DESAT:
The Decentralized Storage & Asset Tokenization Network

White Paper

December 2021

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Democratizing the exchange of physical assets.

Motivation

There is a common understanding that non-fungible tokens ("NFTs") that are backed by a physical asset should be redeemable by the owner of the NFT. Even more so, if the NFT claims to represent ownership of the underlying physical asset. How is this achieved in practice? Redemption relies generally on two elements. Firstly, availability: the underlying asset should be stored in a secure place in order to remain available and accessible for redemption. Secondly, legal entitlement: the legal nature of the NFT and the rights conferred upon the NFT owner must be clearly stipulated and communicated. These elements are currently not being addressed sufficiently, partly because the tokenization of real-world physical assets is still in its infancy. A decisive factor to grow the adoption of tokenized real-world physical assets is creating trust and transparency for owner of NFTs and building a framework that ensures redemption of the underlying physical asset. DESAT is at the forefront of addressing these challenges.

Abstract

DESAT stands for Decentralized Storage and Asset Tokenization and is a network focusing on storage and tokenization of physical assets. It is built around three main actors: a) Members: comprising real-world storage providers that operate physical storage locations, b) Depositors: legal owners of physical assets who wish to obtain digital representation of their physical assets by transferring ownership to the DESAT Network and c) Token Holders: holders of the digital representation of the physical assets who wish to eventually redeem the underlying physical asset.

Physical assets stored at DESAT Network locations are digitized as NFTs on the Ethereum blockchain, implementing a standard that embeds jurisdiction specific agreements conferring legal entitlement upon Token Holders to redeem the underlying stored physical asset.

Tokenization of Physical Assets

Tokenization is the process of digitizing an asset by producing a digital representation in form of a token on the blockchain that (ideally) confers the holder of the token ownership title of the underlying physical asset in the jurisdiction the assets is held. It is the widely accepted expectation that owning the tokenized digitized asset is as good as owning the underlying physical asset. The DESAT Network is built to ensure that a Token Holder can redeem the stored physical asset and obtain physical possession and ownership of the asset at any given time. The actual legal qualification of the NFT issued by the DESAT Network depends on the legal framework embedded in the NFT and the applicable laws which will differ from jurisdiction to jurisdiction. It is the DESAT Network's intent to create NFTs that represent a right as close as legally possible to an ownership title of the underlying physical asset but at the bare minimum it shall entitle the Token Holder to redeem and obtain legal ownership of the underlying physical asset.

The DESAT Network solves the inherent problem of multiple tokenization of the same physical asset by obliging the legal owner of the physical asset to transfer possession and legal ownership of the physical asset to a Member of the DESAT Network who obtains control of the physical asset and ensures that it is

tokenized only once. By transferring possession and legal ownership to the DESAT Network, the physical assets are also better protected from becoming subject to any legal actions the Depositor may face in future. The Token Holder can be confident that the stored physical asset is not subject to any real-world transactions and they are able to verify the location of the physical asset at any given time.

The DESAT Network issues NFTs using the Physical Asset Redemption standard format (an extension of ERC-721) on Ethereum (the "Standard"). This allows any application on the Ethereum blockchain to support DESAT tokenized physical assets. The Standard provides, among others, embedding of the storage location details as well as the legal agreement stipulating the rights and obligations of the Token Holder, DESAT Network and Member. The legal agreements are tailored to the jurisdiction and applicable laws where physical assets are stored in order to ensure legal enforceability in each jurisdiction.

A Token Holder has confidence that the underlying physical asset is securely stored by a Member of the DESAT Network and redemption of the physical asset is legally enforceable. As such, within the context of physical real-world assets, 'storage' and 'tokenization' are inseparable.

Decentralized and Open Network

A requirement of the DESAT Network is the ability to support a substantial amount of the world's stored physical assets. A tokenization solution owned and operated by a single entity bears the risk of a single point failure and would inherently have limited adoption due to its centralized nature. The solution is an open network where under the given requirements anyone can become a Member and offer their storage capacities and therefore no one person owns the DESAT Network. There shall be no single, central entity. This follows the design principles of the internet and large blockchain networks.

In support of this requirement, the DESAT Network is modeled on a proof-of-stake ("POS") blockchain, like Ethereum. Instead of a network of servers executing code and storing bytes, the DESAT Network is one of physical, real world storage facilities, that execute logistic flows and store physical assets. This concept is critical to making the DESAT Network an infrastructure layer for businesses to build and innovate on.

Digital Economic Model

The DESAT Network borrows several concepts from digital POS blockchains, such as Ethereum. Even though the network is made up of physical storage locations, the same POS mechanics can be applied.

