchain

1

2

3

Algorand

L1 Capabilities: Algorand Virtual Machine (AVM)

Algorand Virtual Machine

- Similar to Ethereum's EVM, Algorand Layer 1's Algorand Virtual Machine (AVM) powers Algorand's smart contracts.

- ASC1s (Algorand Smart Contract Layer 1) operate at reported speeds of over 6,500 transactions per second and are final in under 3.7 seconds .[1]

- Algorand is mathematically impossible to fork.[2]

- On average, transactions cost ~.001 Algos ($0.0003 cents at current prices).

- The AVM is currently NOT EVM-compatible, however, Algorand supports multiple languages and offers its own programming language called TEAL (Transaction Execution Approval Language).

- TEAL is a higher-level assembly-like language for the AVM that allows developers to code directly with the language or with Python using Algorand's PyTeal library.

Smart contracts can be written in a higher-level language such as Python or Reach and are compiled to bytecode for execution on the AVM

| Language 1 | Language 2 | ◇ ◇ ◇ | Language N |

↓ ↓ ↓

Algorand Virtual Machine
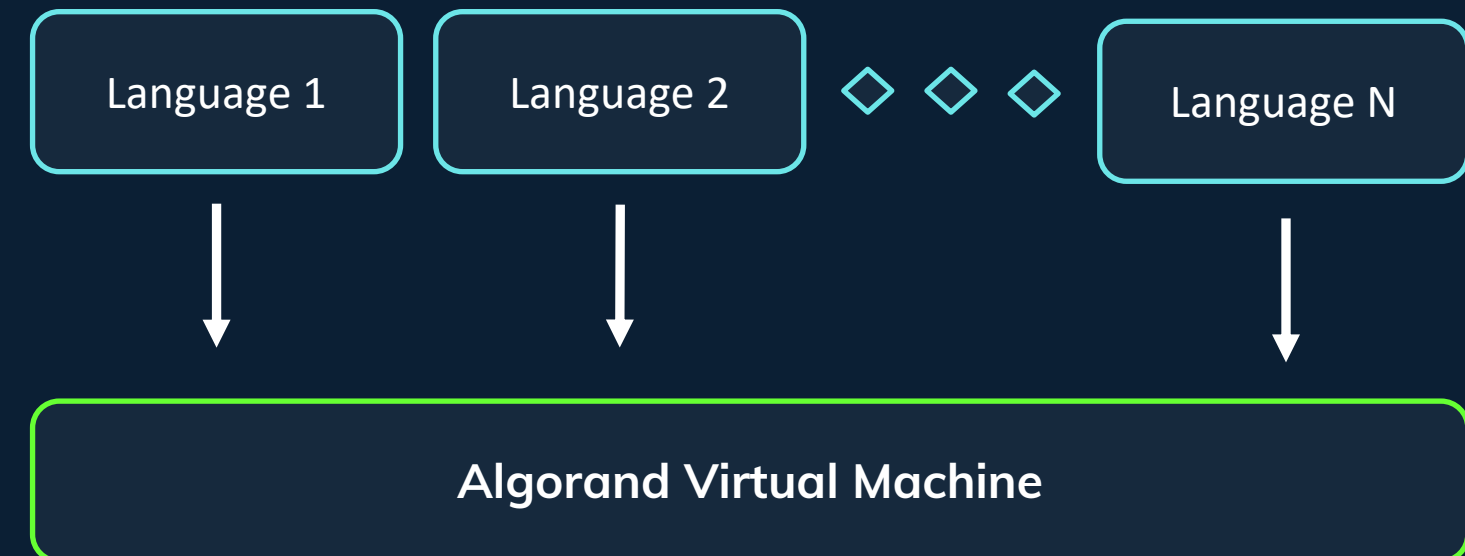
Algorand

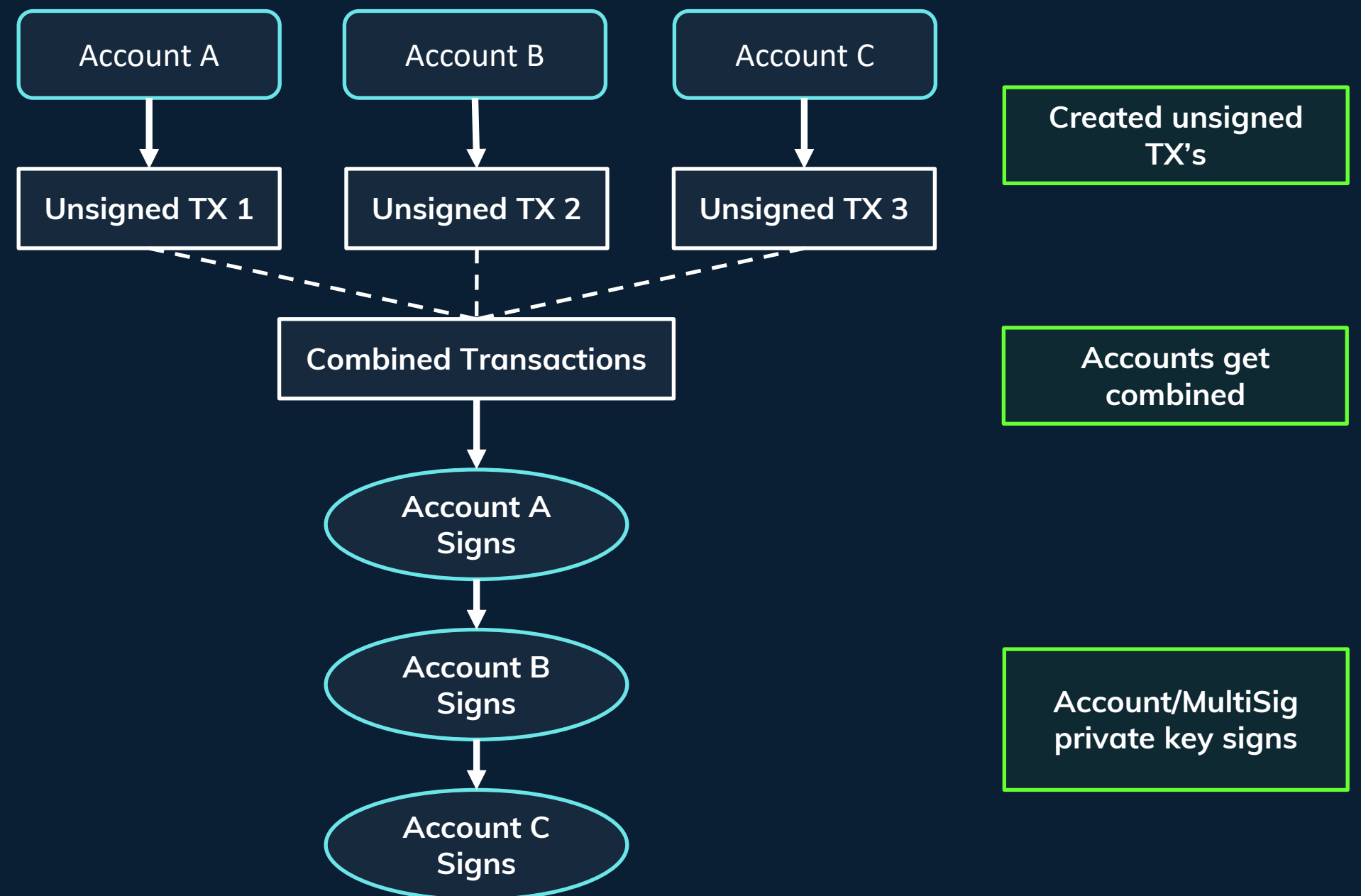# L1 Capabilities: Atomic Transfers

Atomic transfers

Functionality

- Atomic transfers are a novel way of executing complex transfers in a seamless fashion.
- With atomic transfers, either all transactions succeed or fail.
- Algorand supports atomic transfers for all Algorand assets and allows for multi-party transfers.

Potential Use-Cases (Per Algorand)

- Simplified and expedited debt settlement
- Efficient matched funding
- Instantaneous settlement of complex / multi-asset transactions
- Any instance of a multilateral trade

Atomic Transfer Flowchart

Account A	Account B	Account C

Unsigned TX 1	Unsigned TX 2	Unsigned TX 3

Combined Transactions

Account A Signs

Account B Signs

Account C Signs

Created unsigned TX's

Accounts get combined

Account/MultiSig private key signs

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L1 Capabilities: Algorand Standard Assets (ASA)

The Need for ASA

Today's financial system is present with a lot of limitations around digital assets. These include a lack of:

- Access to global, digital markets
- 24/7 transferability
- Instantaneous settlement
- Ease and enforceability of asset controls
- Efficiency of administration, compliance and reporting

Algorand solves these limitations and offers controls in the form of Role-Based Asset Controls (RBAC). RBACs enable:

- Quarantining asset accounts for investigative purposes
- Force transfer of an asset where legal and other regulations require it
- Flexible asset reserve models for custom business requirements

Example Use Cases

Fungible Tokens

- Stablecoins
- Other Cryptocurrencies
- Loyalty Points
- In-Game Gaming Points

Non-Fungible Tokens

- Real Estate
- In-Game Gaming Items
- Collectibles
- Digital Art
- Certifications

