AssetFi

WHITEPAPER

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Executive Summary

AssetFi is an end-to-end asset tokenization and issuance ecosystem, consisting out of a set of protocols for enhanced ownership, The AssetFi Platform serving as a user-friendly interface, connecting investors with issuers and our provenance architecture which ensures the safety and compliance of the whole process. We serve both, as a technology and infrastructure provider, as well as a primary market for issuance.

New models are erupting daily around Blockchain technology. One of its biggest disruptors is asset tokenization, which is completely changing how we see the financial industry. Currently, there are trillions of dollars locked in assets which cannot be exploited, or, to which there is extraordinarily little access to. Markets such as real estate, art, IP, scarce and valuable resources, are predominantly owned by institutional investors, leaving little room for the retail investors to invest in these markets. In other words, retail investors are only left with the possibility of investing in debt or equity markets, where there's high volatility and risk.

This is where asset tokenization comes into play. Through tokenization, AssetFi will open new markets to anyone in the world, allowing readily available capital to flow into illiquid markets, opening a world full of opportunities. AssetFi is focused on tokenizing a wide range of assets and offering broader quality investments formerly reserved for institutional investors. AssetFi believes that new foundational technology will enable more secure, accessible, and efficient investments in the global market by increasing access to more high-performing investment opportunities and lowering the cost of capital for professionals across asset classes.

With these mechanisms, anyone can invest in assets they had never imagined before. No longer do people need to solely rely on investing in the stock or crypto market, because they do not have large amounts of capital to invest in hard assets like real estate.

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Introduction

Asset tokenization is a term for the use of blockchain technology to represent ownership or rights to an asset as a tradable, on-chain token. Though it most commonly refers to the tokenization of financial or fungible assets, such as shares in a company or a quantity of gold, asset tokenization can hypothetically refer to the tokenization of any material or nonmaterial thing possessing monetary value: everything from a piece of art to a patent to an hour of a skilled worker's time. As such, asset tokenization is among the most promising use cases for blockchain, with the upper bound of its growth potentially encompassing nearly all of human economic activity — a dollar number estimated to be worth well over a hundred trillion annually.

Perhaps more impressive than the long-term promise of this use case are the strides towards adoption already being made today. In the past year alone, major enterprises such as Deloitte, BNY Mellon, and EY have studied asset tokenization and concluded that it possesses the capacity to disrupt multiple industries, specifically the 9 trillion-dollar annual global securities industry and the 9.6 trillion-dollar global real estate industry. Additionally, Microsoft, Vanguard, and Sotheby's have announced or gone live with projects tokenizing industrial assets, securities, and real estate, respectively. By these metrics, asset tokenization is already among the most popular blockchain use cases currently achieving real-world enterprise adoption.

At the heart of both the current success of asset tokenization and its long-term potential is the remarkable number of advantages and additional utility that comes with tokenized assets relative to non-tokenized ones. Tokenization can allow for increased liquidity of traditionally illiquid assets; greater accessibility and ease-of-access for otherwise cloistered investment opportunities; greater transparency regarding ownership and ownership history; and a reduction in administrative costs associated with the trading of these assets, including management, issuance, and

transactional intermediaries. Finally, tokenization allows for assets which previously could not access the DeFi ecosystem a path towards doing so, unlocking a whole new realm of potential through asset-backed composability.

Let's dive into an example —

Suppose you have a property worth $200,000 in San Francisco, California. Asset tokenization could convert ownership of this property into 200,000 tokens — each one representing a tiny percentage (0.0002%) of the property. Let's say you need to borrow $50,000; it wouldn't make sense to sell your property, because you need somewhere to live, but you still need the money. So instead, you issue tokens on a public distributed ledger like Binance Smart Chain which allows people to freely buy and sell on different exchanges. When someone buys a token, they buy 0.0002% of the ownership in the asset. 200,000 tokens to become 100% owner of the property. Since distributed ledger technologies are immutable, no one can erase the ownership of the investor who has bought the tokens, or in this matter, shares of a property.

If we zoom in on how tokens are built, it becomes apparent that two kinds of cryptographic tokens exist: fungible and non-fungible.

Types of tokenized assets

Fungible Assets

A fungible asset has two main characteristics:

Interchangeable: Each unit of the tokenized asset has the same market value and validity — for example, Bitcoin: All units of 1 $BTC are exactly the same. They hold the same market value, and are interchangeable. It doesn't matter from whom a $BTC was purchased, since all BTC units have the same functionality and are part of the same network. You can swap one-fourth of a $BTC for anyone else's one-fourth of a $BTC, with confidence that your $BTC's one-fourth holds the same value, despite being one-fourth of different coins.

Divisible: A fungible cryptocurrency can be divided into as many decimal places which were configured during its issuance. Each unit will have the same value and validity.

Non-Fungible Assets

A non-fungible token is:

Non-interchangeable: NFTs can't be replaced with tokens of the same type because each token represents a unique value.

Non-divisible: NFTs are not typically divisible, although F-NFTs do offer fractional ownership of NFTs, such as in the case of expensive fine art or commercial real-estate.

Unique: Each token differs from another token of the same type and has unique information and attributes.

What can be tokenized?

The possibilities are endless as tokenization allows for both fractional ownership and proof-of-ownership. From traditional assets like venture capital funds, bonds, commodities, and real-estate properties to exotic assets like sports teams, race horses, artwork, and celebrities, companies worldwide use blockchain technology to tokenize almost anything. However, we have grouped them into broad categories:

Real Estate

Real Estate tokenization allows fractional ownership, which opens the doors for high capital and increased market participation. Tokenized real estate assets provide an opportunity to expand real estate investment markets.

Commodities & Physical Goods

Tokenization of commodities can offer new market opportunities across the sourcing of commodities and trading lifecycle. Converting physical assets into tradable digital assets offers improved liquidity and lesser barriers to entry in asset classes led by institutional investors individuals. Illiquid assets, including artwork, wine, ownership interests in private companies, partnership shares and more, can be tokenized to offer provenance, lending and price discovery through the blockchain's transparency.

Equity

Equity (shares) can be tokenized; however, the assets remain in the digital form of security tokens stored online in a wallet. Investors can typically buy shares on a stock exchange. Currently, information about shareholders and shares of small-to-medium size companies is recorded on papers or spreadsheets. Each party manages records in its database, creating silos which is inefficient and prone to errors. Tokenization of equity shares allows companies to interact with shareholders by providing information on a single shared and immutable ledger. Shareholders will have ownership transparency and authenticity to run trades on the secondary market.

Funds

An investment fund is a type of asset that investors can tokenize — these tokens represent an investors' share of the fund. Each investor is provided tokens which represent their share of the fund.

