UTILITY TOKENS, NFT'S, SBT'S: TOKENIZATION AND APPLICATION

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Introduction

Blockchain, smart contracts, and digital assets — whereby, digital assets are created via a process called tokenization—stand to change the way we exchange ideas, information, and money. Tokenization is the process of issuing a digital representation of an asset on a blockchain. These assets can include physical assets like real estate or art, financial assets like equities or bonds, nontangible assets like intellectual property, or even identity and data. Tokenization can create several types of tokens. Tokenization in blockchain opens multiple new possibilities for businesses and individuals.
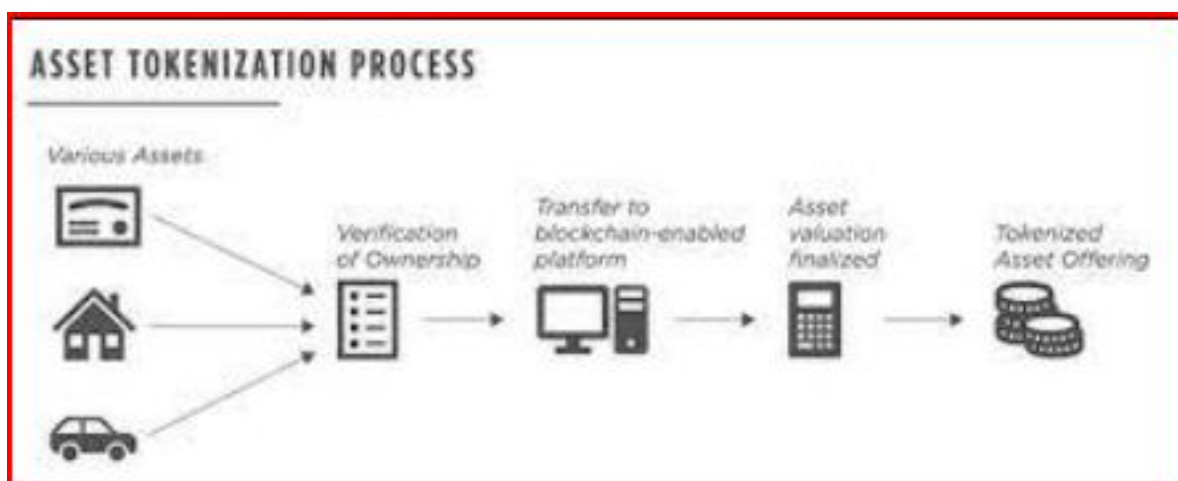

Illustration: Asset Tokenization on the Blockchain

Before the introduction of blockchain technology, we have used tokenization, especially in financial institutions from the 1960s, to safeguard our credit card details and transaction statements. Even hospitals use them to keep sensitive patient information, and governments use them to keep track of voter registration.

The term "token" is generic, but encompasses all tokens, not only asset-backed tokens. With the rise of ICOs (Initial Coin Offerings) and the shift to ITOs (Initial Token Offerings) or STOs (Security Token Offerings), the term "token" has become somewhat omnipresent.

Traditional tokens save the information as alphanumeric tokens and later pass through a cryptographic function. This process makes sure that each token is unique. Blockchain tokenization is like this process. However, blockchain tokenization provides some additional benefits.

- Flexible tokenization of assets
- It comes with security like that of cryptocurrency security.
- Potential for broad application of tokens

What is a token?

A token is a digital representation of value, ownership, or access rights that can be traded, exchanged, or utilized within a specific blockchain ecosystem. Tokens are versatile and can be used to represent a wide range of items, from physical assets such as real estate and artwork to digital services like cloud storage and digital identities. As the blockchain industry continues to evolve, tokens have become a fundamental building block for various decentralized applications (dApps), financial services, and platforms.

Technological Underpinning of Tokenization

The different types of assets show the inputs one can put in for creating tokens with blockchain-based systems. However, the question is how it is technically possible to convert real-world assets into tokens. So let us look at the technological foundations of implementing tokenization in blockchain.

Smart/ Token Contracts - The implementation of tokens depends considerably on smart contracts, also referred to as token contracts. Token contracts are a specific type of smart contract. They define a bundle of conditional rights assigned to the token holder. Token contracts are programs that can help in the verification of business rules alongside transferring value from the wallet of one user to another user's wallet.

UTXO Model - It is important to note that UTXO and account-based models are currently the most preferred choices for the implementation of smart contracts. The UTXO model has been a common choice for many cryptocurrencies after its introduction to Bitcoin.

Account-Based Model - Account-based models are suitable for networks running on Ethereum and Hyperledger Fabric. With the account-based model, one would find a world state database, which helps in maintaining the existing state of the token or asset at a specific instance of time. In addition, the existing state of the token would be classified as the balance for transactions.
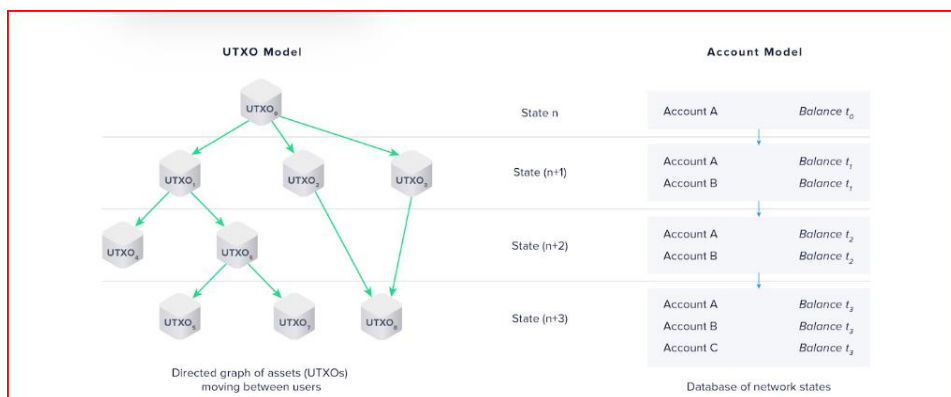

Illustration: UTXO vs Account Based Model

UTXO Model Challenges - There is a lack of a world state database in UTXO-based platforms. On the contrary, these platforms focus on maintaining a balanced output for every transaction they perform. It is possible to calculate the existing token balance from the sum of all unspent balances.

UTXO Working - Interestingly, the sum of input values should be more or equal to the sum of output values in the UTXO-based model. For example, R3 features a robust token-SDK with the UTXO model as the foundation. One can find a promising tokenization example with R3, as he /she can implement token-based solutions in Hyperledger Fabric by leveraging smart contracts.

Concept of Tokens Explained

Tokens on the Blockchain can combine both concepts:
1. access rights to some underlying economic value (property) or
2. permission to access the property or services of someone else or collective good.

This property or service can be public (Bitcoin Network) or private (an apartment that is rented out by a private person). It is important to note that the term "token" is simply a metaphor.

Contrary to what the metaphor might suggest, a token does not represent a digital file that is sent from one device to the other. Instead, it refers to assets and/or access rights that are collectively managed by a network of computers, a blockchain network, or another distributed ledger. A distributed ledger provides a universal state layer, a public infrastructure in the form of a distributed record of transactions that keeps track of which wallet address is the owner of which token.

Token Representation - Tokens represent a set of rules, encoded in a smart contract – the token contract. Every token belongs to a blockchain address. These tokens are accessible with a dedicated wallet software that communicates with the blockchain and manages the public-private key pair related to the blockchain address. Only the person who has the private key for that address can access the respective tokens. This person can, therefore, be regarded as the owner or custodian of that token.

Token Transfer/ Access - If the token represents an asset, the owner can initiate a transfer of the tokens by signing with their private key, which in turn generates a digital fingerprint or digital signature. If the token represents an access right to something somebody else owns, the owner of that token can initiate access by signing with their private key, thereby creating a digital fingerprint. If the token represents a vote, the owner of that token can vote by signing with their private key, creating a digital signature.