Restricted Fungible Tokens

- Securities
- Central Bank Digital Currencies
- Certifications
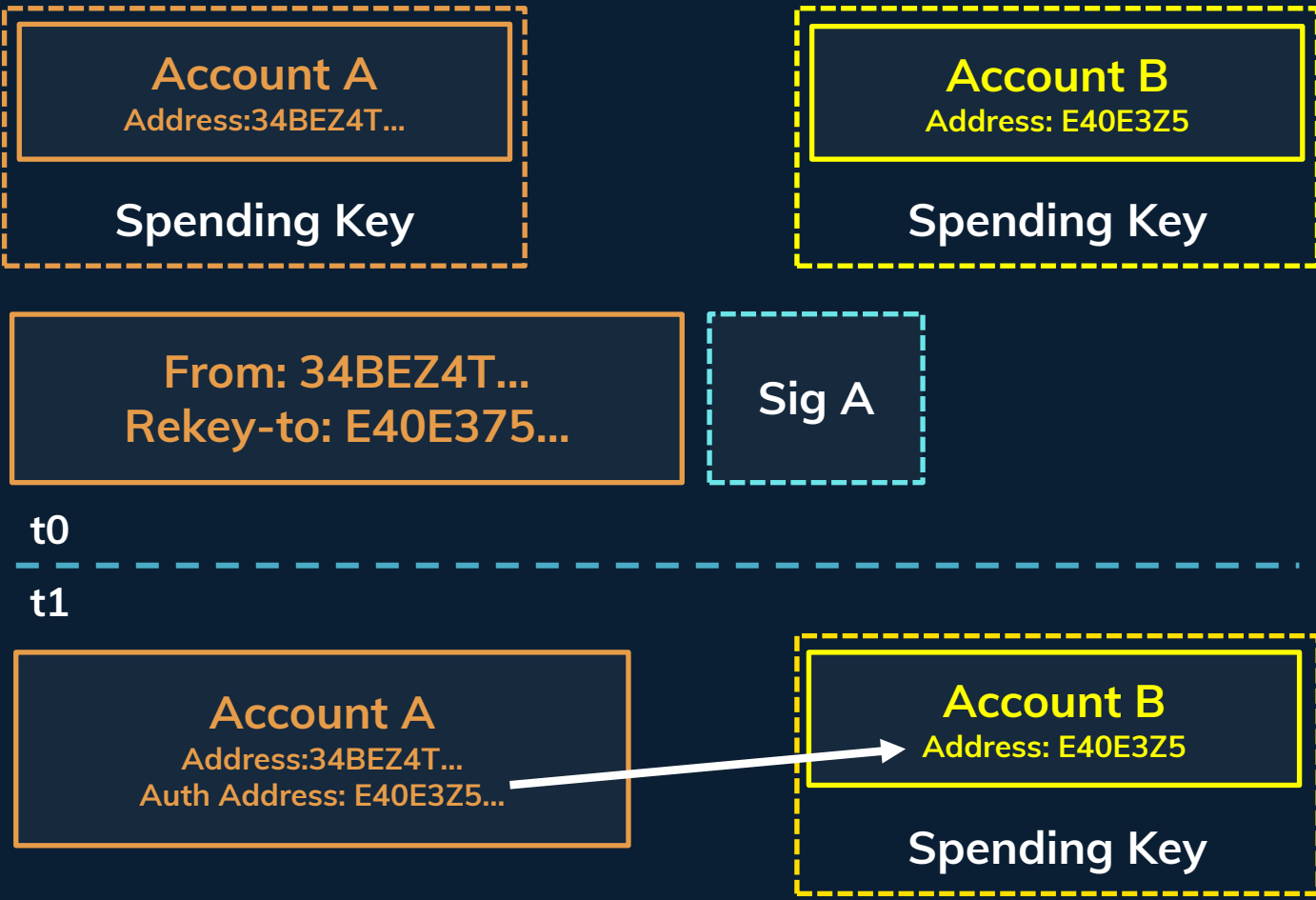
Restricted Non-Fungible Tokens

- Real Estate
- Regulatory Certifications
- Ownership Registries

Offer Flexibility to Enterprises

L1 Capabilities: Rekeying

- Algorand allows users to change their private key without changing their public address, leading to increased efficiency and continuity and providing more security to those who believe their private keys have been compromised.
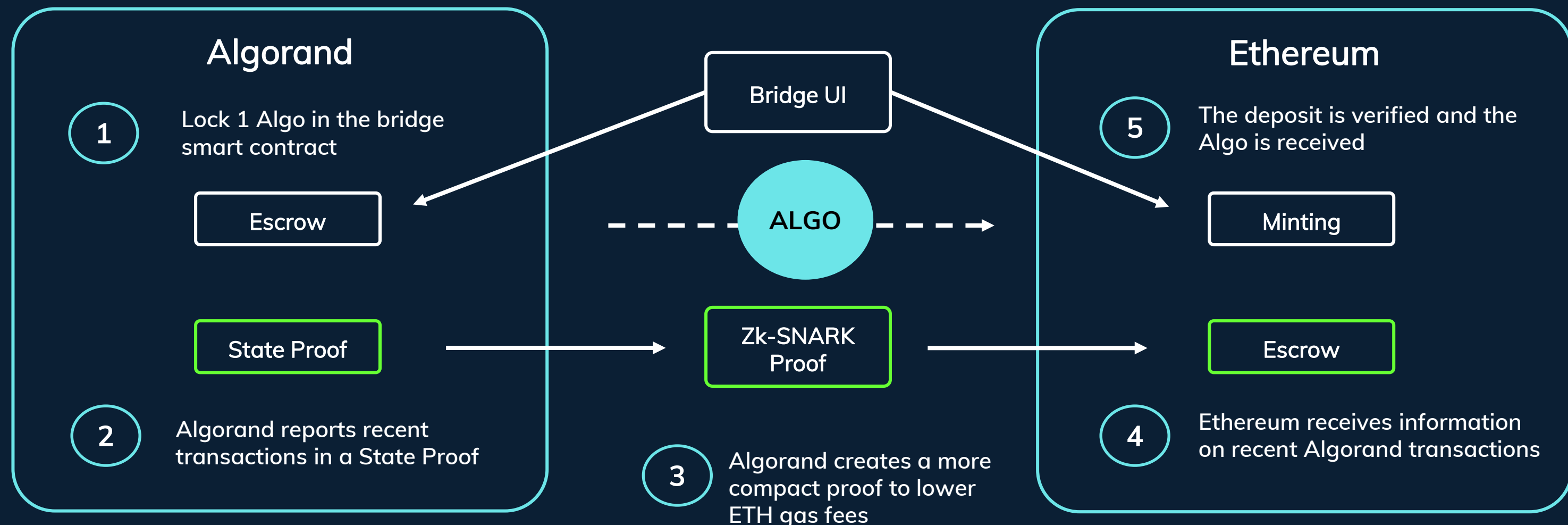
Overview

Algorand lets users change their private spending key without the need to change their public address, resulting in more:

- **Flexibility:** Users can change their private spending key anytime without needing to change the public address.

- **Continuity:** Users can continue using and keeping assets in the same public address.

- **Operational Efficiency:** Maintains existing public addresses for other people and custody providers that continuously transact with that public addresses.

How it Works

Algorand rekeying is accomplished by issuing a "rekey-to-transaction," which sets the authorized address field within the account object. Future transaction authorization using the account's public address must be provided by the keys associated with the authorized address, which may be a single key address, MultiSig address, or LogicSig program address.

Use Cases

The custody provider's benefits include:

- Keeping their user's spending keys cold at all times while only needing to manage one public key.

- Eliminating the chain of old Public Address keys from having to move funds after using the spending keys.

- Onboarding large user bases: Algorand Rekeying allows organizations to create and set up accounts for their users ahead of time and trustlessly reassign them when needed.

Example

The example below shows Account A rekey a single key to Account B.

Account A
Address:34BEZ4T...

Spending Key

Account B
Address: E40E3Z5

Spending Key

From: 34BEZ4T...
Rekey-to: E40E375...

Sig A

t0

t1

Account A
Address:34BEZ4T...
Auth Address: E40E3Z5...

Account B
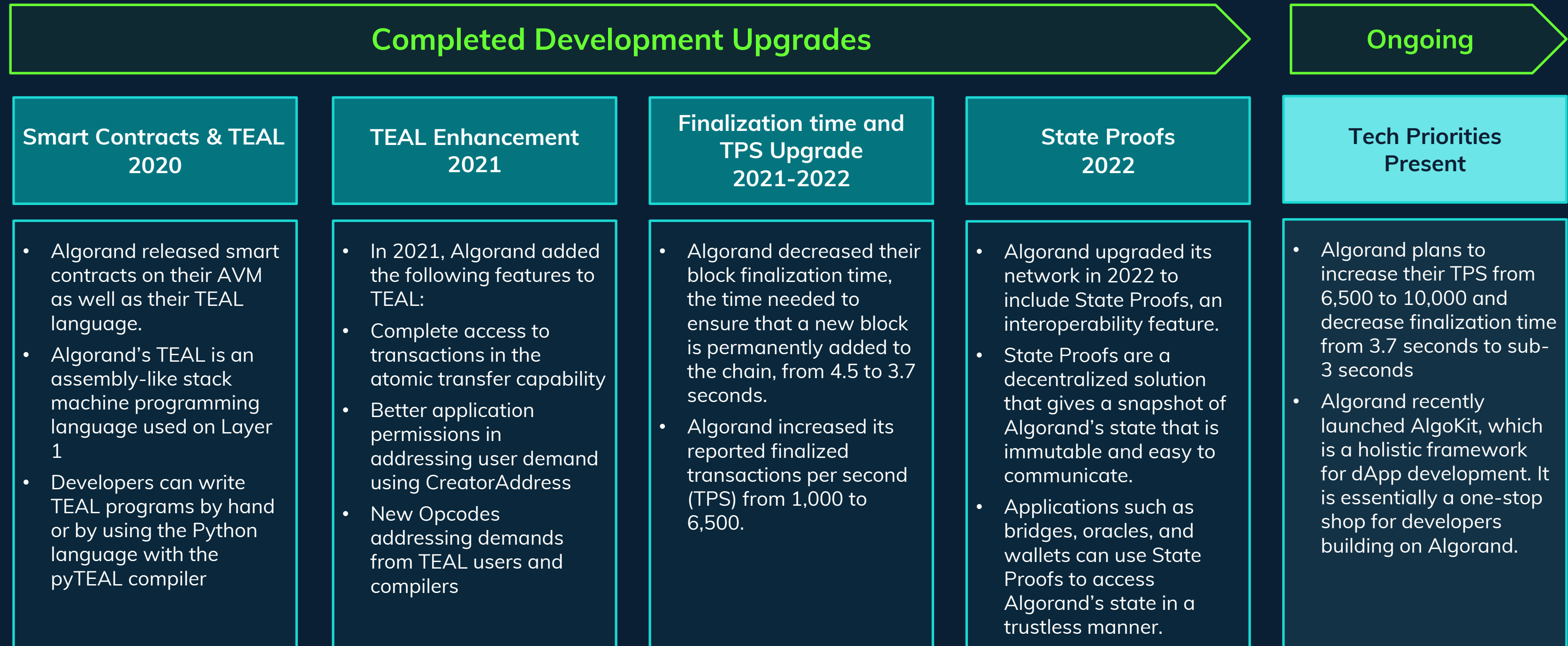Address: E40E3Z5

Spending Key

Stateproofs

- State Proofs are an interoperability standard that provide a decentralized solution to the centralized bridges commonly used today. Centralized bridges, while somewhat effective, have resulted in some of the largest hacks of 2022 (Ronin, for example, was hacked for $600M).
- Stateproofs are an immutable chain proof that attest to the state of the Algorand blockchain. They are a lightweight snapshot of Algorand's state that make it possible for Algorand transactions and balances to be available on lower-power devices such as smartwatches and phones, without compromising security.