Services

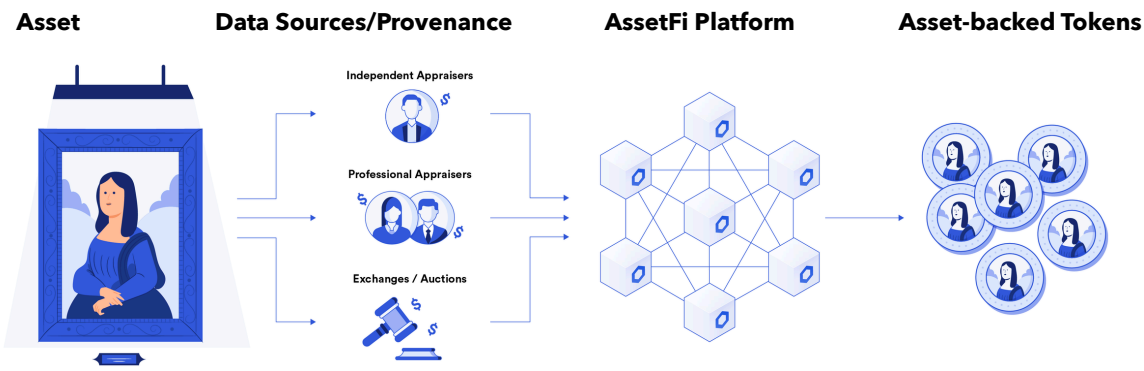
A business can offer goods or services as a way to raise funds or conduct business. Investors can use tokens to purchase goods or services provided by the supplier.

Benefits of Tokenization

In addition to offering a decentralized and trustless alternative to a real-world product, investment vehicle, or service, tokenized assets also actively improve the assets in a variety of other ways. Specifically, tokenized assets present a clear path towards making numerous assets more valuable, accessible, and useful relative to their legacy counterparts, as well as creating a vehicle by which off-chain data can augment their utilization within the DeFi ecosystem. Tokenization is poised to become the next big thing in the financial markets because it provides the following benefits:

Liquidity

By converting real-world assets to blockchain tokens, issuers can secure greater liquidity. For example, private securities are typically illiquid, which affects the trading process on secondary markets.



Fine art is also another example of a potentially high-value, but extremely illiquid asset. Due to their scarcity, pieces of fine art enjoy the so-called "liquidity premium" -- the theory that low-liquidity assets yield higher returns over time. However, collectors who wish to sell their art are often put at a disadvantage because there may (or may not) be a robust market of buyers to accommodate a fair value sale. Because of this, the art world encompasses an entire sub-industry of middlemen whose primary

function is to accommodate collector-to-collector or artist-to-collector exchange: galleries, dealers, auction houses, etc.

This leads to significantly higher transaction costs relative to other assets — a pattern similar to other illiquid assets, such as real estate. Thanks to tokenization, this problem can be addressed to give investors more freedom to implement various strategies on scarcer assets. Tokenization allows assets to enjoy the benefits of low liquidity without the transactional drawbacks.

Accessibility

Many of the highest-upside assets are out of reach to common investors due to financial or regulatory constraints. For instance, consider financing a big-budget movie: the upfront costs, as well as the risk of a production crew going over-budget, comfortably price out all but the wealthiest investors. However, a successful film can earn a return on the investment multiple times over in a relatively short time frame. Other low-access, high-return examples include collecting sports cars, investing in distressed foreign assets, or the purchase and renting of multifamily real estate.

In this case, the benefits of tokenization essentially become similar to crowdfunding, but within a model where the group of investors funding or purchasing an asset also reap the financial rewards of their participation. This allows smaller investors a path towards investing in riskier, but higher-upside assets with relatively low capital.

Fractional ownership

One of the most important features of tokenization is the ability to own fractions of an asset. For example, as an investor, you might be interested in getting exposure to the real estate market by owning property in the best region. However, you might not hold enough funds to buy a single property, let alone create a real estate portfolio. If every property would be converted into multiple tokens, you could own a portion of it or shares of multiple properties and thus benefit from their potential price gains. By holding a token or several of them, you hold the definitive proof that you are the owner of a share of that property. With tokenization, an asset can be represented as

millions or even billions of tokens, creating fractional ownership, which can be subsequently listed on a variety of widely-available and accessible exchanges. This eliminates the need for costly transactional intermediaries and expands the potential buyer pool while simultaneously preserving the liquidity premium because the tokens are still tied to a unique asset.

Composability

One of the most promising benefits of asset tokenization is also among the least well-explored: connecting the value of real-world assets to the composability of the DeFi ecosystem.

One example is DeFi Money Market, a project that allows for the tokenization of over eight million USD in car loans. Users deposit ETH, DAI, USDT or USDC, receiving mTokens in return — tokens that earn interest on the real-world loans. This enhances the liquidity of the wider DeFi space while simultaneously giving retail investors access to an investment class that would otherwise be difficult to access.

Moving forward, asset tokenization will allow for a plethora of opportunities for smart contracts developers seeking to tap into real-world value. Whole new types of synthetic assets, indexes, and token baskets can easily be built by combining tokens tied to various assets, and the ability to turn real-world revenue streams into collateral offers another jolt of innovation for an already rapidly-expanding DeFi field.

Transparency

Blockchain has become one of the most important technologies thanks to its unique attributes, including immutability and transparency. Once a blockchain transaction has achieved finality, it cannot be reversed, canceled, or tampered with in any way. This allows all network participants to monitor data almost in real-time and be sure

about the authenticity of transactions. Many high-value assets suffer from a lack of reliable and easily-available information regarding returns, ownership history, sale history, and other key metrics investors need to be able to make informed economic decisions. This lack of information is especially acute when evaluating foreign assets, or instances where an investor cannot personally inspect an asset prior to purchase. A key benefit of tokenization is that it allows for the open tracking and auditing of all these records due to the fundamentally public nature of many blockchains.

With tokenization, investors can see a record of ownership as well as returns in interest or dividends, depending on the smart contract logic of the asset. Additionally, certain assets such as collectibles or race horses may become more expensive due to celebrity ownership or a rare bloodline. Provenance tracking on the blockchain allows for immutable records, significantly decreasing investment security risks by minimizing record-keeping trust. These features have the potential to significantly reduce the risk of fraud across multiple industries where forgeries and knock-offs are common, such as high-priced luxuries like wine and caviar, as well as fashion and art.

Convenience

Several decades ago, the main form of communication between investors, brokers, and market makers was done by phone. There were no online accounts and no advanced charting options right in your pocket. Today, everyone can get exposure to stocks by buying shares or speculate on their price via derivatives through online platforms. The internet has transformed the way we invest, but blockchain can do even more by making the investment process more convenient and accessible.