Regulation - From a regulatory point of view, however, it is not definitively clear whether or how it is possible to acquire ownership or possession of such tokens. Therefore, concepts like custodianship would probably need legal modifications in many jurisdictions.

Token Validation - Tokens always need a substrate that ensures their validity, including some inbuilt anti-counterfeiting measures. Historically, tokens have been issued and managed by centralized entities, to ensure validity, and have had security mechanisms built into the substrate. Central banks issuing coins and bills need to make sure that their tokens, the coins, and bills, are hard to copy. The same is true for a concert organizer issuing tickets to a concert. The validity and security of tokens are managed by the smart contract that created it together with the underlying distributed ledger by the majority.
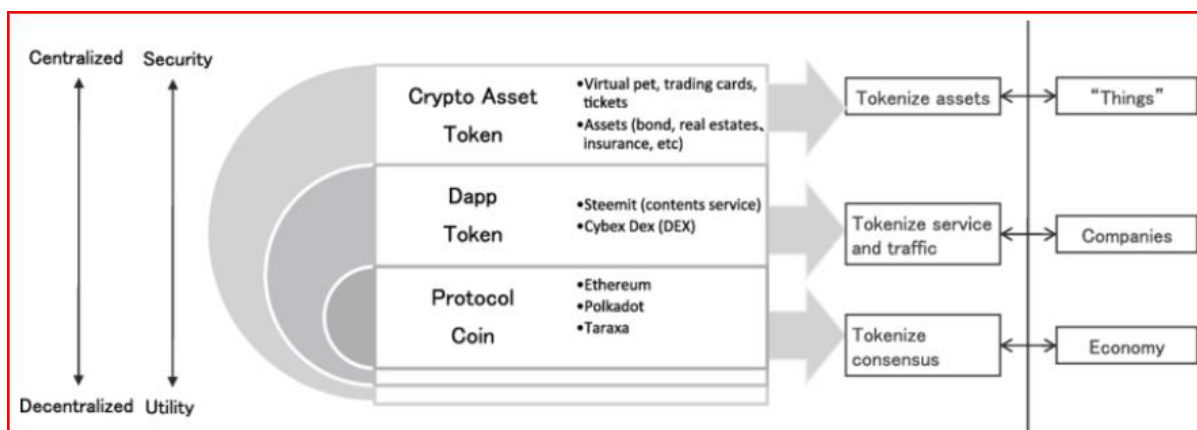

Illustration: Different layers of Tokenization

Protocol Tokens - The first blockchain tokens were the native tokens of state-of-the-art public & permissionless blockchains like Bitcoin, Ethereum, and the like. These native tokens – also referred to as protocol tokens – are part of the reward or incentive scheme of blockchain infrastructure. The role of the native token in a blockchain is to encourage a diverse group of people who do not know or trust each other to organize themselves around the purpose of a specific blockchain.

Application/ Dapp Tokens - With the advent of Ethereum, however, tokens have moved up the technology stack and can now be issued on the application layer with a few lines of code. Such application tokens can have simple or complex behaviors attached to them. Ethereum made it particularly easy to issue tokens with a few lines of code. They developed a standardized smart contract, the ERC-20 standard, which defines a common list of rules for Ethereum tokens, including how the tokens are transferred from one Ethereum address to another, and how data within each token is accessed. These relatively simple smart contracts manage the logic and maintain a list of all issued tokens and can represent any asset that has features of a fungible commodity.

ERC-20 Token - A vast majority of early tokens issued on the Ethereum blockchain have been ERC-20-compliant fungible tokens, where every token has an identical value to any other token of the same kind. They can be fungible and therefore easily traded.

Non-Fungible Token - Later, however, more complex token standards emerged that can represent any asset or access rights with special properties. ERC-721 introduced a free and open standard that describes how to build non-fungible tokens on the Ethereum blockchain. This has introduced the era of building more complex features into the tokens.
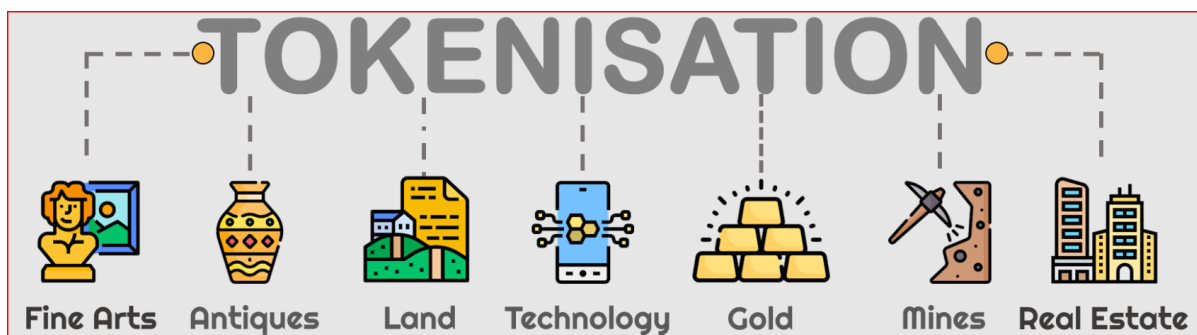

Illustration: Different Assets Tokenization Examples

This standard has made it easy to create a token that represents any type of collectible, artwork, property, or personalized access rights, just to name a few examples. These non-fungible tokens have special properties that make the token unique, or that are tied to the identity of a certain person, and therefore represent less fungible or non-fungible assets and access rights. They might pave the way for one of the most interesting use cases. ERC-721 introduced a much richer spectrum of smart contract standards that exceed the possibilities of the fungible tokens that dominated the early days of token sales.

Interoperability - Tokens mostly do not cross networks, as they are issued and managed by blockchain-specific smart contracts. These different blockchains have different standards and are often not interoperable. However, token interoperability is an issue that is tackled by projects like "Cosmos" and "Polkadot". Interoperability and standardization play into the potential network effects of the mass adoption of tokens. Most investors prefer to store their crypto assets in one place to make life easier, and that is why many muti-token wallets are being developed.

What is the Purpose of Tokenization?

Operational Efficiency - One of the foremost benefits of tokenization blockchain applications is operational efficiency. Tokens enable streamlining of IT systems and infrastructure sharing among participants without any central third party. As a result, it can reduce transaction costs considerably.

Furthermore, automation of manual work and reducing a portion of compliance or reconciliation process could also reduce inefficiencies. In addition, tokenizing assets helps in automation of simple sending or receiving transaction settlements and clearance, thereby ensuring faster transactions. As a result, one can achieve overall efficiency improvements in management of a single transaction.

Assets Divisibility - The conversion of assets into fractions while also ensuring ownership of fractions of assets allows better prospects for liquidity. The reduced barriers to investment in assets could encourage more people to invest in assets. Tokenization algorithms could help sellers in traditionally illiquid markets for carrying out a transaction. At the same time, tokens can also showcase prolific support for inclusive finance. Without any intermediary function, investors could access investment opportunities that would have been conventionally impossible on the grounds of high minimum investment thresholds or infrastructure and geographical reasons.

With tokenization blockchain applications, the investor's location will not affect access to financial markets and a range of new types of assets. Interestingly, investment in assets could become simpler with considerable reductions in minimum capital requirements by leveraging tokens.

The divisibility of assets could also enable the concept of shared ownership. In the model of shared ownership, multiple people could purchase an asset together and use it. Such type of concept of dividing ownership is crucial in times when usage is taking the limelight from ownership. For example, few people can purchase a vacation house together with agreements on who will use the house each week.