Bridge 1 Algo from Algorand to Ethereum via Stateproof

Algorand

1 Lock 1 Algo in the bridge smart contract

Escrow

State Proof

2 Algorand reports recent transactions in a State Proof

Bridge UI

ALGO

Zk-SNARK Proof

3 Algorand creates a more compact proof to lower ETH gas fees

Ethereum

5 The deposit is verified and the Algo is received

Minting

Escrow

4 Ethereum receives information on recent Algorand transactions

Development Roadmap

- **Algorand's team has a history of continuing to innovate and improve the protocol.**

Completed Development Upgrades | **Ongoing**

Smart Contracts & TEAL 2020	TEAL Enhancement 2021	Finalization time and TPS Upgrade 2021-2022	State Proofs 2022	Tech Priorities Present
• Algorand released smart contracts on their AVM as well as their TEAL language. • Algorand's TEAL is an assembly-like stack machine programming language used on Layer 1 • Developers can write TEAL programs by hand or by using the Python language with the pyTEAL compiler	• In 2021, Algorand added the following features to TEAL: • Complete access to transactions in the atomic transfer capability • Better application permissions in addressing user demand using CreatorAddress • New Opcodes addressing demands from TEAL users and compilers	• Algorand decreased their block finalization time, the time needed to ensure that a new block is permanently added to the chain, from 4.5 to 3.7 seconds. • Algorand increased its reported finalized transactions per second (TPS) from 1,000 to 6,500.	• Algorand upgraded its network in 2022 to include State Proofs, an interoperability feature. • State Proofs are a decentralized solution that gives a snapshot of Algorand's state that is immutable and easy to communicate. • Applications such as bridges, oracles, and wallets can use State Proofs to access Algorand's state in a trustless manner.	• Algorand plans to increase their TPS from 6,500 to 10,000 and decrease finalization time from 3.7 seconds to sub-3 seconds • Algorand recently launched AlgoKit, which is a holistic framework for dApp development. It is essentially a one-stop shop for developers building on Algorand.

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Tokenomics

- Algo is the native token of the Algorand blockchain. It is used to secure the network through staking and to pay for transactions. Algorand's max supply is 10 billion, and there are currently 6.89 billion tokens circulating.

Algo Utility

Payment

- Algo's main use case is payment for transactions on the network. In order to use Algorand, you must pay the network fee in Algo. Fees are determined based on network congestion and there is a minimum fee of .001 Algo.

Governance

- In Q4 2021, the Algorand ecosystem moved to An open governance model. Community governance allows all Algo holders to participate in the decision-making process on the growth and development of the Algorand ecosystem.

Long-Term Plan

10-Year Plan

- Algorand has created a new reward system to benefit all holders who commit to participate in the protocol's governance as well as lock their Algos long-term

- Algorand is reallocating part of 3 billion tokens in the direction of incentives for active participation in the network economy and services, and support to institutions and companies committed to the ecosystem and the usage of Algorand blockchain and technology.

- By 2030, the foundation expects over 99% of the Algo minted at Genesis to be in circulating supply

Algorand

Algorand Distribution Schedule

- Algorand's remaining tokens will be distributed over the next 8 years to 2030. The inflation rate is not exactly determined yet but is expected to decrease over time. General estimates consistent with Algorand's expectations are used below.

Circulating Supply & Inflation Rate

Front-Heavy Token Inflation

Circulating Supply Inflation Rate
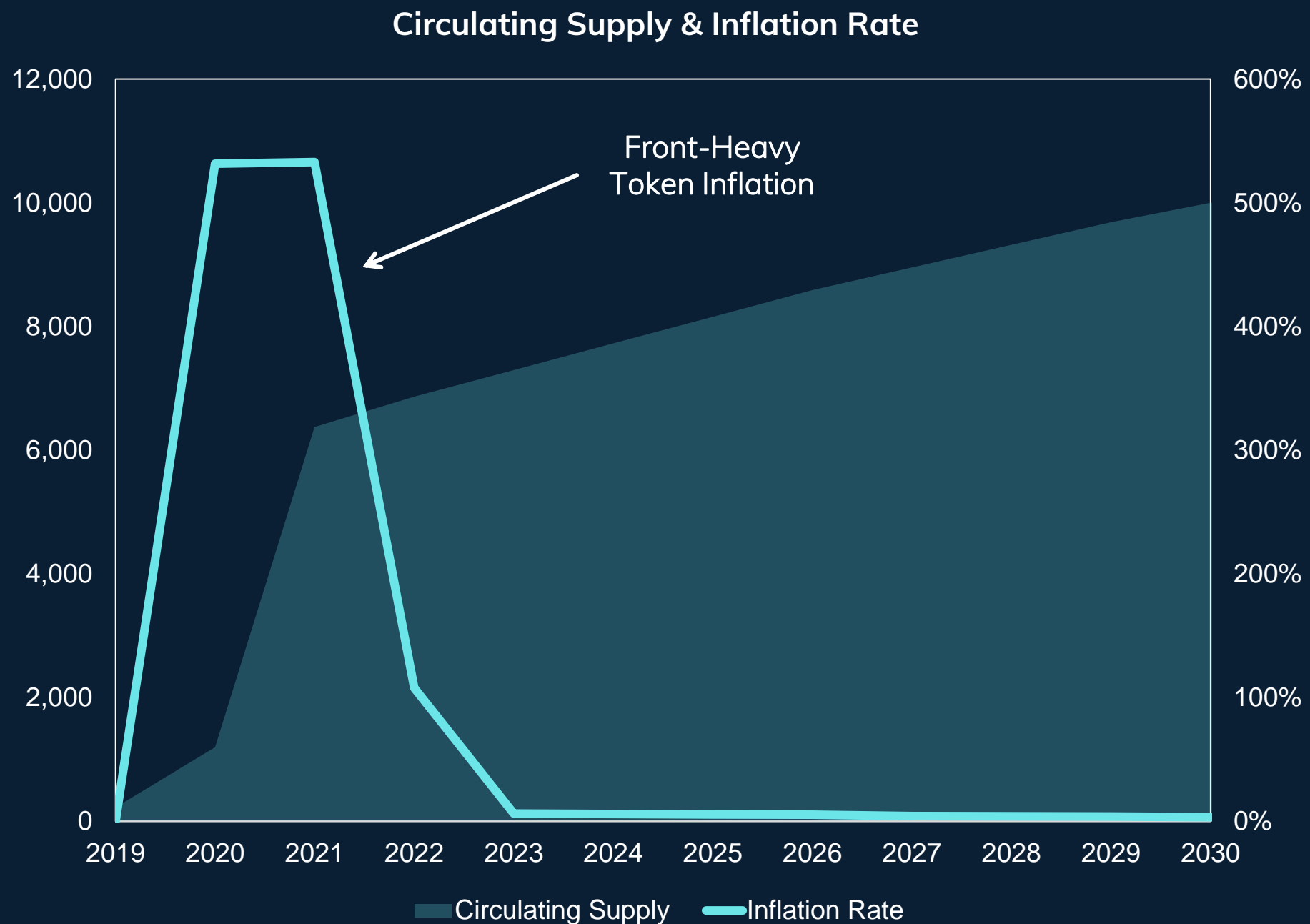
- 2020 and 2021 saw significant token inflation, with the circulating supply increasing ~530% each year. Circulating supply increased from 225 million in 2019 to 1.2 billion at the end of 2020, and from 1.2 billion to 6.4 billion from 2020 to 2021. Token inflation has significantly decreased since then and will continue to decrease until 2030 when all tokens will be in circulation

- With a circulating supply of ~6.8 billion, roughly 68% of all Algorand's supply is now circulating

- According to our estimates compiled under the direction of management, Algorand's inflation rate is expected to gradually decrease from ~6.3% in 2023 to ~3.8% in 2030

- In our estimates, we assumed an increase of 430.4 million tokens per year from 2022-to 2026, an increase of 366.3 million tokens per year from 2026 to 2029, and an increase of 316 tokens from 2029 to 2039.

Historical Token Sales

- In 2018, Algorand raised approximately 80 million dollars in private sales to early investors.

- Algorand raised approximately $60 million from a Dutch Auction for the first 25 million coins settling at a price of $2.40 per token.

- Due to vesting of early backer tokens, Algorand experienced rapid inflationary pressures in the market. The Algorand Foundation was concerned about The Algorand Foundation was concerned about the long-term health of the network and therefore allowed public sale investors who were underwater to redeem their Algo tokens at 85% of the initial sale price. Nearly all public sale tokens were redeemed in the process.

ALGO Token Sale History (Algos, millions)
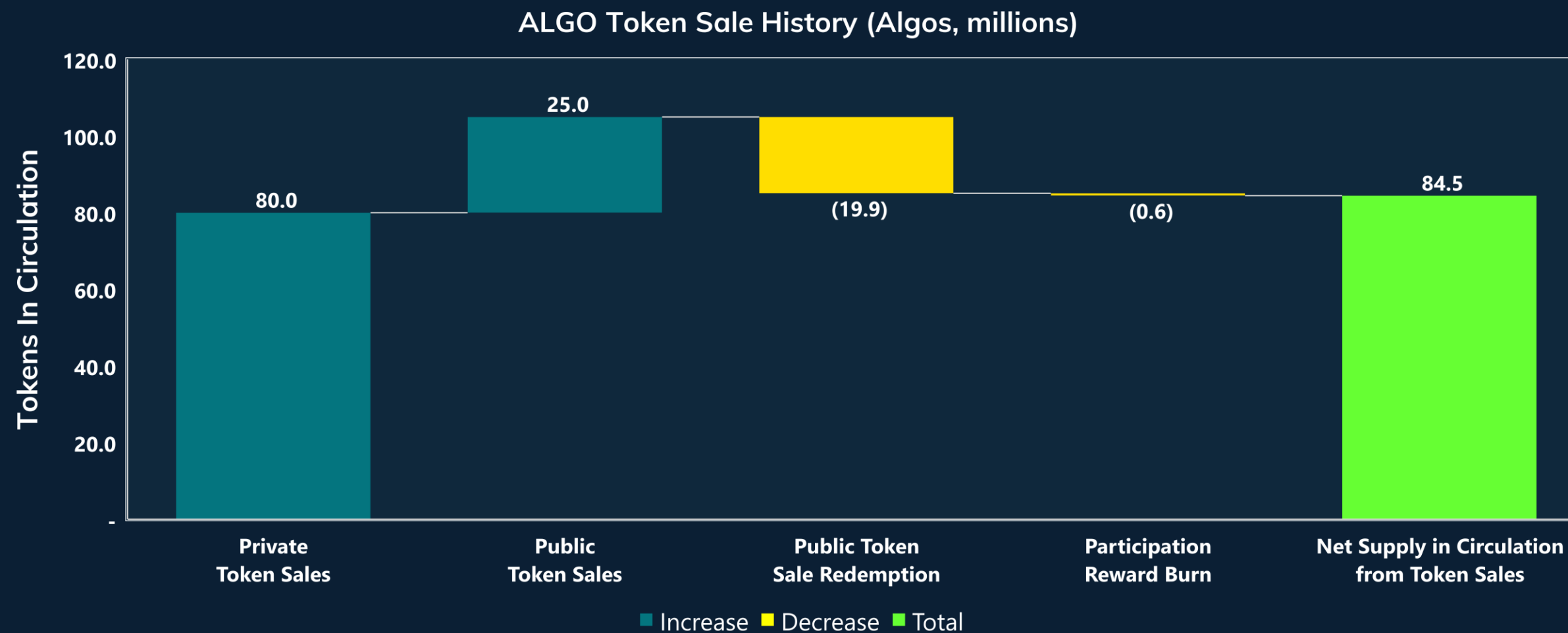
Key Private Round Investors