Tokenization Challenges

Due to the nature of assets in the real world, representing them digitally as tokens on the Blockchain poses an obvious problem by nature. Namely, the problems of due diligence, provenance, valuation and most importantly, verifiability. Apparently, these are off-chain operations. This is unique problem models a major drawback in the design of the Blockchain as we know it. It is called the "Oracle Problem".

Blockchain Oracles

A blockchain oracle is secure middleware that facilitates communication between blockchains and any off-chain system, including data providers, web APIs, enterprise backends, cloud providers, IoT devices, e-signatures, payment systems, other blockchains, and more. Oracles encompass several key functions:

Listen - monitor the blockchain network to check for any incoming user or smart contract requests for off-chain data

Extract - fetch data from one or multiple external systems such as off-chain APIs hosted on third party web servers.

Format - enable two systems to intercommunicate by formatting data retrieved from APIs into a blockchain readable format (input) and/or making blockchain data compatible with an external API (output).

Validate - create a cryptographic proof to attest to the performance of the oracle's services using any combination of data signing, blockchain transaction signing, TLS signatures, attestations, zero knowledge proof, and more.

Compute - perform some type of computation on the data, such as calculating a median from multiple oracle submissions or running more complex tasks like

generating an insurance quote from several types of data (personal risk profile, market rates, cost of capital, etc).

Broadcast - sign and broadcast a transaction on the blockchain as a means to send data and its corresponding proof on-chain for the smart contract's use.

Output (optional) - send data to an external system upon the execution of a smart contract such as relaying payment instructions to a traditional payment network or affecting a cyber-physical system.

To offer the functions above, the oracle system must operate both on and off the blockchain simultaneously. The on-chain component is for establishing a blockchain connection (to listen for requests), broadcasting data, sending proofs, extracting blockchain data, and sometimes performing computation on the blockchain. The off-chain component is for processing requests, retrieving and formatting external data, sending blockchain data to external systems, and potentially performing computation in more advanced oracle networks.

The Oracle Problem

The blockchain oracle problem is one of the most important barriers to overcome to enable smart contracts on networks like Ethereum to achieve mass adoption across a wide variety of markets and use cases. Blockchain-based smart contracts and traditional data and API economies have immense potential to be the future building blocks of data-driven automation, but the question is how do these two worlds connect? This encompasses the crux of the “oracle problem” and will be the focus of this article.

The oracle problem revolves around a very simple limitation—blockchains cannot pull in data from or push data out to any external system as a built-in functionality. As

such, blockchains are isolated networks very akin to a computer with no Internet connection. The isolation of a blockchain is the precise property that makes it extremely secure and reliable, as the network only needs to form consensus on a very basic set of true/false questions using data already stored inside of its ledger—e.g. did the public key holder sign the transaction with their corresponding private key, does the public address have enough funds to cover the transaction, and is the type of transaction valid within the particular smart contract? The very narrow focus of blockchain consensus is why smart contracts are referred to as being deterministic; they execute exactly as written with a much higher degree of certainty than traditional systems.

However, for smart contracts to realize the maximum extents of their potential use cases, they must be connected to the outside world. For example, financial smart contracts need market information to determine settlements, insurance smart contracts need IoT and web data to make decisions on policy payouts, trade finance contracts need trade documents and digital signatures to know when to release payments, and many smart contracts want to settle in fiat currency on a traditional payment network. None of this information is generated within the blockchain, nor are these traditional services inherently accessible. Bridging the connection between the blockchain (on-chain) and the outside world (off-chain) requires an additional and separate piece of infrastructure known as an 'oracle'.

Implementation: AssetFi

Governance, Consensus, Oracle Providers and Validators

Using a unique staking pool, a consensus-based system is employed. Assets introduced and built by Asset Originators are not transferred to the live pool where public participation is possible. Instead, they are stored in an Asset Sandbox while a voting takes place by Validators based off of the results supplied by the Off-Chain Oracle providers and workers.

Staking-backed service agreements and immutable reputation systems provide binding on-chain agreements between the requesting smart contract and the oracle provider that outline the terms of the oracle service and penalties/rewards for performance provides users with enforceable guarantees on their off-chain data request.

Furthermore, by having nodes cryptographically sign the data they provide to smart contracts, users are able to identify which nodes sent data and look at their past history to determine their performance quality.

Also, by employing decentralization at the node and data source level ensures no one node or data source is a single point of failure, providing users strong guarantees that data will be delivered on time and remain resistant to manipulation

Validators & Off-chain Workers

AssetFi integrates major market data providers through a network of permissioned and reputable Validators, who fetch data for requestors on-chain. This uses a method called off-chain workers, encompassing tasks longer than a single block that Validators use to retrieve and provide data from external (non-blockchain) sources. Validators that are responsible for committing new blocks in the blockchain for which they are rewarded with gas fees (i.e. AFI). These validators participate in the consensus protocol

by broadcasting votes. Validators bond their own AFI and have AFI delegated, or staked to them by AFI holders. Validators have a stake in the network.

A reputation system —feeding signed on-chain data into reputation systems— allows users to make informed decisions about which nodes are good and which nodes are not, based on a variety of metrics like successful jobs, clients served, average response time, etc.

Oracle providers in AssetFi

AssetFi is a tool to enforce and manage on-chain compliance rules that come from off-chain regulation. Therefore, someone needs to be the link between both worlds, updating on-chain what has been validated off-chain. We call that entity an Oracle provider.

AssetFi supports compliance delegation, i.e. enabling multiple Oracle providers to work on the same token. For example, if your token is distributed to both US investors and European investors, you can have a US provider managing the compliance of US investors, and a European provider managing the compliance of European investors.

—A token can have as many providers as you want.
—You can add and remove providers to a token at any time.

While asset tokenization has the potential to enhance the utility of a wide variety of real-world assets and simultaneously buttress growth and innovation within the DeFi space, it is also a use case whose functionality is highly reliant on secure, reliable oracles. In order for something of monetary value to be accurately represented and traded on the blockchain, there must be good information on the asset. This need is especially acute at four stages in a tokenized asset's life cycle: when the tokens are created, when they are used as collateral, when users check their valuations, and when they are sold on secondary markets.

Different assets will necessitate different oracle network structures and needs. Depending on the use case, AssetFi's oracles can provide direct valuations to assets or serve as benchmarks for making decisions on them. Since AssetFi will interoperate with any API and off-chain system, AssetFi oracles are able to source this data from multiple avenues, such as professional data providers (and online API services like Estated and Clear Capital for Real Estate), independent/expert appraisers, exchanges/OTC markets, or any customized aggregation of data sources to create a single trusted valuation. The oracle can be run by a decentralized network of independent AssetFI nodes that call off-chain APIs to retrieve data or the data providers/appraisers can run AssetFi oracles themselves to relay data directly to smart contracts.