Transparency - Blockchain offers the benefit of transparency by default, and all transactions on a blockchain network are accessible to all network participants. In the case of physical assets, the value of transparency allows better traceability while improving trust in the origins and ownership of the asset. Therefore, tokenization can serve exceptional benefits in easier identification of ownership of a specific asset and the related chain of ownership.

However, the applications of tokenization in blockchain do not come with complete assurance of transparency. In the case of many industries, transparency is not systematically acceptable in certain use cases. For example, transparency is a tricky concept in the asset management industry and in cases where competitors share the same infrastructure. The plausible solution in these cases would refer to the introduction of privacy-enhancing technologies to avoid exposure to sensitive information.

Single Source of Truth - The next important aspect in validating the growth of tokenization blockchain applications would refer to a single source of truth. Organizations collect a

considerable amount of data for every asset. However, mapping, and interlinking data points like intellectual property rights, licenses, product ownership, and rights to specific products are difficult. As a result, multiple fragmented data points regarding an asset can create avoidable circumstances.

With the help of a tokenization algorithm, blockchain brings in a single layer of trust. The layer of trust can enable business partners or competitors to share their data collectively. As a result, multiple participants in an ecosystem could find ease of interaction with a singular digital representation of a concerned asset. Subsequently, it can improve efficiency throughout the value chain alongside introducing new approaches for collaboration.

The examples of multiple initiatives in the trade finance industry show the capabilities of tokenization to serve a single source of truth. The initiatives have been focusing on empowering companies to share information regarding an asset that is transferred worldwide. Tokenized assets could also support automation and simplification of the process of high-volume trading by leveraging smart contracts.

Different types of Tokens

Illustration: Types of Tokens

Tokens can be classified into four primary categories: utility tokens, security tokens, payment tokens, and stablecoins. Each of these categories has distinct characteristics and use cases, catering to the diverse needs of the blockchain ecosystem. These categories are not exclusive to each other, so some tokens belong to multiple categories.

1. **Utility Tokens -** Utility tokens provide users with access to a specific product, service, or platform within a blockchain ecosystem. These tokens are designed to be used, not as an investment, but to interact with a particular application. Utility tokens are often issued during Initial Coin Offerings (ICOs) or Token Generation Events (TGEs) as a way for projects to raise capital, while simultaneously providing token holders with the ability to use or interact with the project's offerings.

   Some examples of utility tokens include Ethereum (ETH) and Cardano (ADA). Ethereum's native token, ETH, serves multiple functions within the Ethereum ecosystem, such as paying for transaction fees, facilitating smart contracts, and incentivizing validators to secure the network. Cardano's native token, ADA, has a similar role in the Cardano blockchain, where it is used to pay for transaction fees, enable smart contracts, and participate in staking, which helps maintain the security and stability of the network. ADA also functions as a governance token, as it allows token holders to vote on proposals and influence the development and direction of the Cardano platform.

2. **Security Token -** Security tokens are digital representations of traditional securities, such as stocks, bonds, or real estate, and are subject to the same financial regulations as their physical counterparts. These tokens derive their value from an underlying asset and can offer a variety of benefits, including dividends, profit-sharing rights, or voting rights. Examples of security tokens include tZERO (TZROP), a tokenized security representing equity ownership in tZERO Group, Inc., and Blockchain Capital (BCAP), a token representing a limited partnership interest in a Venture Capital Fund.

   The issuance and trading of security tokens require compliance with regulations. Security Token Offerings (STOs) provide a mechanism for companies to raise capital in a regulated environment while benefiting from the increased liquidity, transparency, and accessibility offered by blockchain technology.

   Security tokens are typically not listed on popular coin market cap rankings, as they are subject to strict regulations and cater to a different audience than utility tokens or cryptocurrencies. Instead, security tokens are often transacted on specialized security token exchanges or trading platforms, such as tZERO or Securitize, which operate within the regulatory frameworks established by financial authorities.

3. **Payment Token -** Payment tokens, also referred to as cryptocurrencies or digital currencies, are designed to facilitate the transfer of value within a decentralized network. They function as a medium of exchange, enabling users to conduct transactions and settle payments without the need for intermediaries, such as banks or

payment processors. While many tokens serve as payment tokens, not all tokens are designed primarily for this purpose.

Bitcoin (BTC) is the most well-known example of a payment token and has inspired the creation of numerous other cryptocurrencies, such as Litecoin (LTC) and Dash (DASH). These digital currencies leverage blockchain technology to provide secure, borderless, and relatively fast payment solutions.

It is important to note that some tokens can serve multiple purposes; a utility token may also be used as a medium of exchange for goods and services within that ecosystem, effectively acting as a payment token in that context (for example, ETH). A security token, on the other side, may not be suitable for use as a payment token, as it is intended to represent an ownership interest in an underlying asset rather than facilitate payments or transfers of value. In such cases, using the token as a medium of exchange could be restricted by regulatory constraints and the token's specific functionality.

4. **Stablecoin -** Stablecoins are a unique category of tokens designed to maintain a stable value relative to a specific asset or basket of assets, such as fiat currencies, commodities, or other cryptocurrencies. These tokens aim to combine the stability of traditional assets with the benefits of blockchain technology, such as speed, security, and global accessibility.

   There are three main types of stablecoins:
- Fiat-collateralized stablecoins, which are backed by a reserve of fiat currency, such as the US Dollar or Euro, held in a bank account or other trusted institution. Examples include Tether (USDT) and USD Coin (USDC).
- Crypto-collateralized stablecoins, which are overcollateralized with a basket of cryptocurrencies to maintain a stable value. Examples are Maker DAO (DAI) and Pax Dollar (USDP) which are collateralized by a variety of Ethereum-based assets.
- Algorithmic stablecoins, which rely on algorithms and smart contracts to maintain their peg to a specific asset or index by adjusting the token's supply according to market conditions. Examples include USD Digital (USDD) and FEI USD (FEI).

Each type of stablecoin has its advantages and drawbacks. Fiat-collateralized stablecoins benefit from the stability of the underlying fiat currency but may lack transparency and rely on central entities to manage the reserves. Crypto-collateralized stablecoins leverage the decentralized nature of blockchain but can be subject to the volatility of the underlying collateral. Algorithmic stablecoins aim to eliminate the need for collateral by using algorithms to control the token's value; however, they may face challenges in maintaining their peg during extreme market conditions. In May 2022, the value of LUNA, one of the Algorithmic stablecoins, collapsed from over $120 a

coin to effectively zero, wiping out over $50bn in market capitalization of UST/LUNA and causing over $400bn in losses for the broader cryptocurrency markets.

Most stablecoins can function as payment tokens, as they are designed to maintain a stable value and are often used for transactions, remittances, and trading on cryptocurrency exchanges. However, not all stablecoins may be explicitly designed or intended to serve as payment tokens. For example, a stablecoin designed primarily for use within a specific platform or ecosystem might have limited functionality as a payment token outside of that context. Additionally, stablecoins that are subject to strict regulatory requirements might have restrictions on their use as a medium of exchange.

Token Classification Perspectives

Technical Perspective	Protocol Tokens	Second Layer Tokens
Right Perspective	Property Right	Access Right
Fungibility Perspective	Identical	Not Identical
Transferability Perspective	Transferable	Non-transferable (Tied to identity)
Durability Perspective	Proven to withstand censorship/attack over time thus retain stable value	Unclear if it can withstand censorship/attack over time thus retain stable value
Regulatory Perspective	Easy to classify and regulate	Hard to classify and regulate
Purpose Perspective	Minted upon proof-of-certain behaviour (value creation)	Represents existing assets or access rights
Supply Perspective	Fixed Supply (from source to sink)	Unlimited Supply
Token-flow Perspective	Linear	Circular
Temporal Perspective	Expiry Date	No Expiry Date

Illustration: *Token classification perspectives (Token Economy, Shermin Voshmgir, 2019)*

Besides the four token types mentioned above, there are a few other types of tokens such as Exchange Tokens, Non-Fungible Tokens, DeFi Tokens or Decentralized Finance Tokens, Asset-backed Tokens, Soul Bound Tokens. From these, three types of tokens namely Utility Tokens, Non-Fungible Tokens, and Soul Bound Tokens are discussed below in detail.