Source: FSInsight, Algorand

Long Term Token Allocation

Long Term Algo Allocation
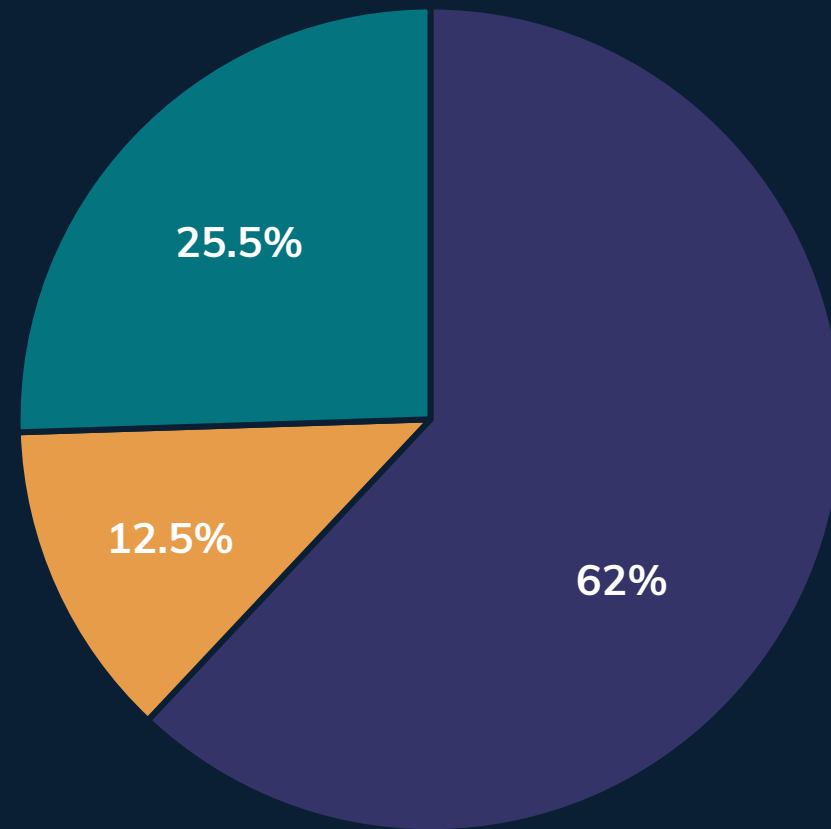
- **Community Incentives**
- **Ecosystem Support**
- **Initial Allocation**

Stakeholder	Allocation	%
Community Incentives Total	**6,200M**	**62.0%**
Participation Awards	2,500M	25.0%
Relay Nodes	2,500M	25.0%
Contingent Incentives	1,200M	12.0%
Ecosystem Support Total	**1,250M**	**12.5%**
Initial Allocation	**2,550M**	**25.5%**
Algorand Inc	2,000M	20.0%
Algorand Foundation	500M	5.0%
Already Injected for Operations / Eco	50M	1.0%

- All tokens were minted at launch, giving Algorand a fixed supply, but the liquid supply will inflate as pre-minted tokens unlock and are distributed. The 10 billion tokens will be distributed over the next 8 years, with all the tokens being distributed by 2030.

- Most of the total tokens (6.2 billion) are allocated to community incentives in the form of participation awards, relay nodes, and contingent incentives.

Algorand

From Staking to Governance Rewards

- Algo token rewards come in two different forms: Participation Rewards from staking and Governance Rewards from participating in governance

Algo Participation Rewards

Period	Starting Round Number	Approx. Dates	Rewards
36	17,500,000	11/17/2021-12/12/2021	21,850,000
37	18,000,000	12/13/2021-1/6/2022	12,000,000
38	18,500,000	1/7/2022-2/1/2022	6,000,000
39	19,000,000	2/2/2022-2/27/2022	3,000,000
40	19,500,000	2/28/2022-3/25/2022	300,000
41	20,000,000	3/26/2022-4/20/2022	300,000
42	20,500,000	4/21/2022-5/15/2022	300,000

- Participation rewards fulling concluded on 5/15/2022. As a result, staking currently yields just .06% Algo per year. (as of May 24th). This is down from staking rewards of 4-6% in 2021. This low yield may pose a security risk due to many stakers not being incentivized to stake and secure the network.

Governance Rewards

- Algorand has a unique governance model that incentivizes participation by rewarding "Governors" with Algo tokens

- Algorand Governors can expect an annual reward rate of anywhere from 6%-24% depending on the amount of Algo committed to governance accounts. Since the amount of Algo allocated for governance is a set number, the fewer accounts that commit to governing, the higher the reward rate.

- Governors are called regularly to vote on various proposals for the network. Governors who maintain their committed Algo balance throughout the period and participate in all votes can claim their governance rewards at the end of the period.

- Algorand's first governance period gave a reward rate of 3.2%. According to stakingrewards.com, the current annualized governance reward is 7.45% a year.

Source: FSInsight, Algorand

Staking Overview

- Algorand offers some of the highest staking yields and participation rates among Layer 1 networks, with 4.1B ALGOS locked among 32k governors.

- It's important to note that the yields on Algorand no longer come from simply staking – but from actively participating in governance. While the yield is higher than other protocols, users must participate in governance proposals to earn the rewards and need to keep their tokens locked for the entire governance period, removing an element of liquidity.

L1 Nominal Staking Yields

Network	Yield
Avalanche	8.6%
Algorand	7.5%
Solana	5.4%
Ethereum	4.1%
Cardano	3.6%

L1 Participation Rate

Network	Rate
Algorand	84.5%
Solana	76.1%
Cardano	70.7%
Avalanche	64.3%
Ethereum	10.9%
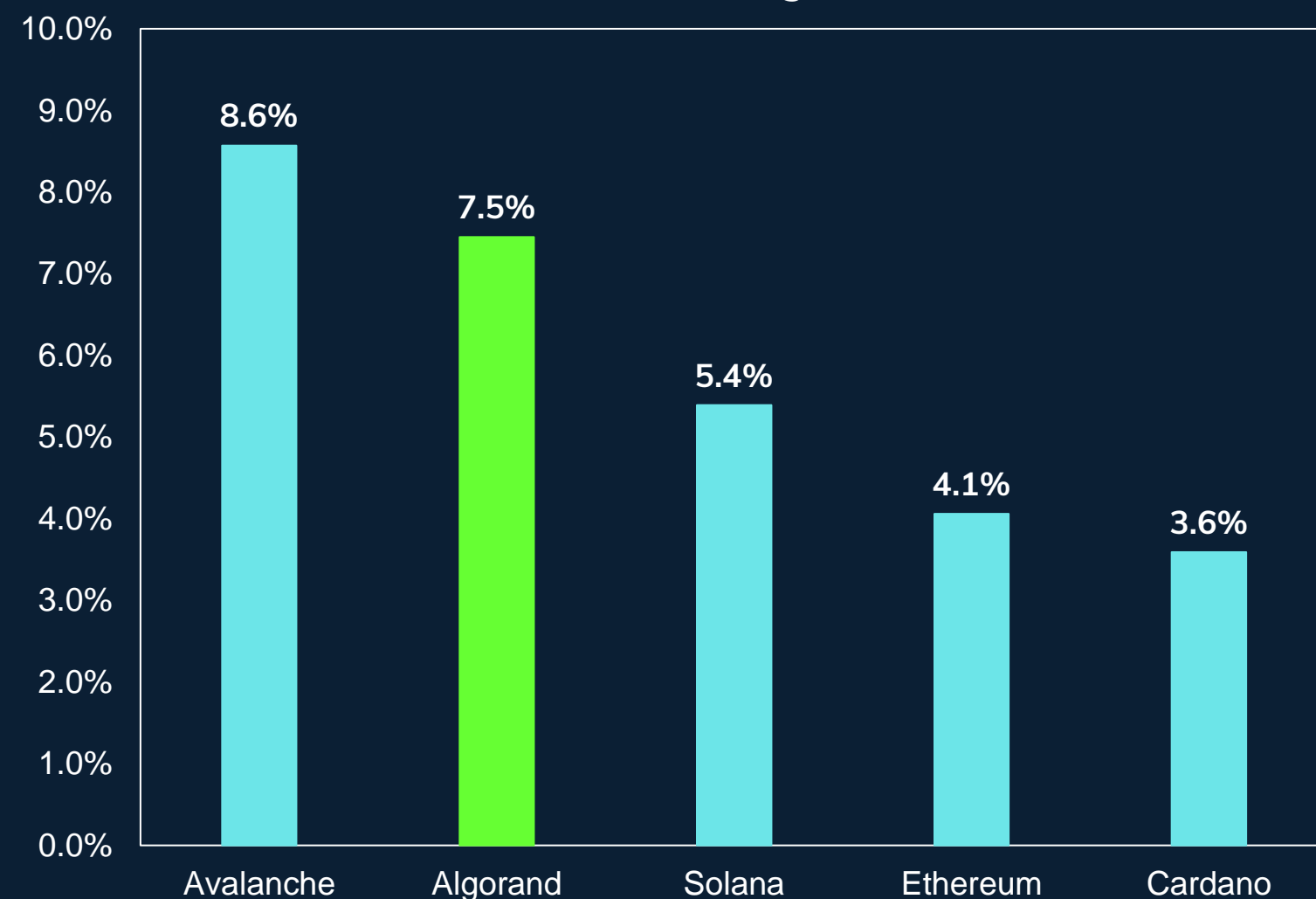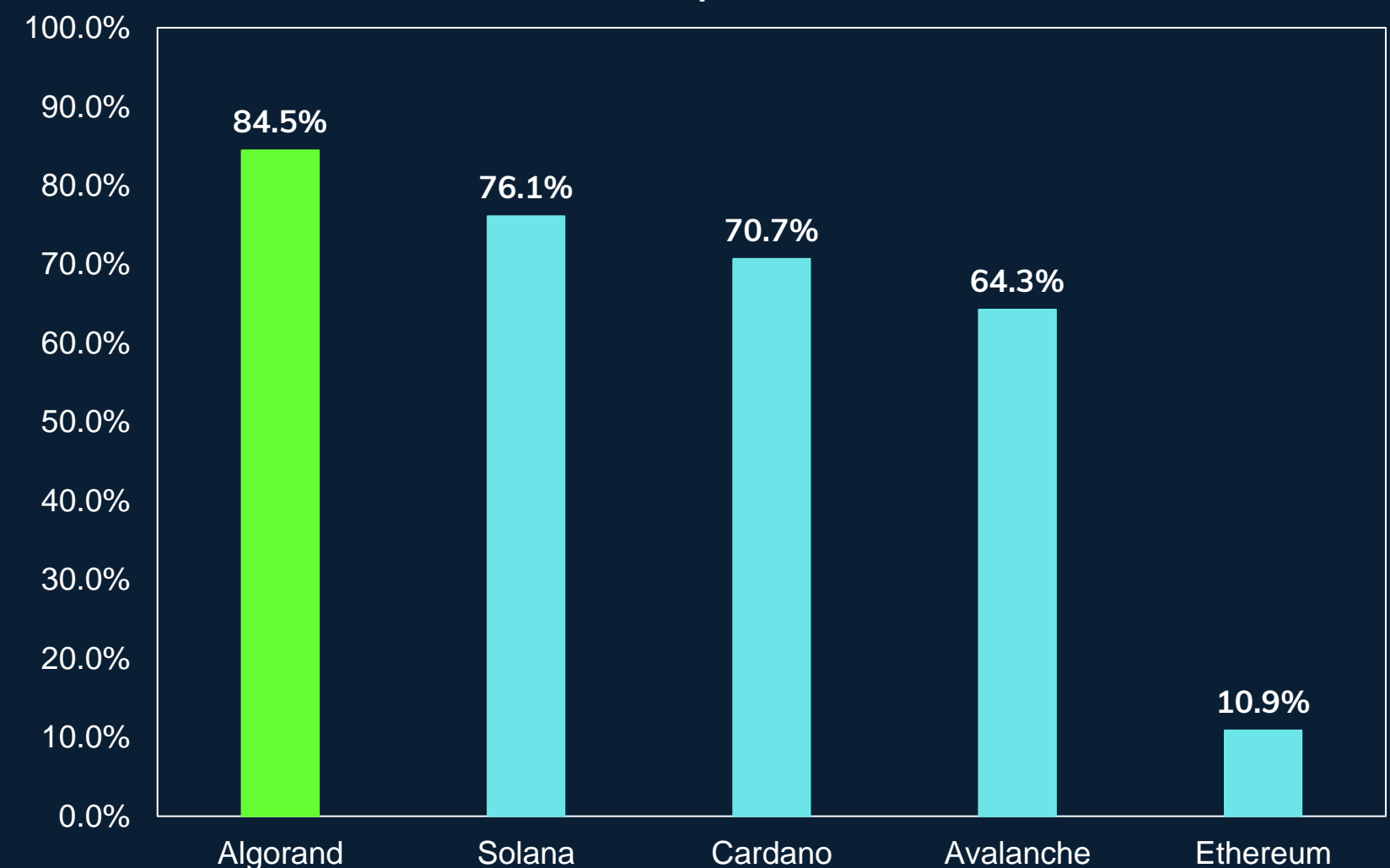
Algorand