In order to further reserve the integrity of the network and maintain a high degree of data quality, unique crypto-economic incentives can be bootstrapped on to the oracle network. AssetFi tools like staking-backed service agreements and immutable reputation systems are able to track the historical quality of the valuations provided by appraisers, nodes, data providers, and more. This framework will incentivize accurate valuations as dishonest valuations will be financially penalized and their reputation score lowered, hindering their ability to earn future revenue as a data provider. It will also allow even niche and esoteric assets which rely on expert appraiser information to enter into the tokenized market while maintaining stronger crypto-economic guarantees that the valuation data is sound.

Asset-backed Token and Interest Distribution

Once a price oracle has established the value of an asset, a user interested in tokenizing it can use AssetFi's oracles to verify a prospective purchaser's accreditation in instances where legal compliance is necessary. Additional tools on AssetFi can be used to ensure a provably fair distribution of asset-backed tokens when there is an overflow of demand, similar to how GET Protocol picks ticket holders from a waitlist of buyers.

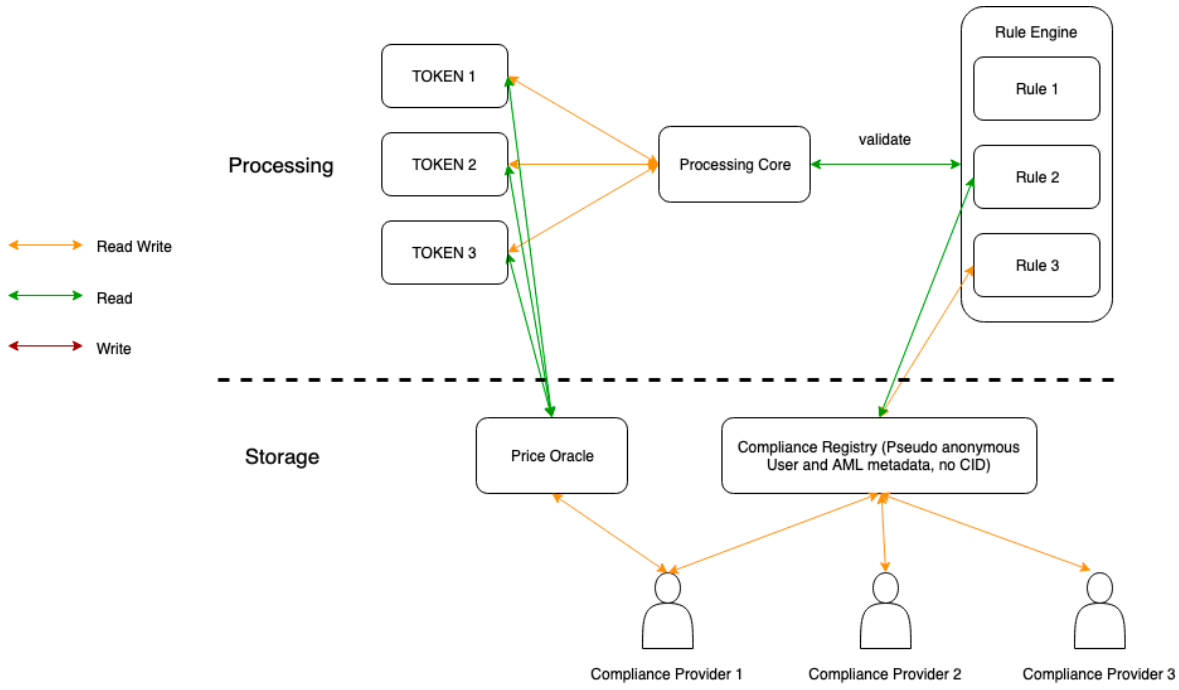
If the issued tokens feature an interest-bearing component based on price appreciation of the asset, AssetFi oracles can also be used to calculate payments for token holders on a scheduled basis.

Pricing Asset Pools

On AssetFi, asset-backed tokens can be collected into pools of different assets and compositions, creating tradable derivatives on the blockchain with links to real-world value. For instance, tokenized pools might be represented as multiple stablecoins, and would therefore need periodic price data in order to rebalance should market changes occur. Automated portfolios might also want to hold a weighted pool of assets, and would need price data on the underlying assets to know how much to buy or sell on a regular basis to maintain its target ratios.

Infrastructure: AssetFi

Unlike typical utility tokens, for which transfer is most of the time unrestricted, security tokens are subject to transferability restrictions based on many factors (identity, asset class, local rules, transfer history, etc.) dictated by financial regulations. Most of security token middlewares use a token-based approach to enforce such transfer restriction rules. This concept is a good step towards regulation, but lack cross-token capabilities to apply rules that are computed across multiple tokens (global transfer thresholds, for example).



The purpose of AssetFi is to provide a solution to this problem by offering a cross-token compliance layer that can restrict the transferability of ERC-20/BEP-20 compliant tokens based on a set of rules. Those rules are managed by the issuer, who can set new rules whenever needed.

Moreover, for regulatory compliance reasons, AssetFi provides features that would allow authorities to transfer tokens from one address to another in case of exceptional events (loss of keys, legal constraints, locked assets, etc.).

Supported networks

AssetFi provides a buffer layer deployed as a set of smart contracts on top of a blockchain that is compatible with Ethereum Virtual Machine (EVM). AssetFi will be available on the following networks:

Ethereum:

Mainnet

Ropsten

Goerli

Kovan

Binance Smart Chain:

Mainnet

Testnet

Polygon:

Mainnet

Testnet

xDai:

Mainnet

Testnet (Sokol)

Algorand:

Mainnet

Cosmos:

Mainnet

AssetFi Architecture

AssetFi is designed and developed to support the financial service industry needs by providing a ledger, registry, and exchange across multiple financial assets and markets. AssetFi facilitates the establishment of an ecosystem that garners participation amongst financial functions including asset originators, fund managers, servicers, banks, and investors.

AssetFi is an eco-friendly, public proof-of-stake platform that reduces unnecessary computational waste. Assets are defined natively using the AssetFi Contract Execution Environment in conjunction with the Metadata Module enabling users to quickly define asset classes, permission data to counter-parties, create mutually agreed-upon processes, define ownership structures, and exchange on third party marketplaces.

AFI is the AssetFi utility token to stake, govern, secure, and transact on the network.