Utility Tokens

A utility token, also known as a 'user token', serves a specific function that gives holders access to features of a decentralized application or ecosystem and forms the economy of that system. This could include a DEX, metaverse platform, or blockchain-based Web3 platform.

Utility tokens are more than just a buzzword in the burgeoning blockchain ecosystem – they are a key aspect that powers functionalities and use cases in decentralized applications.

Some Facts about Utility Tokens

- Utility tokens are the most common type of cryptographic token because the majority of the initial offerings that took place during the 2017 initial offering boom used utility tokens.
- By far the most well-known standard for creating utility tokens is ERC-20, which lives on the Ethereum network.
- Because utility tokens provide access to a product or service, their value is linked to the popularity of that product or service.
- If more people request to use the product or service, the demand for the utility tokens that allow them access to that product or service rises. As a result, the utility token becomes more valuable. In the same way, if users' interest in the product or service dwindles, the value of the utility token decreases as well.

What Is a Utility Token?

Utility tokens refer to blockchain-based tokens that have a specific use and offer utility. They are created on the blockchain and are native to the platform they are used on. They are also not considered to be financial instruments, meaning that they are not subject to the same regulations as securities.

Illustration: Utility Token

One major difference between utility tokens and other forms of cryptocurrency is that they are not mineable. Most utility tokens are pre-mined, meaning they all get created at once and then distributed in the way the project creators decide. Utility tokens are typically issued during an ICO, IDO, or IEO where investors can purchase them in exchange for cryptocurrency or fiat currency.

They are used to incentivize users to participate in a platform and to power the network. For example, a platform may require users to hold a certain number of tokens to be eligible to participate in certain activities or to access certain features. Utility tokens can also be used to reward users for completing tasks or providing services on the platform. The use of a utility token is limited to the ecosystem that it is designed for. Utility tokens are not designed as investment vehicles.

Utility tokens are not subject to the same regulations and requirements that security tokens are because they are not considered to be investment contracts. One of the most well-known examples is Filecoin, which has been designed to help users use the Filecoin decentralized data storage platform.

Given that utility tokens are used to access specific services or products within a decentralized network (blockchains), they are not considered securities and do not represent any ownership or investment in a company or asset. As a result, they are subject to less regulatory scrutiny than security tokens. The intrinsic value of utility tokens is derived from their utility within the network rather than from a claim on profits, which distinguishes them from securities. This is a crucial aspect underpinning their legality and regulatory standing.

Primary Functions of Utility Tokens

Utility tokens can serve various roles in their respective ecosystems:

1. **Medium of Exchange:** Used to purchase services or goods within the platform.
2. **Entitlement:** Grants access to specific features or benefits.
3. **Discount Mechanism:** Provides reduced rates for services or transaction fees.
4. **Stake in Governance:** Involves holders in decision-making processes via voting.
5. **Payment for Network Fees:** Compensates for transaction processing or other network services.

Differences between Security Tokens and Utility Tokens

1. Purpose: The purpose of security tokens is to raise funds for a business or project, while the purpose of utility tokens is to provide access to a product or service.

2. Legal Implications: Security tokens are considered securities and are subject to SEC regulations, while utility tokens are not.

3. Value: The value of security tokens is tied to the performance of the investment, while the value of utility tokens is tied to the demand for the product or service.

4. Investor Rights: Security token holders have rights to ownership, profit-sharing, and decision-making, while utility token holders do not have these rights.

5. Examples: Security tokens can include tokenized stocks, bonds, and real estate, while utility tokens can include tokens used to access a platform, service, or product.

Types of Utility Tokens

1. **Access Tokens -** These tokens provide users with authorization to access features or services within a given platform. For example, in a decentralized cloud storage system, users may require access tokens to store or retrieve data securely.

2. **Usage Tokens -** Users associate these tokens with the consumption of services within the blockchain system. They serve as a unit of payment for using various services, such as computing power, data storage, or bandwidth.

3. **Reward Tokens -** These tokens serve as rewards given to users for engaging in specific actions that contribute to the project's development. Such actions may include referring new users, completing tasks, reviewing products and services, and making other meaningful contributions.

4. **Discount Tokens -** These tokens offer users discounts on services or products available on the platform. Users receive rewards for holding and utilizing the tokens during transactions within the specific platform.

5. **Subscription Tokens -** Certain platforms adopt subscription-based models, enabling users to use tokens for repeated access to premium services, content, or features. These tokens facilitate a subscription mechanism within the platform.

6. **In-App Tokens -** These types of utility tokens function within specific applications built on a large blockchain platform. The tokens are applicable for use in various in-app activities, including purchasing virtual items or unlocking additional levels in a game.

7. **NFT Utility Tokens -** Non-fungible token (NFT) platforms sometimes utilize these tokens to give users access to unique digital assets, like exclusive digital art or collectibles.

The Lifecycle of a Utility Token

Design & Creation: The conceptualization of the token's purpose and technical specification. This often involves the creation of a whitepaper.

Fundraising & ICO: The token is introduced to potential investors to raise capital for the project's development.

Distribution: Post-ICO, tokens are distributed to investors, often via a crypto wallet.

Utilization: Tokens become instrumental within the platform or ecosystem for various uses.

Secondary Markets: Tokens are often listed on exchanges for trading, providing liquidity to holders.

Examples of Utility Tokens

There is a nearly limitless amount of different utility tokens, with more being created daily. Let us briefly summarize some major ones. That way, one can see some real-world examples of utility tokens and what they are used for.

LINK

Chainlink is what's known as an "oracle" or data provider that is used to connect blockchains with external data that's stored off-chain. Although blockchains are great at maintaining a secure decentralized digital ledger of transactions, they are not great at taking inputs from things happening off-chain. Chainlink helps connect blockchains to external things like fiat and credit cards, scores of sports games, and even the weather. LINK is a utility token used within the Chainlink system to incentivize node operators. These node operators help to transfer data in and out of the blockchain securely, and they get paid with LINK for their service. This is different from a lot of tokens people are probably more familiar with since LINK is not designed to be used by consumers for everyday purposes.

BNB

Binance Coin (BNB) is used mostly to pay for trading fees and transactions on the Binance exchange. Binance incentivizes users to use BNB instead of stablecoins or other cryptocurrencies by offering discounts. However, the use case for BNB is expanding, and now one can use it as collateral for loans on some platforms or even use it to pay for goods.

UNI

There are several utility tokens like Uniswap (UNI) which facilitate decentralized finance. Instead of having to deposit cryptocurrency on an exchange to trade it, one can use platforms like Uniswap to instantly trade between different currencies right in their browser. Users stake their cryptocurrency in Uniswap to provide liquidity for trades. In return, they are paid in UNI tokens.

MANA

MANA is an ERC-20 token used within the Decentraland Marketplace. It can be used to buy or trade virtual land, digital items, and other goods or services.

ADA

ADA is the native token of the Cardano blockchain. The Cardano blockchain can be used to create smart contracts and decentralized applications. Plus, it allows funds to be sent and received almost instantly with minimal fees. Cardano's goal is to solve issues of scalability, sustainability, interoperability, and other challenges that older cryptocurrencies like Bitcoin and Ethereum face. Specifically, the slowing down of networks and high fees as the number of transactions increases. ADA is used on the Cardano blockchain to pay transaction fees. And ADA holders are paid rewards for staking their ADA.