Liquid Governance

- Many Algorand DeFi protocols have enabled "Liquid Governance" where they allow users to participate in governance while using governance-locked ALGO in a capital-efficient manner.
- This may be one of the reasons why Algorand was able to maintain and grow TVL while other L1s saw TVL decline.

How it Works

- Governors who commit their ALGO to governance via select Algorand DeFi protocols receive a token with a 1:1 exchange rate that they can use on the protocol.

- This allows users to get the 6-24% governance yield while also putting their ALGO to use efficiently (depositing it as collateral to borrow against, putting it in a liquidity pool, etc.)

- Exchanging is only permitted once the Algorand Governance Rewards are distributed).

- Algorand's TVL rising in a bear market and high staking participation rate may indicate that liquid governance is effective.

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Ecosystem Funds

Funds Raised

- Arrington Capital: raised $100 million Arrington Algo Growth Fund in June 2021.

- SkyBridge Capital: raised $100 million for an Algorand fund capped at $250 million.

- Hivemind Capital Partners: launched a $1.5 billion venture fund to invest in blockchain and digital assets and selected Algorand as a strategic partner to provide technical capability and network ecosystems infrastructure in November 2021.

- Borderless Capital: launched its second $500 million Algorand-focused fund called ALGO Fund II in 2022. The first fund, ALGO Fund I, was launched in 2019 by then-Algo Capital, with $200 million of funding invested in over 100 companies.

- Algorand Ventures was launched in November 2022 as a replacement for the legacy 250M AlgoGrants program. Algorand Ventures invests in the best ecosystem builders across verticals and stages of their lifecycles, from pre-seed to seed.

Growing Ecosystem

- Algorand has over 500 global organizations using its network. Below are select ecosystem participants.

Apps/Web3 (100+)
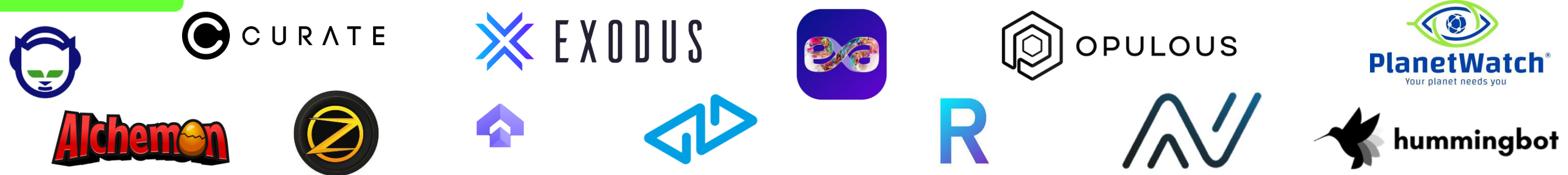
Infrastructure (90+)

Tooling (35+)

DeFi (90+)
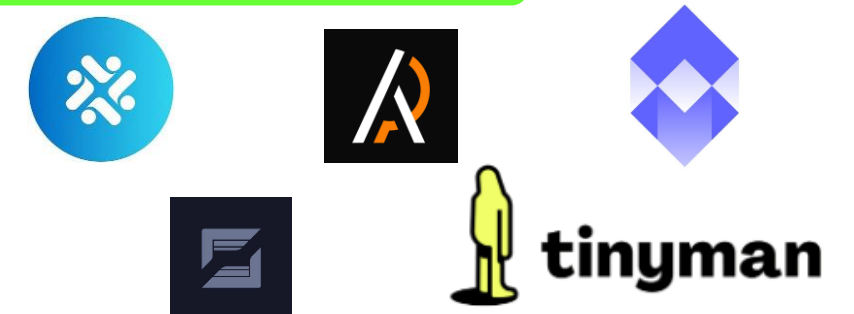
Wallets / Exchanges (10+)

Dev Partners

Payment/Stablecoin

Source: FSInsight, Algorand

NFTs

- Algorand has a vibrant NFT community that has grown despite tough market conditions. Volumes peaked in September, the same time that FIFA announced an NFT Platform in partnership with Algorand.

Highlights

- Algorand saw NFT sales steadily increase (in Algo terms) throughout 2022 despite there being a market-wide bear market. Algorand NFTs had a record month in September of 2022, with $8.7M in monthly sales

- Algorand NFT marketplaces such as Rand Gallery ALGOxNFT.com feature a wide range of NFTs such as artwork, profile pictures, and other collectibles.

- Algorand partnered with FIFA to release NFTs during the World Cup. FIFA+ Collect NFTs consist of collectible NFTs based on soccer start and teams.

- Music artist, Lil Durk, Co-Founded an NFT project on Algorand named NXTG3NZ in 2022.

Algorand NFT Monthly Sales

Millions (Algos)

Month	Value
Aug-21	0.3
Sep-21	0.9
Oct-21	1.3
Nov-21	2.3
Dec-21	1.6
Jan-22	3.6
Feb-22	4.6
Mar-22	2.9
Apr-22	3.7
May-22	3.7
Jun-22	4.3
Jul-22	4.9
Aug-22	6.5
Sep-22	8.7
Oct-22	4.0
Nov-22	2.5
Dec-22	4.3
Jan-23	5.3

Source: Fundtrat, Algorand, NFTExplorer.app

30
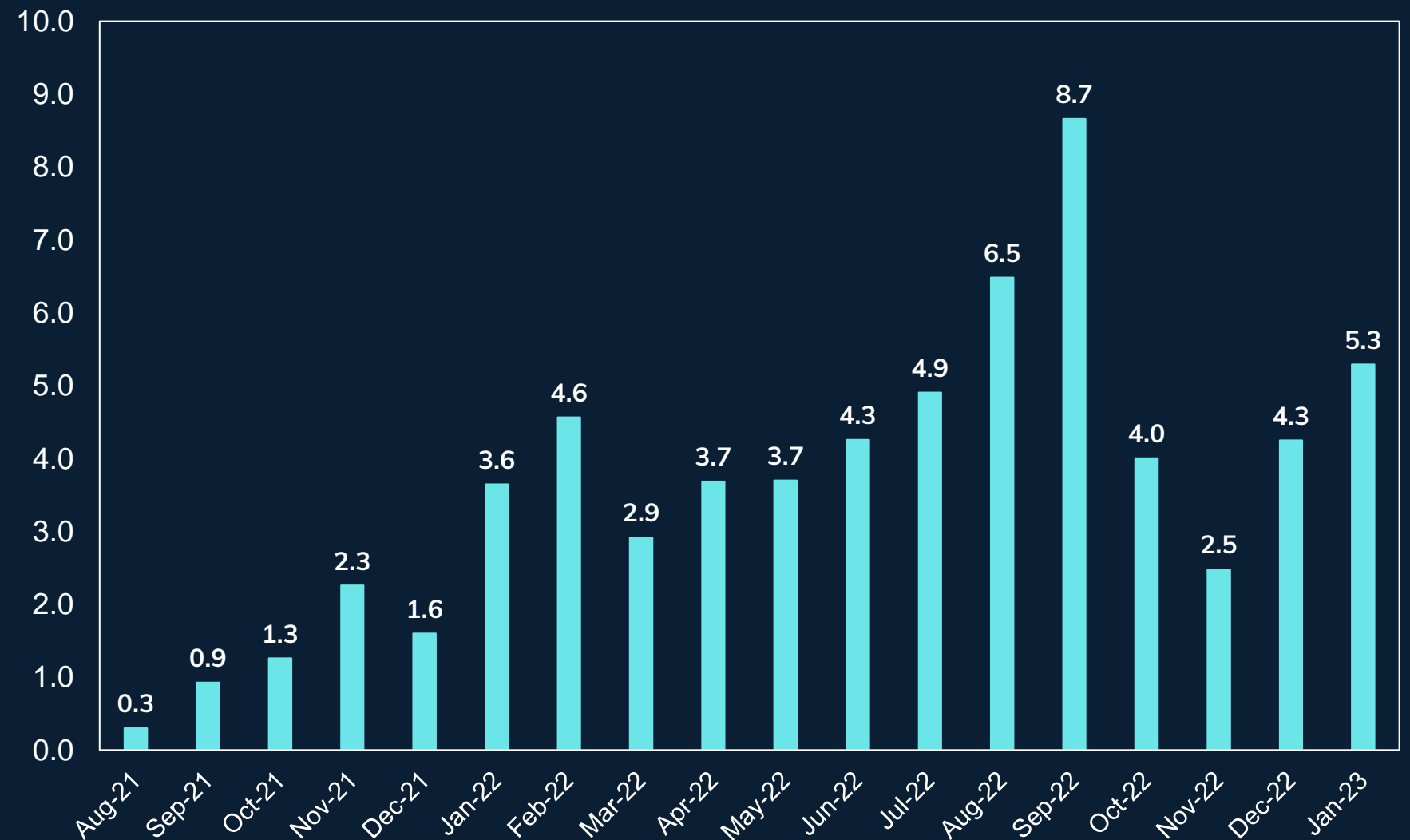
Climate-Focused Partnerships

- **Sustainability has been a core focus of the Algorand network since 2018. Algorand has pledged to be the "Greenest Blockchain" with a "Carbon-Negative" network.**