Large financial institutions, investors, technical leaders, and individuals provide the foundation of security and stability of the AssetFi network by staking AFI as a network Validator or Delegator for which they are rewarded with a fee. While AssetFi facilitates the establishment of an ecosystem that will garner participation across all areas of finance including, but not limited to, asset originators, fund managers, servicers, and banks, AssetFi is openly extensible for developers to build innovative applications that address new use cases. AssetFi is composed of three core concepts:

—**Modules** that implement financial services business logic. Modules are composed to realize complex financial services processes.

—A **smart contracting engine** to develop and deploy contracts directly to an EVM provisional layer.

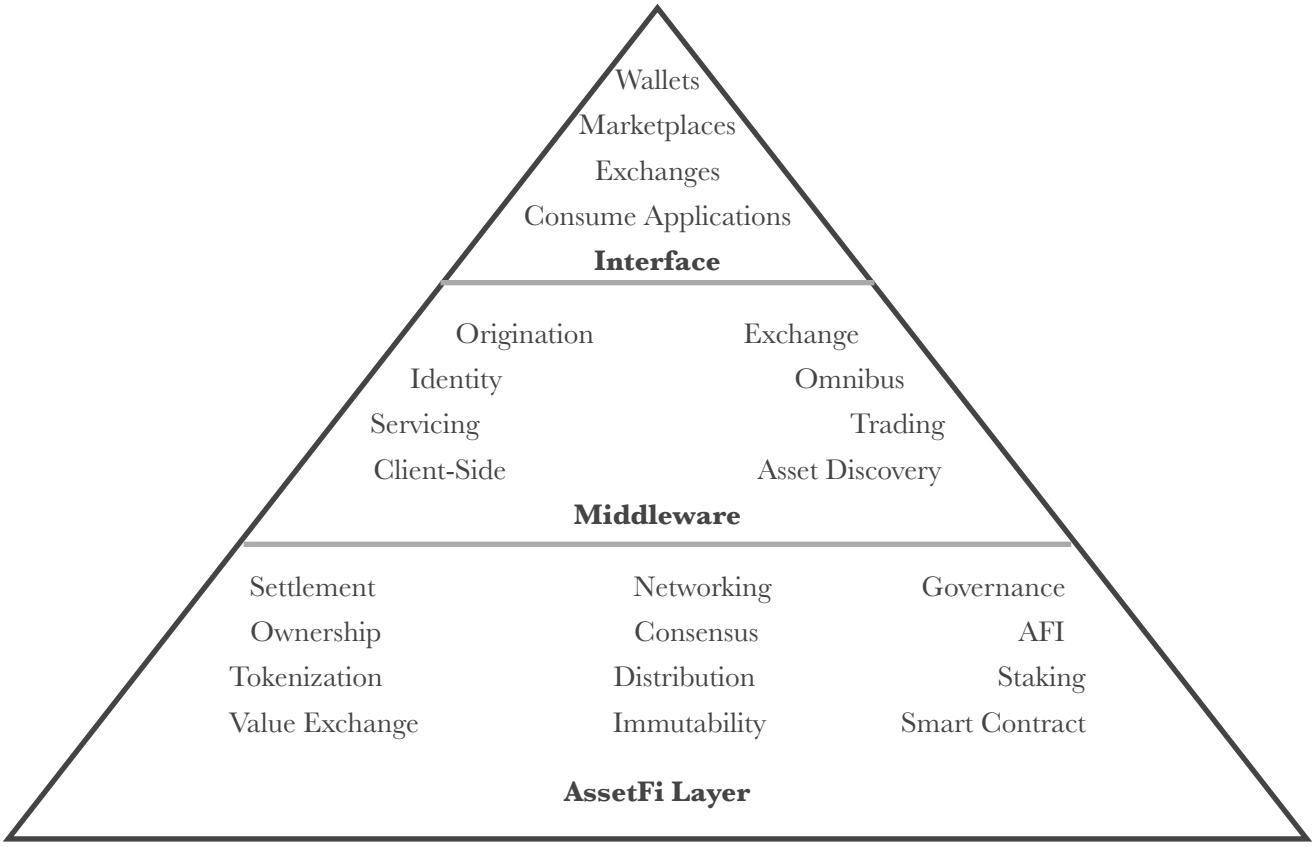
—**Off-chain client-side agreements** using the Contract Execution Environment.

Each of these core concepts has its own set of strengths allowing complete control of the consumer's private and confidential data.

Application Architecture

High Level Architectural Components

As is typical with most application architectures there are 3 well-defined layers: a user-facing interface, middleware to implement the application business components, and a foundational blockchain network infrastructure that supports the sophisticated requirements of the higher layers.



Interface Layer

This layer provides the traditional user interface for interacting with AssetFi-based applications. Marketplaces and Exchanges are typical use cases where users buy, sell, and trade things of value. These "things of value" include asset-backed securities, cryptocurrency, or tokenized assets.

An important component of the interface layer is the Wallet. Entities (organizations, systems, or users) must have an account to conduct business on the AssetFi platform. An account is represented by the public key portion of a public and private key-pair. Accounts contain a uniquely identified address, which simply a string value derived from the entity's public key following the Bech32 format, thus providing standard blockchain pseudonymity.

Consider an AFI transfer transaction where John is an AFI holder and Jane is the recipient. John holds 100 AFI at the address specified thus:

`af1kaczxflvhq4700r0ntdnqlxpu80xdp869seh9e`

(again, address is derived from the public key portion of a key pair that John holds).

Jane also has generated a key pair and an address from the public key portion of the key pair

`af18839rhfk0ql7mdqgn27eeaesmfr9ckpajssuc4`

Before John can send a transfer transaction request to the AssetFi layer he must sign the transfer transaction. John uses the private key portion of his key pair to sign the transaction and submits the transaction to the blockchain. AssetFi validates the transfer transaction signature against John's public key, verifies that he has an account on AssetFi, and that the address holds enough AFI to pay transaction fees and to transfer to Jane.

A Wallet is where John and Jane store their key pairs. The Wallet is used to manage key pairs, addresses, and the token-values the addresses hold. Typically, and when using the AssetFi Wallet, HD Wallets are used. HD Wallets allow entities to create a root mnemonic seed and then derive child keys from the root that can be used to hold value on AssetFi. For example, John's address:

`af1kaczxflvhq4700r0ntdnqlxpu80xdp869seh9e,`

is one of many keys in his HD Wallet. Entities can import, export, or regenerate their Wallet (and any subsequent derived addresses) using the root mnemonic seed. The root mnemonic seed is a secret value that the entity controls and never exposes to the AssetFi ecosystem.