VET

VET is the utility token for the VeChain blockchain. It is used to transfer value between decentralized applications that run on VeChain's blockchain. Several major companies like PwC, IBM, Ford, Dell, Cisco, and 3M use VeChain to improve product verification and traceability.

Illustration: Utility Token Process

Utility Token Applications

The utility token applications are as follows:

- These tokens play a significant role in **DeFi (Decentralized finance)** platforms, enabling users to participate in lending, borrowing, liquidity provision, and other financial activities. The tokens work as collaterals for governance in protocol decisions and as a reward for providing liquidity.
- The tokens are vital to blockchain-based gaming ecosystems. They enable players to purchase in-game items, characters, and assets using tokens. These tokens can also represent ownership of digital assets and can be traded or used across different games.
- Blockchain platforms that focus on content creation, like blogging or video sharing, use these tokens to reward content creators. The rewards are based on engagement, views, and consumer interactions with their content.
- Patients receive these tokens as rewards for sharing their health data securely on blockchain platforms. The data assists in medical research while maintaining privacy and ownership control.
- In the travel industry, users receive these tokens for bookings, loyalty programs, and access to exclusive services. They help in promoting user engagement and customer retention.
- Some e-commerce platforms integrate these tokens to incentivize customer loyalty, reviews, and referrals, creating a more engaged customer base.

Utility Token Benefits

01

USER ENGAGEMENT:
UTILITY TOKENS CAN INCENTIVIZE USER PARTICIPATION AND LOYALTY .

02

RAPID FUNDING:
THESE TOKENS CAN BE SOLD IN AN INITIAL COIN OFFERING (ICO) OR TOKEN SALE TO RAISE CAPITAL.

03

COMMUNITY BUILDING:
TOKENS CAN FOSTER A SENSE OF COMMUNITY AMONG HOLDERS, OWING TO A VESTED INTEREST IN THE PROJECT.

04

NETWORK EFFECTS:
MORE USAGE OF THE TOKENS CAN ENHANCE THE OVERALL VALUE OF THE ECOSYSTEM .

05

DECENTRALIZATION: UTILITY TOKENS OFTEN SUPPORT A DECENTRALIZED MODEL, WHERE NO SINGLE ENTITY HAS COMPLETE CONTROL.

Issues and Challenges with Utility Tokens

Utility tokens have lots of great functionality, but they are not without their challenges as well. Here are some things to consider.

1. **Regulatory Challenges -** There are concerns about utility tokens when it comes to the regulatory authorities. There is a constant threat of government crackdowns, which could result in various utility tokens being labeled as securities. That could scare people away and hurt the projects. For a real-world example of a utility token that has run into regulatory issues.

E.g. The U.S. Securities and Exchange Commission dropped claims against two Ripple Labs executives in its lawsuit alleging the blockchain company violated U.S. securities law, according to a court filing in New York on Thursday. In its December 2020 lawsuit, the SEC accused Ripple of illegally raising more than $1.3 billion in an unregistered securities offering by selling XRP. The agency said in court papers it is dropping claims that Ripple Chief Executive Brad Garlinghouse and co-founder Chris Larsen aided and abetted sales of the cryptocurrency XRP which a judge has found amounted to unregistered sales of securities.

2. Potential for Scams - Most utility tokens would probably prefer to remain unregulated. However, being unregulated comes with its issues, including scam potential. There have been many cases of scammers creating tokens and ICOs just to make quick money before vanishing. This is commonly referred to as a rug pull in the crypto community.

3. High Transaction Fees

Many utility tokens are ERC-20 tokens that run on the Ethereum blockchain. Ether gas fees can be very high, as much as $50 or more for a transaction. The Ethereum team is working on a solution to help reduce gas prices. But in the meantime, prices may only get more expensive as more people enter the cryptocurrency space.

4. Can be used for Speculation

The sad truth is that while many altcoins are created with good intentions, they often become used first and foremost for financial speculation. Utility tokens are no exception. It can be hard for people to know how many tokens they will need to perform a transaction if prices fluctuate wildly. Some utility tokens fix this by being designed as stablecoins, meaning their price is fixed at a 1:1 ratio to some other asset.

5. Lack of Decision-Making

Utility token holders may not get to provide feedback or vote on the project's direction. All of the decisions may be centralized in the hands of founders and developers. Compare this against security tokens, which act like shares in a company and allow the holder to have a lot more say over the future of the project.

6. Success is tied to the Overall Project

A utility token is only useful if there is a larger project for it to exist as a part of. If a project doesn't succeed, then its utility token will lose all its value. There can also be liquidity problems when a project does not have the funds needed for continued development.

The Future of Utility Tokens

As project development teams are starting to realize that using fiat funds within decentralized projects is more of a pragmatic reality, rather than a betrayal of the virtues of decentralization, the need for deploying utility tokens is eventually fading. The use of NFTs as versatile, cross-chain, and accessible instruments for interaction with the blockchain also casts a shadow on the practical need for utility tokens. The ones that remain will do so largely thanks to the value they yield to their users in terms of the prominence of the issuing platform and the additional benefits they provide, as is the case with exchange tokens.

With the unstoppable development of the blockchain market, its growing adoption, and the emergence of entirely new types of digital assets, utility tokens will have to get in sync with the new reality to stay relevant.

Summing Up

Utility tokens are a testament to the versatility of blockchain technology, offering not just a means of financing but also fuelling innovation and network engagement. As blockchain continues to stretch its boundaries, the utility token's evolution will serve as a litmus test for the industry's creativity and regulation.

Non-fungible Tokens

Although the technology has been around for a while, NFTs took off in 2020 and have been growing in popularity ever since, particularly in the digital art world. NFTs have generated great excitement but at the same time have been criticized for being volatile, highly speculative, and vulnerable to scams.

NFT stands for 'non-fungible token'. Non-fungible means that something is unique and can't be replaced. By contrast, physical money and cryptocurrencies are fungible, which means they can be traded or exchanged for one another. Every NFT contains a digital signature which makes each one unique. NFTs are digital assets and could be photos, videos, audio files, or another digital format. NFT examples include artwork, comic books, sports collectibles, trading cards, games, and more.

What is a Non-Fungible Token (NFT)?

A non-fungible token (NFT) is a unit of data that lives on a blockchain. Each NFT has a unique identification code that cannot be replicated or copied and metadata that can be linked to a variety of things to provide immutable proof of ownership. For example, the metadata an NFT

contains can be tied to digital images, songs, videos, or avatars. It can also be linked to physical items, like cars and yachts, or used to give an NFT owner access to exclusive merchandise, tickets to live or digital events, or other exclusive perks.

NFTs allow individuals to create, buy, and sell things in an easily verifiable way using blockchain technology. When it comes to digital items, NFTs give creators a way to establish an item's provenance. Provenance is documentation that authenticates the creator, ownership history, and appraisal value of a particular piece of art. Before NFTs, there was no way to verify the creator and ownership history of digital works. NFTs are also best described as a "certificate of authenticity" issued by the original creator on the blockchain. As blockchains are public, NFT collectors don't have to worry about counterfeiting the same way collectors of physical art do.

Characteristics of NFTs

Uniqueness –NFTs are unique and cannot be replicated on the blockchain and ownership lies with any one person at any point in time.

Rarity – NFTs also tend to be rare, which is what contributes a majorly to the value associated with them. Since there can be only one piece of each NFT to ever exist, it makes them valuable.

Indivisibility – this is one of the foremost characteristics of non-fungible tokens and NFTs are tailored in such a way to be indivisible by default to serve their utility. One real-world example to relate is: that one cannot buy a place ticket and divide it between two people because there is only one seat allocated for one of those tickets, it is indivisible.

Authenticity – this is another critical trait of non-fungible tokens and has gained much attention in recent times. Non-fungible tokens today provide representation for real-world objects, and thus is important to have authentic NFTs.