- **We think that over time, as people realize more utility on-chain and the energy grid becomes cleaner, the major environmental criticisms of blockchains will dissipate, regardless of their overall carbon emissions. Thus, we hesitate to ascribe much value to the purported sustainability of Algorand. However, given the state of ESG-focused investment mandates globally, this market positioning could help attract developers to the ecosystem.**

- Algorand has partnered with ClimateTrade to help achieve its sustainability goals
- ClimateTrade is a Spanish company whose objective is to help other companies achieve their sustainability goals by offsetting CO_2 emissions and financing climate change projects.
- To achieve a carbon-neutral network Algorand and ClimateTrade will implement a sustainability oracle that will notarize Algorand's carbon footprint for each epoch. Algorand will then lock the equivalent amount of carbon credit on chain as an ASA (Algorand Standard Asset) into a green treasury so that its protocol keeps running as carbon negative.

- Planet Watch is the first blockchain company to join the spin-off partnership program by CERN in a continued effort to improve global air quality monitoring
- PlanetWatch is leveraging Algorand, CERN, and air quality sensors in order to incentivize and gamify air quality monitoring
- The data collected by PlanetWatch air sensors are transcribed onto Algorand to create an immutable air quality repository accessible to all participants

Improving Developer Resources and Tooling

- Attracting developers is difficult for Layer 1's given the intense competition, especially for chains that are non-EVM compatible, as developers from Ethereum may have a harder time transitioning. While Algorand isn't yet EVM compatible, they offer a wide range of developer resources lowering the barrier of entry for developers looking to onboard.

Resources	Greenhouse Series & Global Accelerator Series	Languages
Algorand has created resources to make onboarding a seamless experience. These resources include: • A Developer Portal full of information: https://developer.algorand.org/ • Tutorials and in-depth articles • In-house Developer Relations team • Developer office hours Algorand has actively committed to supporting its community through: • A Developer Portal full of information: https://developer.algorand.org/ • Tutorials and in-depth articles • In-house Developer Relations team • Developer office hours	The Algorand Developer Greenhouse is a curated developer experience from the Algorand Foundation and is open to developers around the world Greenhouse provides a nurturing environment where developers can grow their ideas on the Algorand blockchain. Whether you are new to programming, Web3 or already have Web3 experience, you'll gain access to a supportive environment as you grow your ideas into working prototypes and beyond. The Algorand Global Accelerator Series takes the most promising early-stage projects in the ecosystem, provides them with support, and connects them with industry experts.	• Algorand has support for Java, JavaScript, Go, Reach, Python SDKs as well as REST APIs • Algorand developers can also develop contracts through Algorand's unique programming language called TEAL • In February of 2022, Algorand announced a $10M grant focused on EVM compatibility within Algorand. Introducing EVM compatibility will make it easier for Ethereum developers to make the transition to Algorand.

Source: FSInsight, Algorand

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Algofi

Project Overview

Project:	AlgoFi
Website:	https://www.algofi.org/
Tokens:	Stablecoin: STBL Governance: BANK
Backers & Partners:	USV, JumpCapital, Coinbase Ventures, Algorand Foundation, and more
Founded:	2021
Industry Segment:	Decentralized exchange and lending market
Project Description:	AlgoFi is the DeFi hub of Algorand and comprises 61% of Algorand's TVL. It allows users to earn interest, borrow, and trade their crypto. AlgoFi also has its own algorithmic stablecoin native to the protocol.

Tokenomics Overview

BANK

- BANK is the protocol governance token that provides a method of distributing control of the protocol to users
- 51% of all minted BANK tokens are set aside to be distributed via rewards programs and other community incentives, the remaining 49% will be allocated between core developers, governance treasury, and investors.
- BANK has not yet been launched yet to the public but is planned to launch later in 2022

STBL

- STBL is an algorithmic stablecoin that functions through over-collateralization. Any STBL leaving the protocol is fulling collateralized.
- 1 trillion STBL were minted and irretrievably deposited into the Algofi protocol. This is the max supply of STBL that can be brought into open circulation.

Lofty

Overview

- <u>Lofty</u> is a marketplace that consists of token investors and people looking to sell their property. The platform allows you to invest in tokenized U.S. real estate. Due to the fractionalized nature of the tokens, you can begin investing in with just $50.

- Token holders receive rental income every day. In addition to this, the real estate tokens update in value on a monthly basis.

- Take-rate: Lofty takes a 5% listing fee on each property (or $5,000 if the listing is less that $100,000). Lofty also charges sellers a 3% seller's fee at close (or $2,500; whichever is larger).

- Key Backers Include Ycombinator, Nvidia, Rebel Fund, Launch, and Hustle Fund

Key Attributes/Benefits of Tokenized Real Estate

- **Streamed rental income:** Earn rental income daily and withdraw at any time.

- **Property appreciation:** Tokens appreciate as the property appreciates.

- **Liquidity:** There are no lock-up periods. Tokens are liquid from the start.

- **Tax Advantages:** Benefit from favorable tax deductions like asset depreciation.

- **Decentralized Governance:** Token holders vote on all property decisions.

- **Convenience:** All properties are managed by a 3rd party property management company.

OPULOUS

Project Overview

Project:	**Opulous**
Website:	**https://opulous.org/**
Tokens:	**OPUL**
Backers & Partners:	**Rand Labs, R3, Ditto, Algorand, Jump Trading, Algorand, Binance NFT, TrustVerse, Somesing**
Founded:	**2020**
Industry Segment:	**Music, NFTs, and Defi**
Project Description:	**Opulous offers a launchpad and exchange to buy and trade MFTs (Music Fungible Tokens) and NFTs, as well as a DeFi loan platform that is backed by future artist royalties.**

Tokenomics & MFTs

Token Distribution

- Seed Sale
- Strategic Sale
- Private Sale
- Private Sale 2
- SEED SHO (Round 1)
- SEED SHO (Round 2)
- Team
- Advisors & Partners
- Liquidity Pool
- Ecosystem
- Foundation Reserve
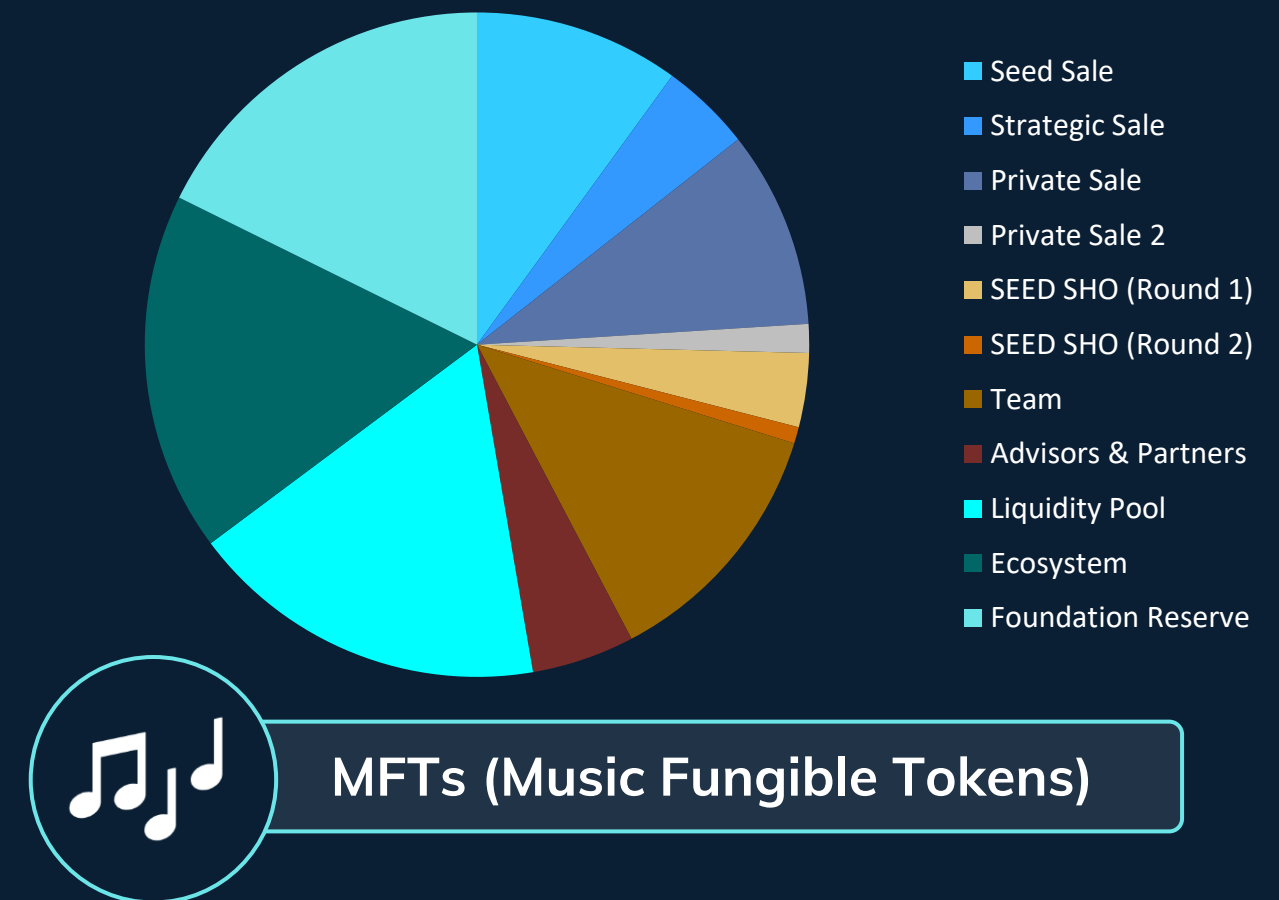
MFTs (Music Fungible Tokens)

- MFTs offer buyers a share of a single, EP, or album's music copyright.
- These tokens will generate monthly royalty revenue and increase in value as the artist's career progresses.
- MFTs are the only music copyright-backed token approved by the SEC.