Middleware

The middleware layer is where organizational business processes are defined. These business processes include the establishment and orchestration of business value. For example, originating a loan is an action that creates a value marker. Utilizing a stable coin marker for a payment application also creates and uses value markers.

The middleware layer is the bridge between the AssetFi core layer and the financial services business logic. The middleware layer connects directly to an AssetFi node to invoke transactions, query transactions, and listen for events.

The middleware layer is also where entities leverage the AssetFi client-side Contract Execution Environment for the onboarding and management of private and sensitive information. The Contract Execution Environment is a client-side solution that provides the ability for entities to exchange private data yet still leverage the ownership, immutability and value benefits provides by the AssetFi platform.

AssetFi Layer

The AssetFi layer provides:

—A persistent, distributed, immutable, and replicated deterministic state machine

—The networking and consensus layers of the AssetFi blockchain including transaction ordering and consensus

—Value and ownership markers leveraged middleware business applications including coins, cryptocurrency, and tokenization

—Exchange, trading, and settlement of value markers and bridges to fiat currency

—Bi-lateral exchange implementations using Smart Contracts

—Blockchain primitives such as account authorization, governance, staking, voting, gas and fee processing, telemetry, and node configuration.

AssetFi Core Components

AssetFi's fundamental layer is composed of these core concepts:

—Modules that implement financial services business logic. Modules are composed to realize complex financial services processes.
—Smart Contracting engine to develop and deploy contracts directly to the AssetFi execution layer.
—Off-chain client-side agreements using the Contract Execution Environment.

AssetFi distinguishes three types of applications based on these core concepts:

— On-Chain

Any client application that is configured with the proper key/addresses and modules, and uses AFI tokens for service payments, can transact directly on-chain within the AssetFi ecosystem. Applications interact directly with the core AssetFi Modules and an AssetFi Node. Applications may implement and leverage custom Smart Contracts specific to the business application use case.

— Client-Side

Using the client-side Contract Execution Environment, AssetFi includes functionality to encrypt and store confidential data and documents and to securely and selectively share those with other clients. Note that the on-chain immutability is extended to the off-chain data when the on-chain contract refers to those data by their hash (checksum) identifier, i.e. the cryptographic hash of the data's content. This functionality allows for off-chain transactions that optionally can complement the on-chain operations. The Contract Execution Environment is a client-hosted solution (or, optionally, hosted by a trusted service provider) that also interacts with an AssetFi Node.

— Hybrid

Financial transactions often consist of on-chain and client-side parts. For financial transactions, for example, the confidential documents supporting the transaction can be referred to by reference in the on-chain transaction. Those references point at immutable and encrypted documents that are safely stored off-chain. As part of the transaction, those confidential documents can be securely and selectively shared between the business partners. AssetFi fully supports this hybrid model, which allows for more complex financial transactions to be conducted within the AssetFi-ecosystem.

AssetFi Node

An AssetFi Node is a daemon process Full-Node Client implementation and is the core process that runs the AssetFi blockchain. This process runs the state-machine, starting from a genesis file, and connects to peers on the network running the same client to receive and relay transactions, block proposals and signatures. Participants in the network run this process to initialize their state-machine, connect with other full-nodes and update their state-machine as new blocks come in. The blockchain full-node presents itself as the binary.

Nodes in the network include:

—Query nodes used by business application middleware for efficient and fast state query.

—Transactional nodes used by business application middleware for efficient transaction submission and event listening.

—Archival nodes where the pruning strategy is set to maintain all historic states.

—Validator nodes

—Sentry nodes for Validator DDoS mitigation.

— Cosmovisor

Cosmovisor is a small process manager around the AssetFi daemon process that monitors the governance module for upgrade proposals. Approved upgrade proposals can be run manually or automatically to download the new code, stop the node, run the migration script, replace the node binary, and start with a genesis file.

— Modules

Modules define the AssetFi logic. AssetFi is composed of modules from the Cosmos SDK and custom modules to support value markers and the Contract Execution Environment. Modules provide core functionality that blockchain applications need,

including a boilerplate implementation of the ABCI to communicate with the underlying consensus engine, a multistore to persist state, a server to form a full-node, and interfaces to handle queries. Modules implement the bulk of the logic of financial service applications and the core does the wiring to enable modules to be composed together.

Modules can be seen as little state-machines within the state-machine. They generally define a subset of the state using one or more key-value stores and message types.

— Key Ring

To interact with the AssetFi daemon, and by extension the node, a keyring that holds the private/public key pairs used to interact with a node must be established. For example, a validator key needs to be set up before running the blockchain node so that blocks can be correctly signed. The private key can be stored in different locations, called "backends", such as a file, an HSM, or the operating system's own key storage. Refer to the Cosmos keyring documentation for more information.

— Genesis

Before running a node the chain is initialized via a genesis file. A default AssetFi genesis file is provided depending on the network in use (mainnet versus testnet).

— Interacting with a Node

There are multiple ways to interact with a node: using the CLI, using gRPC, or using the REST endpoints. With a running node, the AssetFi daemon process can be used as a CLI. The CLI provides functionality for signing and submitting transactions, querying, key and key ring management, as well as Module interaction.
Refer to the Cosmos 'Interacting with the Node' documentation for more information.

Smart Contracts

The AssetFi Smart Contract engine is based on the CosmWasm smart contracting platform. It is referred to as provwasm within the ecosystem. It provides a the smart contracting component of the ecosystem.
AssWasm is a module within AssetFi thereby providing smart contracting support to the AssetFi chain without adjusting existing logic. Smart contracts are hosted on a running AssetFi node where they can then be used by applications. Applications connect to smart contracts in the same way as they would interact with modules: CLI, gRPC, or REST.

There are 3 phases of an AssWasm contract that help understand how they are used:

Upload Code: Upload the optimized smart contract (wasm) code, no state nor contract address (example Standard ERC20 contract)

Instantiate Contract: Instantiate a code reference with some initial state, creates new address (example set token name, max issuance, etc for my ERC20 token)