Thus far NFTs are often associated with digital art, where an NFT represents a unique image that is owned by a specific wallet on the blockchain. This has been a very speculative asset class in web3 during the past couple of years. However, the applications of NFTs are far broader than this, as an NFT can be used to represent any unique real-world or digital asset. The Cryptopunks and Bored-Ape Yacht Club NFT projects are the best-known NFT projects. One of the features that makes them so popular is that royalties are enforced by the smart contract that manages the token. This means that every time an NFT changes hand, it is possible for a percentage of the sale price to be passed to the original creator of the NFT as a royalty.

In the long term, whilst there will still be digital art NFTs, this will be a small component of a much larger market.

Which assets can be tokenized?

While new use cases for NFTs are being proposed and implemented daily, here are some of the more commonly seen uses:

Physical Assets: Offline collectibles use NFTs to prove ownership and authenticity of physical assets, such as valuable art, watches, jewelry, sneakers and even fine wine. Other use cases might represent fractional owner of real-estate or other real-world asset.

Digital Assets: Digital assets commonly associated with NFTs include videos, photos & audio files. NFTs can also be used to prove ownership and authenticity for Online digital collectibles, such as a skin or weapon in an on-line game or an asset in a metaverse, where only one's avatar has exclusive use of that object.

Negative Assets: NFTs can also be "negative value" assets such as loans, burdens and other responsibilities.

Credentials: NFTs can also be issued as ticket to an event or credentials, such as a degree. As a matter of fact, CFI uses NFTs to prove that learners have completed a course, specialization or accreditation.

History of Non-Fungible Tokens (NFTs)

As sometimes happens with innovative technology, NFTs did not just come out of the blue and become popular overnight. It leads to the question of when the first NFT came into existence. According to some, Colored Coins, which was initiated in 2012, has the honor of being the first NFT. In the words of investor Andrew Steinworld, he said that one might argue that the Colored Coins were the NFT that first came into existence. Colored Coins exhibited a major leap in the capabilities of Bitcoin, however, they had a downside too. They could represent only some values if their worth is agreed upon by everyone. The scripting language of Bitcoin did not enable this type of behavior within the network it is in. Some argue that "Quantum" NFT by Kevin McCoy minted on the Namecoin Blockchain on 2nd May 2014 is the first rightful owner of an NFT title.

NFTs only started to gain mainstream momentum in 2017, when the first NFT collections were launched on the Ethereum blockchain. A project called "CryptoKitties" by Dapper Labs on Ethereum was the implementation of NFTs widely recognized as the first of its kind. Although it was not the first NFT project on Ethereum, CryptoPunks stands as of the most popular of these early collections and helped truly kick off the crypto art movement.

The next four years were filled with a bevy of niche project launches across a wide range of blockchains. Then 2021 rolled around, and things really took off.

Two catalysts helped start the 2021 bull run. The first was the COVID-19 pandemic. It caused individuals worldwide to become more digitally native, and platforms like Twitter and Clubhouse quickly became Web2 bastions for Web3's most excited builders. The second is Beeple, who became the first creator to sell an NFT with a major auction house. Christie's auction for Beeple's "Everydays — The First 5000 Days" closed for $69 million, and NFTs could no longer be ignored.

As mainstream adoption increased, so did the sales volumes and price points. This led to an explosion of interest from companies and brands looking to launch their own NFT projects. Early adopters include brands like Coca-Cola, Taco Bell, Hot Wheels, and Adidas.

Properties of NFT

- NFTs cannot be divided into smaller parts while retaining their inherent qualities. This distinguishes them from fungible tokens like a pound note, which can be subdivided into pence.
- When an entity mints NFT, it can sell to a new entity that can become the owner of that NFT. But, depending on a specific set of circumstances, smart contract rules may be utilized to restrict or stop further token transfers.
- Though an NFT has specific properties when it is created, those properties can be updated over time through smart contracts when certain conditions are met; this is akin to a 'pass the parcel' game where a parcel loses a layer of wrapping every time the music pauses.

Why people own NFTs?

The demand for NFT art has exploded recently. However, there is still a lot of skepticism. After all, NFTs are generally tied to digital files. Here are some of the main reasons why people own NFTs.

1. **Empowers Artists**

Publishers, producers, and auction houses often strong-arm creators into contracts that don't serve their interests. With NFTs, artists can mint and sell their work independently, allowing them to retain the IP and creative control. Artists can also earn royalties from all secondary sales of their work. In this respect, NFTs have the potential to create fairer models by bypassing the gatekeepers that currently control creative industries, and many individuals buy NFTs because it's a way of empowering and financially supporting the creators that they love.

2. **Collectability**

Despite costing less than 5 cents to make, a 1952 Mickey Mantle rookie card sold for $5.2 million. This happened because of the history, rarity, and cultural relevance of the card. NFTs are, in many ways, the digital version of this. For individuals who want to build a collection of

digital assets, NFTs offer a unique opportunity that hasn't existed outside of traditional collectibles and art markets ever before.

3. Investment

Some NFT owners simply want an asset that will increase in value. In this respect, some collectors treat NFTs as an investment — much like traditional art. Want proof? Mike Winkelmann, a prominent American digital artist known professionally as Beeple, sold his Everydays: The First 5000 Days composite at Christie's for $69 million in March of 2021.

This may seem strange to some, as everyone can see and interact with the image. However, as noted, there can only be one NFT owner. For some, this is enough. Yet, market volatility makes NFT investment a high risk, with the potential for major losses.

4. Community

NFT Ownership also comes with social benefits, as many creators have turned their NFT projects into vibrant communities. The Bored Ape Yacht Club is, perhaps, the best example of community building in relation to an NFT project. Collectors get access to a members-only discord, exclusive merchandise, a vote in the future of the project, tickets to virtual meetups, and more. As such, for many collectors, owning an NFT how they socialize with friends and a matter of identity.

How do NFTs work?

Non-fungible tokens or NTFs are cryptographic assets which sit on a blockchain – that is, a distributed public ledger that records transactions. Each NFT contains unique identification codes that distinguish them from each other. This data makes it easy to transfer tokens between owners and to verify ownership.

NFTs hold a value which is set by the market – i.e., supply and demand – and they can be bought and sold in the same way that physical assets can. NFTs are digital representations of assets – and can also represent real-world items such as artwork and real estate. Tokenizing real-world tangible assets in this way is considered by some users to make buying, selling and trading them more efficient, as well as potentially reducing the likelihood of fraud.

What is an NFT marketplace?

The NFT landscape is evolving, but typically, most NFT marketplaces fall into one of these three categories:

Open marketplace – Anyone can sell, buy or mint NFTs. Minting refers to the process of uniquely publishing their token on the blockchain to make it buyable. Open marketplaces typically mint NFTs, though creators can also mint their own works.

Closed marketplace –Artists must apply to join and the marketplace usually undertakes the minting processes. Selling and trading are more restricted.

Proprietary marketplace – A marketplace which sells NFTs trademarked or copyrighted by the company operating it.

Some NFT traders create accounts on and subscribe to a variety of marketplaces so they can receive announcements about new NFT drops. Information about new NFTs is also shared on platforms such as Discord and Twitter, as well as more specialized investing platforms like Rarity Sniper and Rarity Tools. When highly anticipated NFTs are released, investors tend to act quickly.

Most marketplaces offer step-by-step guides which help users understand how to use them. Once someone has created a marketplace account, one should connect their wallet to the marketplace. Some marketplaces allow people to set up a new wallet from within the website, or they use their own proprietary wallet. Using a marketplace's proprietary wallet might come with discounts or a reduction in the additional fees incurred by using external wallets.

Examples of NFT Marketplaces

There are dozens of NFT marketplaces. Examples include:

OpenSea: One of the largest NFT marketplaces, OpenSea, offers NFTs in a number of areas – art, music, fashion, sports, games, and collectibles. The site also offers various learning resources for users.