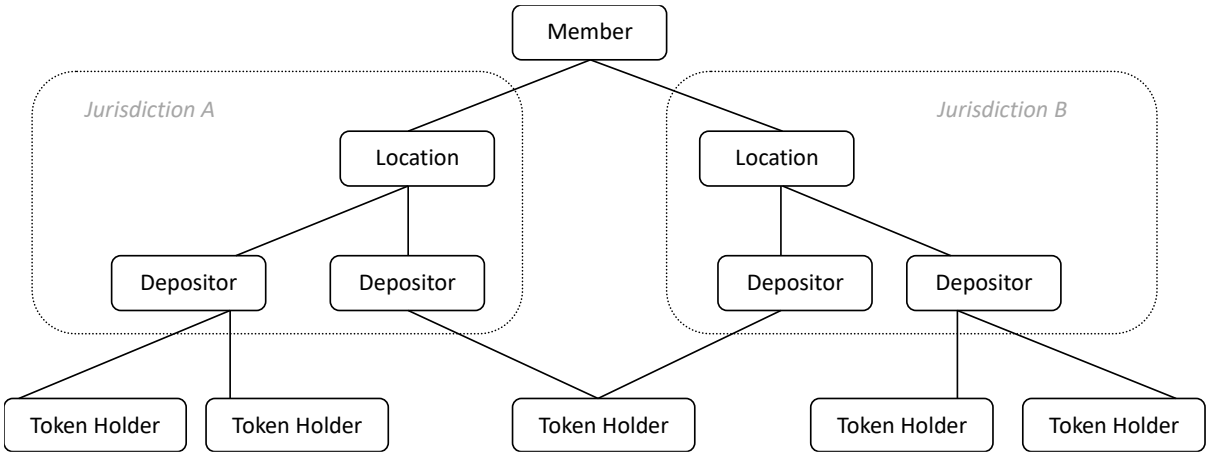
Like Ethereum and other POS blockchains, DESAT utilizes a native utility token (DSAT) to grant access to the network. When a storage provider wishes to bring their capacity 'on-chain', they are required to purchase DSAT and stake it on the network. Staking DSAT grants the provider the right to participate in the network where they, under the given requirements, become a Member and offer their storage capacity, letting Depositors store their physical assets.

Since assets are tokenized using the Standard, the NFTs sit in the Token Holder's Ethereum wallet whereas there are very limited ways for the Members to pass storage costs of the underlying physical asset to the Token Holder. The DESAT Network solves this problem primarily by making the network itself as counterparty for the Members. Instead of collecting the costs associated to the storage of the physical asset from the Token Holders, Members are rewarded with a yield on the amount of DSAT staked. In addition, DSAT is required and used by Depositors and Token Holders to pay network fees for depositing /

redeeming physical assets and other transactions on the DESAT Network. Parts of these fees are attributed directly to the Members. This provides a market of buyers and sellers.

Just as with digital POS blockchains, stakers are penalized, when they fail to meet the requirement of the network. If a Member loses or damages an asset, the network compensates the respective Token Holder using DSAT tokens staked. Likewise, if a Depositor commits fraud by intentionally mislabeling assets the digital token holder is compensated.

Network Structure



Member

Storage facility operator that meets the DESAT Network's requirement and which has staked the prescribed amount of DSAT tokens. Typically, the storage facility operator is an expert in running storage facilities and experienced in logistic flow. The Member adheres to the DESAT Network's operation model regarding depositing assets, redemption and storage and is remunerated via the yield on staked DSAT tokens.

Depositor

An individual or entity represented by a wallet that has passed the required onboarding process, including setup of brand and identity, and where necessary met KYC requirements, to be able to deposit physical assets at a Member's location. Depositors are required to pay fees for the interaction with the DESAT Network.

Token Holder

Owner of an Ethereum wallet in which tokenized physical asset is held. Following the tokenization process, the Depositor becomes the first Token Holder. After subsequent transfers Token Holder will be an unrelated party to the DESAT Network until Token Holder decides to redeem the underlying physical asset. The redemption process is designed in accordance with the applicable jurisdiction's laws and may include KYC procedures in order to identify the Token Holder's identity.

Jurisdiction

Refers to the territory where a specific system of law is applicable. The DESAT Network implements jurisdiction specific processes and legal framework around the NFTs for each location to ensure enforceability of Token Holder's rights and operational compliance by the Members.

Location

A real-world storage facility where physical assets are deposited and stored. Locations must comply with the network's jurisdiction specific processes. Locations may be approved by the Network for specific categories of physical assets only as certain physical assets require special storage conditions.

DSAT Token

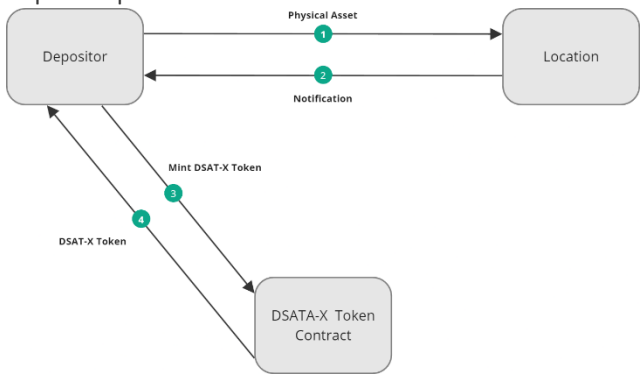
ERC-20 utility token used to transact on the DESAT Network. DSAT is the native network currency that grants access to the DESAT Network. The Members are required to stake a certain amount of DSAT tokens to generate a yield to cover their costs and for the network to hold a collateral in case of a Member not meeting its obligations. Any transaction fees on the network are settled in DSAT.