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Key Network Adoption Metrics

- **Consistent with many other layer 1 networks, adoption metrics spiked during the recent bull market and have since corrected significantly.**

Quarter End	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Algo Price ($)	$ 1.36	$ 0.88	$ 1.62	$ 1.67	$ 0.93	$ 0.31	$ 0.35	$ 0.17
% Change	*311%*	*-35%*	*84%*	*3%*	*-44%*	*-67%*	*13%*	*-51%*
Circulating Supply (MM)	2,618	3,110	6,140	6,373	6,638	6,905	7,011	7,117
% Change	*119%*	*19%*	*97%*	*4%*	*4%*	*4%*	*2%*	*2%*
Market Cap ($MM)	$3,536	$2,745	$9,756	$10,653	$6,110	$2,144	$2,445	$1,233
% Change	*1240%*	*-22%*	*255%*	*9%*	*-43%*	*-65%*	*14%*	*-50%*
FD Supply (MM)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
% Change	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
FD Market Cap ($MM)	$13,558	$8,815	$16,182	$16,686	$9,286	$3,100	$3,500	$1,700
% Change	*311%*	*-35%*	*84%*	*3%*	*-44%*	*-67%*	*13%*	*-51%*
Avg Daily Active Addresses	30,414	26,404	46,329	146,897	37,206	27,916	55,936	31,642
% Change	*24%*	*-13%*	*75%*	*217%*	*-75%*	*-25%*	*100%*	*-43%*
Avg Daily Txn Count (MM)	3.75	4.32	5.05	7.34	6.92	3.84	4.23	4.06
% Change	*33%*	*15%*	*17%*	*45%*	*-6%*	*-45%*	*10%*	*-4%*
Total Fees	$84,323.4	$94,113.8	$120,330.8	$307,537.3	$253,848.2	$86,442.3	$37,986.0	$34,870.0
% Change	*424%*	*12%*	*28%*	*156%*	*-17%*	*-66%*	*-56%*	*-8%*
Total Value Transferred ($MM)	$ 10,274.05	$ 7,070.81	$ 11,398.35	$ 20,058.95	$ 11,277.68	$ 6,118.38	$4,463.88	$4,278.64
% Change	*1141%*	*-31%*	*61%*	*76%*	*-44%*	*-46%*	*-27%*	*-4%*
Average TVL ($MM)	NA	NA	NA	$65.8	$107	$97	$87	$77
% Change	*NA*	*NA*	*NA*	*NA*	*63%*	*-9%*	*-10%*	*-12%*

We note the outsized negative effects that early inflationary pressures had on token price. We think that a steadier distribution schedule moving forward might lead to a healthier, more sustainable ecosystem.

Source: FSInsight, Algorand, Defi Llama, AlgoExplorer

Algorand

Network Adoption

- Daily transactions have risen steadily, spiking in December of 2021 when the crypto market was near all-time highs. Since then, transactions have fallen but are still higher than they were in Q2-Q3 2021.

- Algorand's TVL actually increased during the 2022 bear market – something that cannot be said for most protocols.

Weekly Transaction Count

TVL by Protocol
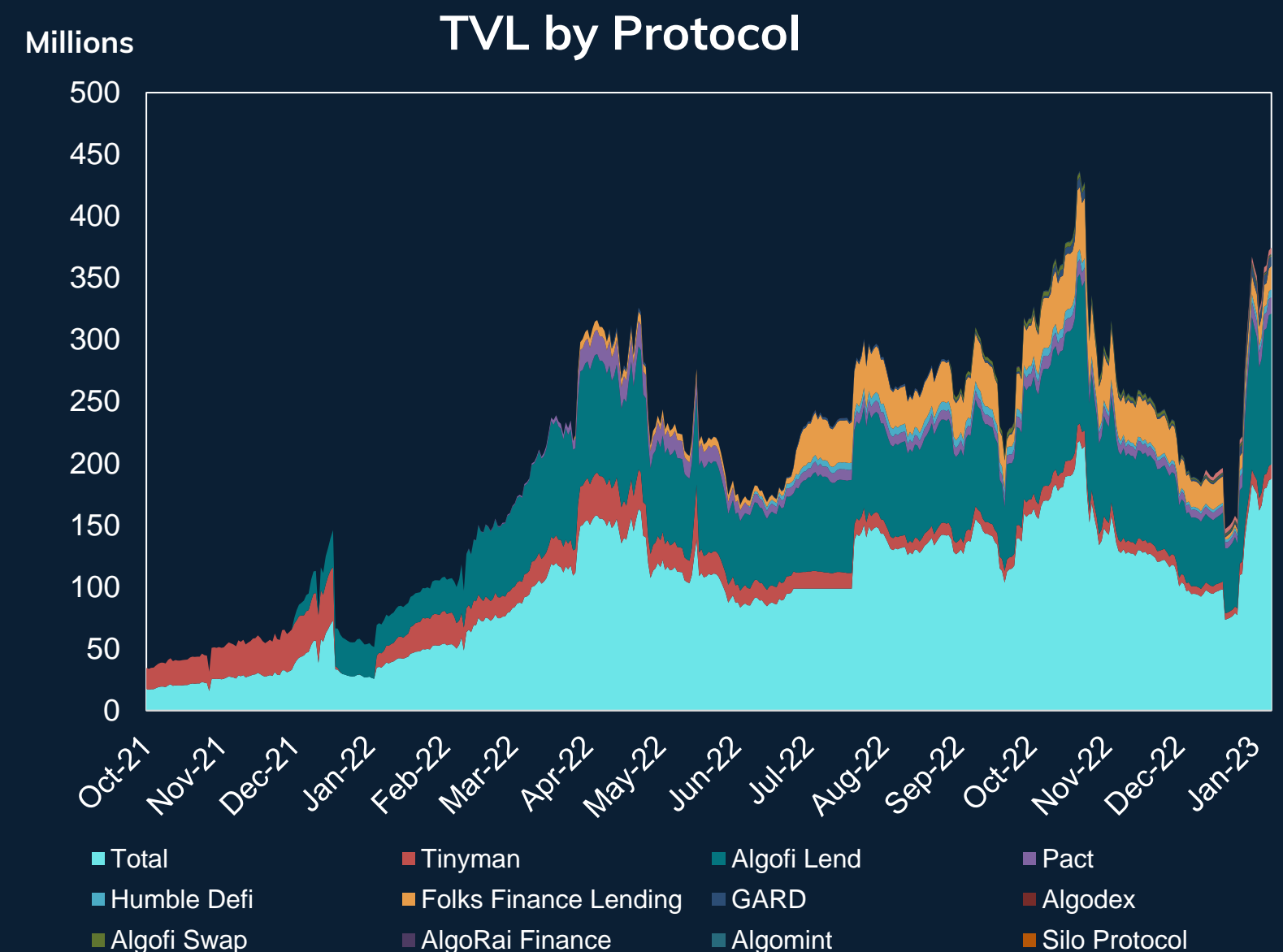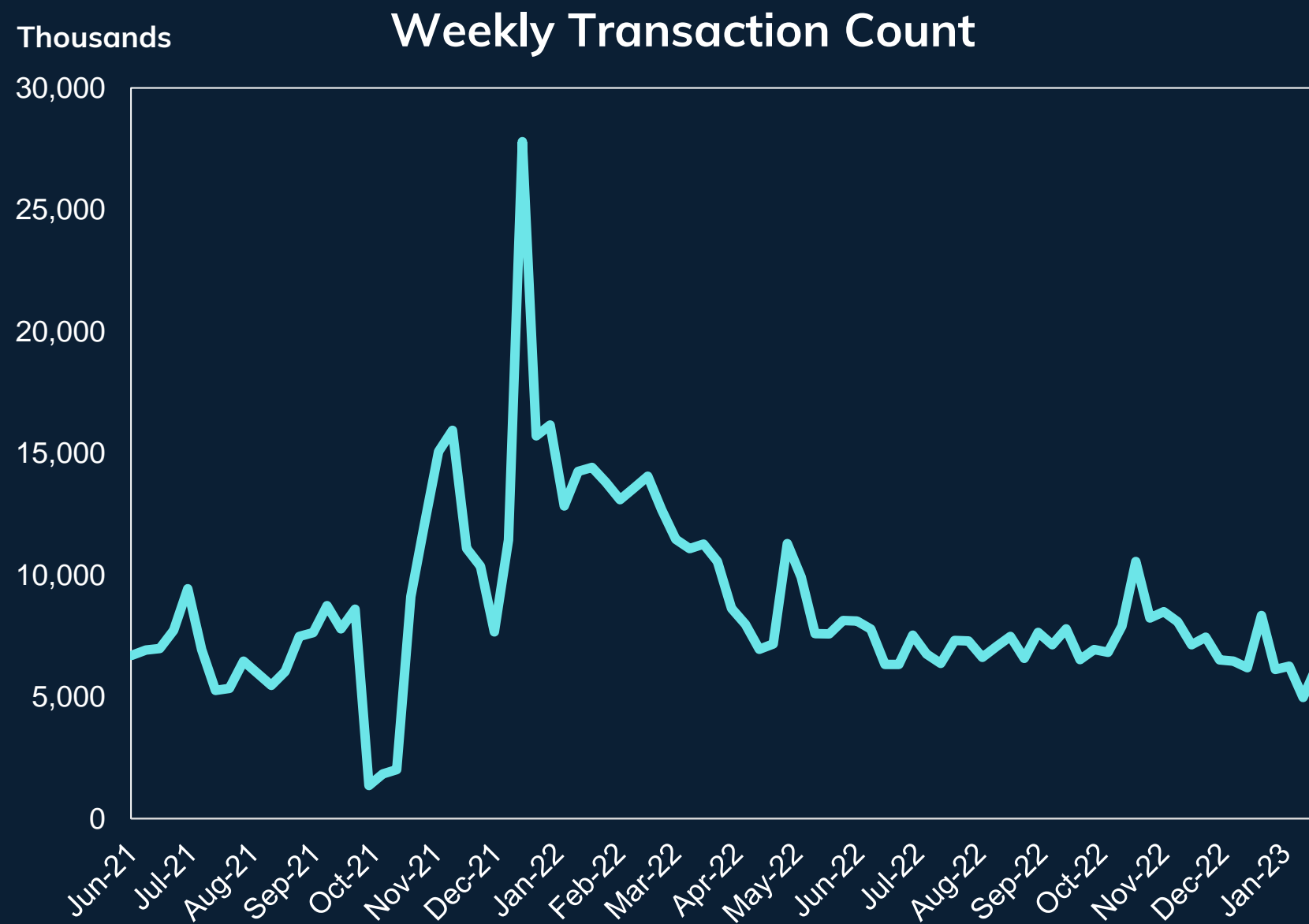
Valuation Metrics

- We calculated multiples of price/sales and market cap/total value locked (TVL) among the top L1 blockchains below. P/S is calculated using the non-fully diluted market cap divided by the annualized most recent daily fees (as of 3/22/2023).