NBA Top Shot: An NFT marketplace where sports fans can trade basketball video clips. NBA Top Shot has a large community of followers, and contests and challenges provide a social aspect.

Nifty Gateway: Nifty Gateway offers collections from well-known multi- and mixed-media, video, fine art and animation artists. The site is aimed at buyers whose goal is to collect or trade art with long term value.

Rarible: An Ethereum-based platform that facilitates the creation, sale, and purchase of ownership rights to digital works of art via NFTs.

Benefits of NFTs

Some benefits that NFTs bring to the table for creators, collectors, and users alike include:

Enhanced Security and Trustworthiness: NFTs provide a secure and reliable method for establishing ownership and authenticity of digital assets, ultimately fostering trust among users.

Distinct Digital Signatures: By using unique digital signatures, NFTs enable clear ownership, easy transfer, and authentication on a blockchain, ensuring a seamless experience for users. This means that once an NFT is transferred to another holder there is no opportunity to copy and ownership is transferred wholly and fully.

Uncompromised Protection and Public Verifiability: NFTs are tamper-proof and can be verified publicly using blockchain technology, adding a layer of security to digital assets.

Versatile Smart Contracts: NFTs leverage the power of smart contracts to create highly customizable tokens with specific rules and conditions, granting various rights and usage options to their owners, such as royalties and access to exclusive content.

Programmable: An NFT can be programmed to give its owner certain rights, such as the right to showcase it publicly or the right to sell it. These rules and conditions are written into the smart contract and are enforced automatically when certain conditions are met.

Disadvantages Of NFTs

While NFTs have gained considerable attention and offered unique opportunities in the digital world, it is important to consider the significant drawbacks and risks that come along with them:

Unpredictability of profits: The profitability and scalability of NFTs are uncertain, with some selling for millions, while many others failing to generate substantial revenue.

Fraud and scams: The NFT market is heavily susceptible to fraudulent activities, as scammers create fake NFTs to deceive buyers into purchasing worthless assets. Therefore, it is important to carry out due diligence on NFTs under consideration before purchasing them.

Lack of regulation: The absence of clear regulations and guidelines makes it challenging to hold bad actors accountable for their misdeeds and ensure transparent and fair transactions.

Accessibility and exclusivity: Because NFTs can be pricey, they may impose entry hurdles that restrict access for some people or groups. This exclusivity could exacerbate wealth inequality in the market for digital art and collectibles by concentrating ownership and wealth in the hands of a select few.

Navigating intellectual property (IP) rights: While an NFT purchase implies ownership of the token, it does not necessarily mean IP rights of the digital asset are transferred between owner and the anonymous party during a transaction. This may create complex issues surrounding ownership, especially when transactions involve said anonymous parties.

In light of these risks and uncertainties, potential investors and creators should carefully evaluate the pros and cons of NFTs before venturing into this emerging market.

SoulBound Tokens

Introduction

Alongside crypto tokens and non-fungible tokens, SoulBound tokens are the latest form of blockchain-enabled decentralized assets. They are the latest addition to the league of blockchain enabled token development. SoulBound tokens can even outperform the NFTs and unlock new opportunities for the developers and the consumers.

The term "soulbound tokens" was coined by Vitalik Buterin, founder of Ethereum, in his popular blog post Soulbound — applying it in the context of the blockchain and what non-transferrable NFTs can enable. Vitalik's blog discusses the concept of "soulbound" items in popular games like World of Warcraft, and how the same can be applied to NFTs for provenance and reputation on the blockchain. In World of Warcraft, Soulbound items are powerful items that cannot be transferred or sold to another player. These items typically require completing a quest or defeating a powerful monster, and they are a key aspect of the game's mechanics. This keeps the game challenging, and ensures that players must actively participate in difficult task to obtain the best items.

What are SoulBound Tokens?

Soul Bound Tokens are non-transferable digital identity tokens representing the individual's unique identity. These tokens incorporate unique traits, characteristics, or background which may include the person's education history, medical history, work records, or the other type of information that solely belongs to that entity- all encapsulated within the secure confines of blockchain wallets known as "Souls."

There are two distinct categories of SBTs:

Self-Certified SBTs: These tokens contain personal information that individuals consider relevant to share within their networks.

Soul-Issued SBTs: In this context, "Souls" represent institutions, companies, and other individuals capable of issuing SBTs as proof of credentials, affiliations, or memberships.

In other words, SoulBound token is a non-transferrable, unique blockchain asset that stores an individual's, an organization's or any form of entity's metadata of identity and credentials. Like all blockchain tokens, these are too backed by cryptography. The SBT stores the identity and credentials metadata for identity cards, medical records, employment records, criminal records (if any), academic records etc. This data is immutable and cryptographically stored. A wallet that stores these records is known as a Soul.

Significance Of Soul Bound Tokens in Real World

A person can possess multiple SBTs, each representing aspects of their lives in the digital realm. Let's take an example of "Education" Soul, which securely stores student credentials, degrees, and attendance records. Similarly, the "Medical Records" Soul helps people keep track of their past medical history. When combined with Soul Bound Tokens (SBTs), these Souls enable individuals to build a trustworthy digital reputation in the Web3 ecosystem, rooted in their past actions and experiences, significantly boosting their overall credibility.

When discussing entities, Souls serve as the representatives responsible for allocating SoulBound Tokens (SBTs). In this particular context, SBTs contained within a single Soul can undergo validation or issuance by other Souls, which serve as reliable counterparts within this network. These counterpart Souls can encompass various types of entities, including businesses, individuals, or organizations.

To illustrate this concept, consider business organizations as "Souls" that issue SBTs containing work experience details to employees who have their own Souls. These work experience details are added to the employee's "Credential" Soul, which holds information about their previous work experience and educational qualifications.

Working Of Soul Bound Token: While there are currently no formal specifications for SoulBound tokens (SBTs), Vitalik and his colleagues' whitepaper provides valuable insights into their fundamental functioning. One notable and distinctive feature of SBTs is their inherent non-transferability.

In contrast to commonly known tokens like non-fungible tokens (NFTs) and token standards such as fungible ERC-20 or non-fungible ERC-721, SoulBound tokens are intentionally designed to lack any market value. As a result, they are non-transferable to different wallets.

Here is how one can create a Soul Bound Token

1. Proto-Soulbound NFT: One approach involves the creation of a Proto-Soulbound NFT, which can issue or invalidate SBTs for other wallets.

2. Multi-Sig Community Wallet: Another method is establishing a Multi-Sig Community wallet that can issue SBTs to community members. Additionally, it holds the authority to revoke or recover SBTs if they are lost.

3. Proto-Souls and Direct Issuance: Creating Proto-Souls or Proto-Wallets provides another avenue to directly issue SBTs to other Souls or wallets.

However, it is important to note that once received, a Soulbound Token cannot be transferred, although it may be revocable by the issuer. Once these tokens enter a person's wallet, they remain bound to them indefinitely. The sole entity with the power to burn a Soulbound Token is the issuer.

Functions of Soulbound tokens

Soulbound tokens serve a versatile range of functions, including but not limited to:

1. **Proof of Ownership:** Utilize your token to assert your ownership of an item, such as an NFT.
2. **Proof of Attendance:** Demonstrate your presence at a specific place or event using your tokens.
3. **Proof of History:** Employ Soulbound tokens to establish the existence of an item at a particular moment in time.
4. **Proof of Presence:** Verify your attendance at a particular event through Soulsbounded tokens.
5. **Digital CV:** Construct a digital curriculum vitae by accumulating and showcasing a series of SBTs from various employers. This forms a robust resume, providing a comprehensive employment history.
6. **Academic Records Management:** Colleges and universities may issue SBTs to their students, simplifying the process of verifying enrollment for future employers. This has the potential to significantly reduce fraud across multiple industries.
7. **Uncollateralized DeFi Lending:** Explore the option of using your Soulbound tokens as collateral for lending against unsecured assets.
8. **Certification and Documentation:** Leverage Soulfound tokens to certify documents and offer concrete proof of your existence.
9. **DAO Governance:** Participate in the governance of DAOs by utilizing your SOUL tokens to vote on proposed initiatives and decisions.