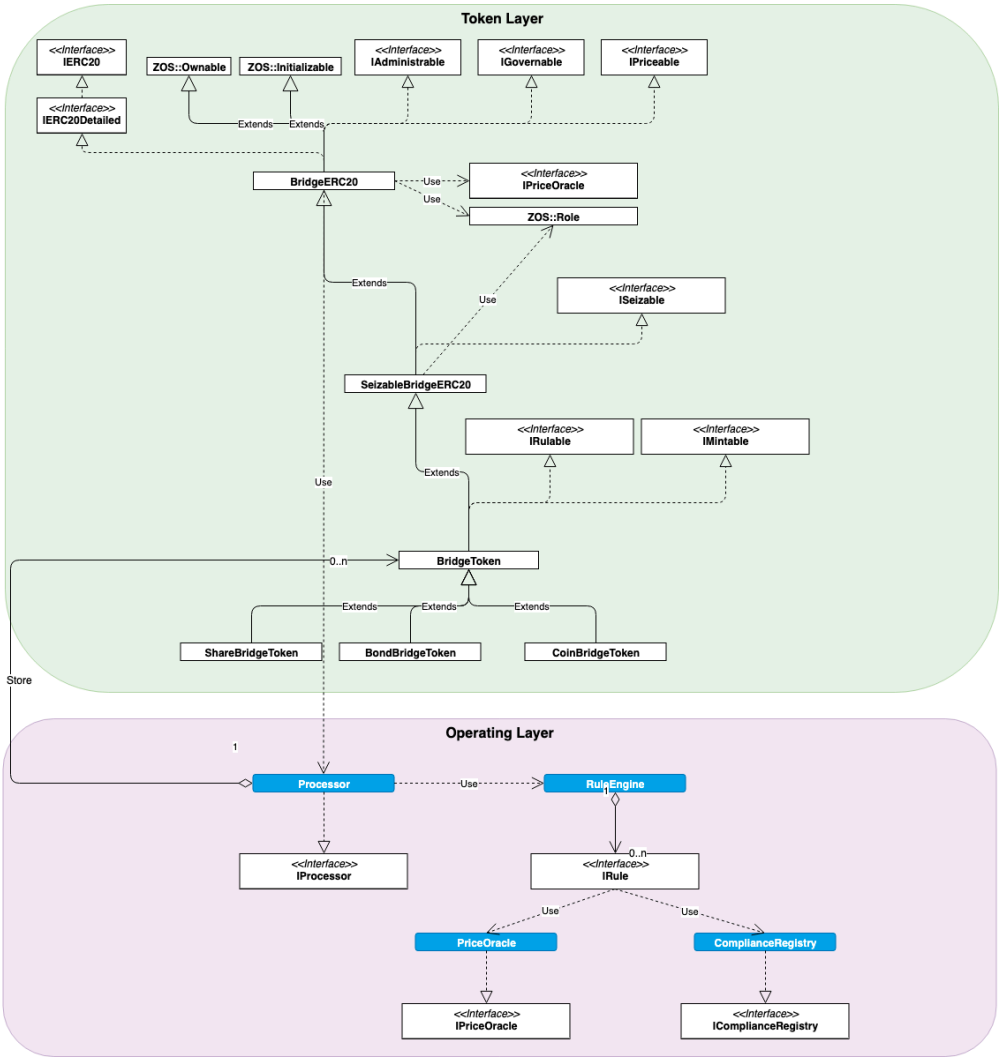
Execute Contract: This may support many different calls, but they are all unprivileged usage of a previously instantiated contract, depends on the contract design (example: Send ERC20 token, grant approval to other contract).

AssetFi Smart Contract instantiation and execution is metered and requires gas. Furthermore, both instantiation and execution allow the signer to send some tokens to the contract along with the message. Two key differences are that sending tokens directly to a contract does not trigger any contract code. AssetFi Smart Contract are able to leverage AssetFi Modules. This allows for the creation of complex, multi-module contracts.

Contract Execution Environment

The AssetFi Contract Execution Environment (ACEE) is an optional layer on top of the AssetFi base layer to allow single- and multi-party client-side contract execution while preserving data privacy. AssetFi client-side contracts take encrypted data from the user (client) and transform the information into encrypted data in the user's own private object store with object hashes recorded on the blockchain. ACEE directly integrates with the AssetFi Metadata Module to simplify generating signed records of an asset's provenance.

Assets can be directly defined with the Metadata module, but the ACEE execution environment assists in the complex process of hashing of data, maintenance of immutable objects, and signature orchestration between multiple parties.



— Client Contracts

Client-side contracts differ from "smart contracts" in that they keep data private between parties off-chain and thus facilitate a structure to record agreed-upon state data to the blockchain. Smart contracts, in comparison, are run directly on the blockchain and require the validators to have access to the data, which complicates many consumer-based transactions due to data privacy laws.

— Transaction Flow

Entities and organizations utilize the Contract Execution Environment to execute contracts creating single or multi-party agreements. Entity identity and data encryption make use of public-private key pairs. Entities are known to each other and share data with each other through their public keys. Contracts and asset data are forwarded to all entities participating in the contract by public key identifier. Entities provide an implementation of an Encrypted Object Store (EOS) where encrypted data related to their public key is stored. Contract execution consumes data from the entity EOS, and the results of the contract executions are returned to the submitting entity's execution environment. The hash sum of the Contract execution results, i.e. the cryptograph hash of its content, are submitted to the AssetFi core layer (via the Metadata module) where they are validated and committed to the chain. AssetFi emits events notifying entities the contract has been committed on the blockchain. An index, local to the entity, is updated with the new contract information. This information is used later for searching and querying the data.

AssetFi Token (AFI)

The token part of AssetFi is the interface used by third parties to interact with the token through the different stages of its lifecycle (issue/redeem, approvals, transfers, etc.). The token has a single owner, one or multiple administrators, one or multiple issuers, and one or multiple seizers.

As we want AssetFi to be as open as possible, the token issuer will have the opportunity to define trusted intermediaries that will act as the compliance authorities for given tokens. The role of the compliance authority is to maintain the compliance registry and make sure that the information stored in the compliance registry are accurate.

The token is registered with a Processor that will process all operations centrally. Having a single Processor for all tokens facilitates maintenance over a token's lifecycle, as it is not necessary to upgrade tokens to be able to add new features or new restrictions to them.

Proxy and logic

All the token contracts that are deployed with AssetFi are in the form of proxy + logic. The proxy is what contains the data storage, while the logic contains how one interacts with the data storage. The purpose of this approach is to:

—Be able to update the logic of a token without having to redeploy its data storage and needing your users to migrate to a new token.

—Re-use a previously deployed logic for a new token, which saves you the cost of re-deploying a logic each time you create a new token.

Rule engine

The Rule Engine is a library of rules that can be used by the token issuer to control how a token can be transferred or not. As regulations evolve, new rules can be added to the Rule Engine and the token issuer will be able to enforce them to adapt its compliance. Trivial rules like maximum transfers or minimum transfers will not need to have interactions with other contracts. For more complex rules that need information about the identity linked to an address or the history of transfers linked to an address, two contracts are currently provided: Compliance Registry and Price Oracle.