- While these valuation metrics do have some limitations, they do provide insight into how fairly valued an L1 may be relative to competitors based on their usage. Algorand currently ranks as slightly overvalued based on fees paid on the network, but its TVL multiple is in the middle of the comp set.

Price/Sales

Blockchain	P/S
Cosmos	388,902
Polkadot	20,178
Algorand	3,722
Cardano	3,160
Near	2,541
Avalanche	582
Solana	369
Ethereum	358
Binance Smart Chain	250

Market Cap / TVL

Blockchain	Market Cap/TVL
Cardano	139.0
Near	12.0
Solana	51.0
Algorand	16.0
Binance Smart Chain	10.0
Avalanche	9.0
Ethereum	8.0
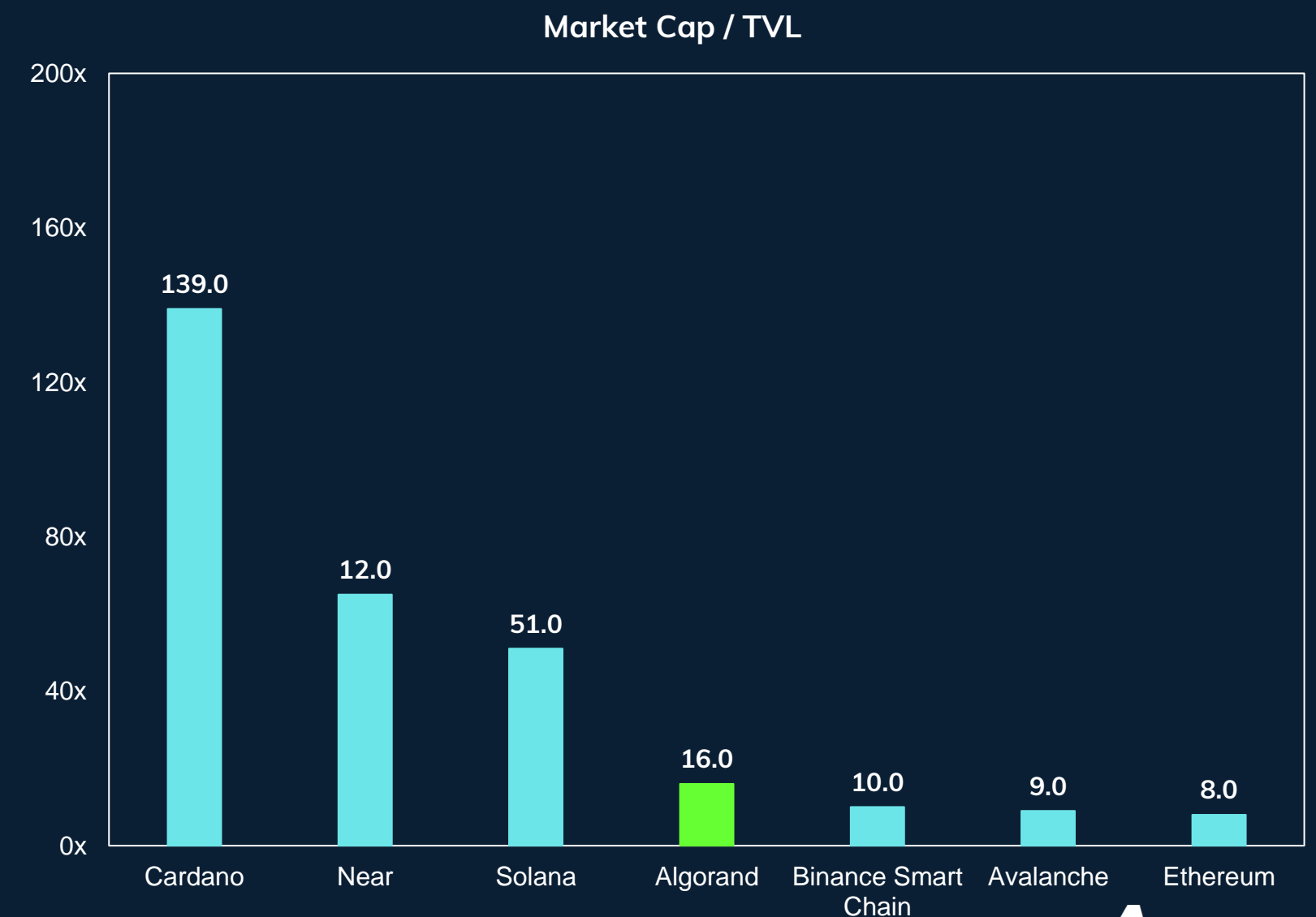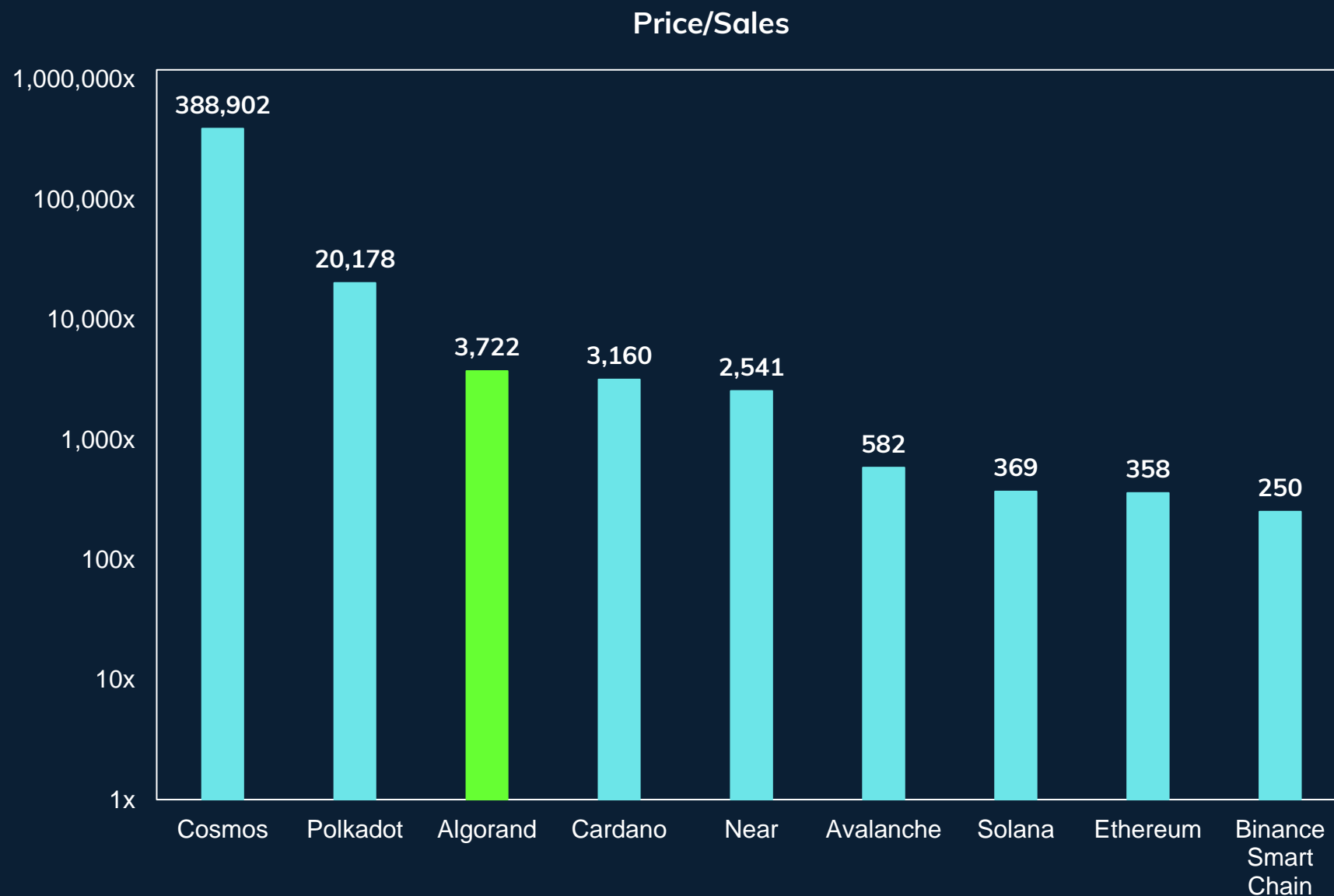
Risks

Legal and Regulatory

- Shifts in government policy or regulatory agency stance could negatively impact cryptoassets, particularly the smaller cap assets. For example, new regulatory guidance from the Securities and Exchange Commission (SEC) around the securities classification of cryptoassets could force some assets to be registered as securities which could further impact how and where crypto assets are traded.

- This risk, however, is not exclusive to Algorand, dampening the possibility of Algorand being singled out.

Centralization Risk

- Most of Algorand's relay nodes lie in the hands of Algorand Inc, Algorand Foundation, and early backers.

- Requirements to run these nodes are high and one must gain permission from the Foundation to run a relay node.

- While these nodes do not participate in consensus, the Participation nodes rely on relay nodes to communicate with each other. Further, these nodes comprise the lion's share of the network's full archival nodes, which store the full history of the Algorand blockchain. If the network is unable to achieve sufficient decentralization among relay nodes, they will remain a glaring attack surface.

- Algorand's "Relay Program" in 2023 aims to mitigate this risk and make the protocol more decentralized.

Competition Risk

- There are a number of other layer 1 networks such as Solana, Avalanche, and Near that have high amounts of funding, good teams, and strong ecosystems. These networks could possibly take/retain market share from Algorand.

Source: FSInsight

Risks (Cont.)

HodInaut Exposure

- The Algorand Foundation has $35M of USDC exposure to HodInaut, a crypto lender who halted client withdrawals on August 8th among liquidity concerns. HodInaut reportedly suffered heavy losses in the Luna / UST collapse.

Valuation Risk

- At the time of writing, Algorand has a $1.5bn market cap, making, despite only procuring $34,870 in fees in Q4 2022.

- As one would expect, Algorand ranks high on a price-to-sales metric, indicating that the market ascribes it a valuation premium relative to its level of usage. Whether this premium is justified remains to be seen.

Disclosures