DESAT NFTs (DESAT-X Tokens)

All physical assets deposited with the DESAT Network are represented on-chain as ERC-721 NFTs. These asset backed tokens use the Depositor's branding and identity while also clearly marked as DESAT physically backed NFTs. Members can issue one or more DSAT-X token types to Depositors allowing classifications of their physical asset such as different collections.

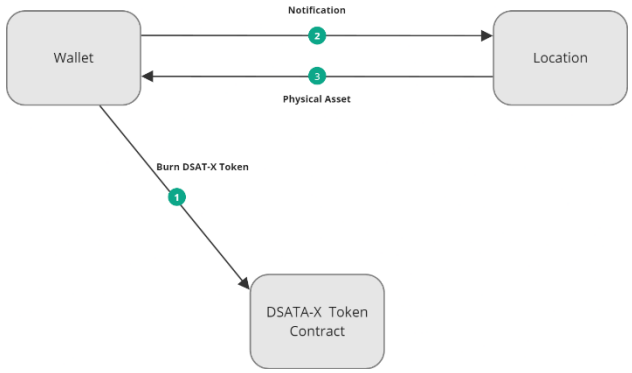
Basic Network Flows

Deposit procedure



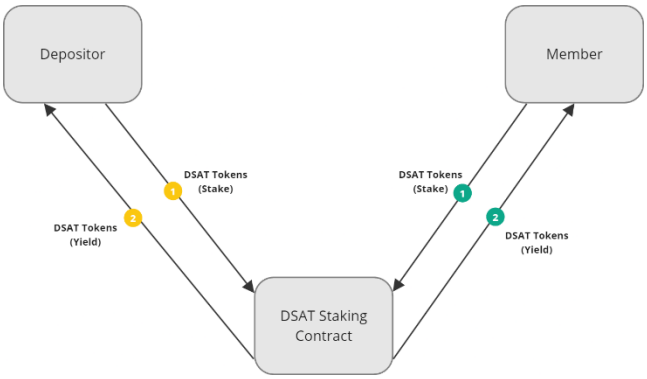
1. Depositor deposits physical asset at Location, in person or via other means as allowed by each Location.
2. Member operating the Location processes the physical asset, associating it with the Depositor and notifies them to confirm complete the minting of the NFT.
3. Depositor checks whether token information is correct and proceeds to mint.
4. Minting places the NFT in the Depositor's wallet.

Redemption Procedure



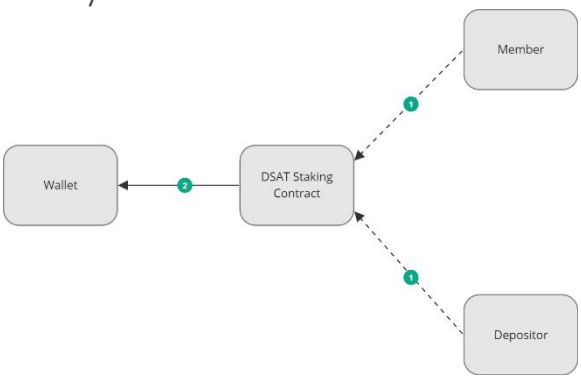
1. Token Holder (wallet) instructs the DSAT-X smart contract to burn the token and initiate redemption.
2. Member is notified of redemption at Location, including details.
3. Member releases the physical asset to Token Holder.

Staking



1. Depositor or Member stakes DSAT tokens to the DSAT staking contract. The amount staked provides the right to mint or store assets up to a defined.
2. A yield is paid on DSAT deposits, giving Members a revenue stream for providing storage.

Penalty



1. DSAT staking provides on-chain collateral for the protection of Token Holders. If a physical asset is damaged or lost while in storage, a Token Holder is compensated with a combination of insurance proceeds and DSAT tokens from the staking contract. If a physical asset is determined to be not what is described by the Depositor a Token Holder can claim DSAT tokens equal to the declared value. The responsible party's – Member or Depositor - staked DSAT balance is slashed.
2. Claims are awarded and sent to the NFT holder's wallet.

Governance

DESAT Foundation

A foundation established in Zug, Switzerland, of non-profit nature with primary purpose to advance, support and develop the DESAT Network shall govern the DESAT Network during the initial stage before the DESAT Community is well enough established to govern the network.

DESAT Community

Members, Depositors, Token Holders and businesses will play a crucial role in the governance of the network. The DESAT Foundation will establish the on- and off-chain solutions for the community to govern over time.

Summary of Problems Solved

- Creation and issuance of NFTs that represent physical assets stored with the DESAT Network and that confer the Token Holder a legally enforceable right to redeem the underlying physical asset.
- Business model that provides storage providers with a single customer – the network – eliminating the necessity to market to, convert and invoice customers directly.
- Limitless scale and low risk using a network that is owned by its participants instead of a centralized entity.
- The network is an authority that can support multiple blockchains.
- Room for other roles to join the network, such as on-chain insurance providers and authenticators/attestors/certifiers.