Rule specifications

Each rule in the Rule Engine has to implement the IRule interface:

```
function isTransferValid(
        address _token, address _from, address _to, uint256 _amount,
uint256 _ruleParam)
    external view returns (uint256 isValid, uint256 reason);
  function beforeTransferHook(
        address _token, address _from, address _to, uint256 _amount,
uint256 _ruleParam)
       external returns (uint256 isValid, address updatedTo, uint256
updatedAmount);
  function afterTransferHook(
        address _token, address _from, address _to, uint256 _amount,
uint256 _ruleParam)
    external returns (bool updateDone);
```

Adding new rules

An asset originator can add any rule they want to AssetFi and its Rule registry, and then add it to a token by using the rule number.

Compliance registry

AssetFi's Compliance Registry is responsible of the storage of all identity information linked to an address or the storage of the history of transfers linked to an address. The compliance registry is managed by trusted intermediaries, the Oracle providers. Each trusted intermediary has its own space within the registry to update its own address related information. Based on the token trusted intermediaries, the Compliance Registry will return the compliance information that have been updated by one of the token trusted intermediary.

The Compliance Registry is designed to store only pseudo-anonymized data (no Customer Identification Data). To be able to maintain a single reference currency for transfers history, the Compliance Registry will use the Price Oracle.

Tokenomics of AssetFi

To accomplish the development and launch of the platform, including ensuring proper regulatory compliance as well as the security of the technology, AssetFi will be having a public token sale in 2021.

This offering will be for AssetFi Token ($AFI), which are BEP-20 tokens that represent the AssetFi Platform itself, not the assets listed on it, as asset creators/originators will determine what their tokens will be. These $AFI tokens allow investors in the AssetFi Platform to access instant liquidity in secondary markets.

A key component to the function of the actual AssetFi Platform itself, the offering and distribution of AssetFi Tokens ($AFI) is critical to the successful launch of the platform. These reserved tokens are intended for investors, the team, partners, and others for the purpose of bootstrapping the development of the AssetFi Platform itself, and its supplemental economy of offerings.

Description	
Token Name	AssetFi
Ticker	$AFI
Token Type	BEP-20
Token Supply	500,000,000
Nominal Token Price	$0.015
Diluted Token Valuation	$7,500,000

Token Allocation

Total Tokens: 500,000,000

Platform Usage: 450,000,000

For Sale: 50,000,000

TOKEN SALES

Description	Allocation	Price ($)	Supply
No Private Sale	-	-	-
Public Sale	10%	0.015	50,000,000
TOTAL	10%		50,000,000

INITIAL MARKET CAP

Description	TGE Release	Price ($)	Initial Circulation
IDO	30%	0.015	15,000,000
	IMC		$225,000

DISTRIBUTION SCHEDULE

Tranche	Allocation	Supply	Vesting
Public Sale	10%	50,000,0000	30% released at TGE. 10% monthly linearly release
Team	10%	50,000,000	12 months cliff. 4% monthly release
Advisors	5%	25,000,000	12 months cliff. 4% monthly release
Liquidity	18%	90,000,000	Reserved for DEX and CEX liquidity providers
Ecosystem	32%	160,000,000	1 Month Cliff. 4% Monthly Release. (Reserved for partnerships, user acquisition and platform development)
Marketing	15%	75,000,000	5% unlock 10 Days Post-TGE. 5% monthly release
Reserve	10%	50,000,000	

Project timeline

Roadmap

— Q3 2020

— AssetFi Team Assembles

— AssetFi Product Conceptualization

— Feasibility Study/Market Analysis

— Prototype Development, Use-Cases and Proof of Concepts

— AssetFi Standards and Architecture finalized

— Finalize Protocols For Interchain Liquidity Bridges

— Q2 2021

— White Paper Released

— Community Building

— Vision Campaigns

— Smart Contracts Development

— Q3 2021

— AssetFi MVP Release: Pilot Program

— Q4 2021

— Public sale on select launchpads

— Pancakeswap Listing

— Token Distribution

— Strategic Partnership Rounds And Announcement Of Advisors

— Q1 2022

— Web Platform Beta Launch/Bug Bounty Program

— Top-tier First Exchange Listing

— SDK and Open API Beta Releases

— Release Platform Documentation

— Mainnet Live

— Web Platform Official Launch

— Mobile Apps (Android & iOS) Released

— Cloud Platform Integrations

— Staking and Delegation

— Q2 2022

— Cardano Integration Completion

— Cross-Chain Marketplace (DEMA) and Exchange Launch

— Cross-Chain Derivatives Launch

— AssetFi Growth™ Release

— AssetFi NoobCurve Rollout

— AssetFi Investment Streaming (AIS) Rollout

About

—Who we are and why we're doing this

Currently there are unnecessary barriers, including geographical and jurisdictional constraints, that prevent an alliance of investors from forming. While our networks have grown globally and turned digital, traditional asset classes remain highly immobile. Investing through traditional channels is still unnecessarily difficult, expensive, paperwork-intensive, and dependent on a variety of counter-parties or intermediaries. The current investment ecosystem and financial industry relies on governmental intervention to curb the worst excesses of the system. Financial regulations are designed to protect investors but, ironically, with the vast scope and subtleties of these financial regulations, the novice investor finds himself entirely excluded from the most attractive opportunities. To make things worse, due to regulation, many of the best opportunities to invest in attractive projects are only available through avenues like Venture Capital, which is only open to high net-worth accredited investors.

Our vision

AssetFi's vision is to "enable ownership for all" through making ownership more transparent, accessible, and efficient. Access barriers make most investment opportunities available exclusively to accredited investors, making the rich richer and leaving others with hardly any chances to break the glass ceiling. For example, the entry level for investing in real estate is so high that a lot of people incur debts in order to invest substantially. We keep our money in the bank, but it's the bank that controls it. Raising capital for projects is costly and depends more on who you know rather than what you're building. Why is it that wealthy public companies have much easier access to raising capital? Why can't we keep full control over our own money? Why can't we invest in real estate or financial instruments on our own basis?

Our mission

We want to change the status-quo. Make ownership transparent, inclusive, and efficient. Cut out the middleman. Throw out the barriers to entry. Enable direct transferability of assets. Make issuance easier and more accessible. In other words, enable ownership. For all.

Core team

The AssetFi team is comprised of a group of 5 amazing individuals from different niches of professionalism and strong backgrounds in finance, engineering, blockchain development, marketing and business strategy. Passionate about bridging traditional investing with the incredible portal that DeFi and the Blockchain technology opens up. The team is keen on building a platform that thrives on the core tenets of the Blockchain —completely anonymous, trustless and zero-knowledge proof.

For now, we would rather the focus and spotlight be on the prospects and potentials that AssetFi project holds. We cannot say if this will change in the future. Who knows, we might venture out of the shadows. :) But first, let's build the future.