Use Cases of SBTs

The scope of SoulBound token projects covers and is not limited to the following:

Verifiable Credential

Just like in the real world where society heavily relies on social signalling, the essential components for constructing a digital identity incorporate trustworthiness, social value, and reputation. This is precisely why one of the most promising applications for SoulBound tokens lies in the realm of "verifiable credentials." These tokens serve as a robust means of verifying an individual's identity, attributes, expertise, and qualifications. Although the issuance of digital credentials is not a novel concept – educational institutions routinely provide digital credentials to students to showcase their knowledge in specific fields – it can often be challenging to ascertain the authenticity of these credentials. Consider the example of LinkedIn, where individuals can freely add multiple employers to their profiles. This open system creates opportunities for malicious actors to masquerade as members of reputable organizations, leading to a prevalence of identity scams on such platforms. Fortunately, If the credential details are stored on the Blockchain network, the data becomes verifiable and immutable.

Moreover, the records are permanent with details about the tokens like the issuing date, or transfer details. Token provenance makes sure that the certificates are given by an authentic organization or institution, so there is no chance for fraud scams. Therefore, the Soul-bound tokens unlock verifiable credentials allowing tokens to represent any valuable information from certificated to educational records.

Governance Rights and Delegated Authorities

NFTs have gained significant traction in granting governance rights and delegated authority. However, in the context of systems like DAOs, the transferability of these NFTs presents significant challenges for two primary reasons:

- The transferability of governance rights contradicts the very essence of a "decentralized" governance system. It opens the door for concentrated interests to accumulate governance rights from others, potentially undermining the system's ability to reflect the majority consensus effectively.
- Transferability of governance rights can introduce the risk of disinterested or unqualified individuals gaining access to the system and acquiring governance rights without a genuine commitment to the community's well-being.

To mitigate such problems, Soul Bound tokens can be used to make the governance right non-transferable or conditional on participation- with revoking capabilities in case the user loses access to their wallets or contributes to something that does not match the community interest.

Non-transferable voting rights serve to create more democratic governance structures for everything from a CityDAO with evenly distributed voting power that is tied to residence in the city, to blockchain ecosystem protocols that require active participation by DAO members.

Your Customer (KYC) Enhanced by Binance's Soul Bound Token

Binance introduces the innovative Soul Bound Token (SBT) to revolutionize data privacy and security concerns associated with KYC processes. Here's how it works: Imagine a person hold BAB tokens. These tokens empower account holders to seamlessly complete their KYC verification. Moreover, these tokens double as proof of verification stored securely in wallets, elevating security and trust levels in the world of DeFi finance while safeguarding user information. KYC Tokens serve as formidable tools for financial institutions to combat fraudulent activities and deter bots from accessing financial services. They might even facilitate the provision of flash loans with minimal collateral requirements. In essence, Soul Bound Tokens strike an ideal balance between user privacy and regulatory compliance. They are non-transferable, serving as digital KYC credentials.

Innovating Credit Scoring with Soul Bound Tokens

Decentralized finance (DeFi) champions the empowerment of individuals who lack trust in traditional institutions. Soul Bound Tokens introduce a fair scoring system: Conventional credit

scoring methods often exhibit bias against individuals with lower incomes or marginalized backgrounds, individuals without traditional credit histories. By allowing individuals to establish transparent financial transaction records through SBTs, DeFi platforms can extend uncollateralized loans to a wider demographic, reducing racial biases in credit scoring and promoting fairness.

Bot and Spam Mitigation on Social Media Platforms

The proliferation of automated bots on social media platforms poses significant challenges. These bots manipulate public discourse, spread misinformation, and employ deceitful strategies to extract personal information from unsuspecting users. Soul Bound Tokens offer a solution by enabling the creation of authentic "human-only" social media platforms. Users must verify their digital identity through mechanisms like Ethereum Name Service (ENS), similar to platforms such as Lens and Farcaster, which effectively exclude bots by linking digital identities to user accounts.

Ongoing efforts are underway to develop proof-of-humanity or proof-of-personhood using SBTs. This approach promises a more reliable and open digital environment while protecting user privacy for those who prefer online anonymity.

Enhancing Electronic Government Voting with Soul Bound Tokens

Replacing traditional voting methods with fully electronic systems has proven challenging due to concerns about errors and potential interference. Leveraging blockchain technology, Soul Bound Tokens offer a promising solution: Under this system, each voter receives an SBT, equating to one vote. Only those holding the specific token can cast their votes. For larger jurisdictions, voting could extend to include holders of municipality-specific SBTs within that area.

SBTs streamline the electronic voting process and offer flexibility, accommodating regional preferences with both on-chain and off-chain voting methods. On-chain voting records votes directly on the blockchain while preserving voter anonymity through zero-knowledge proofs.

Web3 Games

Returning to the inception of this idea, Vitalik found inspiration for non-transferrable NFTs in the web3 use cases by drawing parallels with the concept of "soulbound items" seen in popular video games such as World of Warcraft. These items are exclusively obtainable through challenging in-game tasks and cannot be acquired through monetary purchases. This very same notion can be extended to in-game items within the web3 gaming realm. As the web3 gaming ecosystem continues to expand, an ongoing conversation revolves around the transformation of in-game items into NFTs, granting players full ownership and enabling activities like buying, selling, and trading them on open marketplaces.

However, what about items that can only be achieved through in-game accomplishments, rather than being available for purchase? This mechanic holds significant importance in many games as it fosters online social recognition based on achievements, rather than purely financial transactions. Hence, the concept applied to the scenarios described above can also be employed for in-game items, ensuring that they remain the exclusive property of a single player, ineligible for trade, and serving as a testament to the player's in-game skill or achievements.

For instance, projects like DeQuest, Ever Game, and X-Borg utilize NTSTs as badges and tokenized trophies for their communities and supporters.

Healthcare Records Management

Blockchain-based tokenization has already proven its effectiveness in addressing key issues of the healthcare landscape. At times patients and physicians had to spend a lot of time tracing medical history, validating identity, validating medical certificates and prescription slips and others. No matter whether crypto tokens and NFTs have done a great job by putting data on the chain, these are still exchangeable tokens, which may not be good for data as sensitive as healthcare. SBTs would settle the issue once and for all by putting every individual's medical records in a Soul.

Tickets and POAPs

The Proof-of-Attendance-Protocol (POAP) NFTs are given to attendees at events. Ticketing, as we know, is a popular application of NFTs. Given all the limitations that NFTs have, SBTs provide a more secure tokenization solution. They are non-transferable and could eliminate ticket scalping, selling in black and forging. To put it simply, just holding a ticket Will not prove that the user attended an event. Building non-transferable POAPs proves that the original owner of the ticket attended the event.

SBTs have a wide range of potential use cases. Some examples that could potentially find use in everyday life are mentioned above.

Applications of SBTs

1. NFT Ownership

The major difference between NFTs and SBTs is the latter's non-transferability. However, they can still be used as provenance for NFTs. Let's take an example. In most cases, creators mint NFTs on a centralized marketplace like OpenSea. In any scenario when the marketplace suffers a downtime, it could result in a loss of content and even tokens as happened in an event earlier this year. Such a dependency to prove the ownership of their digital assets is still not perfect. SBTs, on the other hand, address this issue. Since creators will be able to mint NFTs from their blockchain Soul wallet, it automatically validates the ownership of the NFT by the user account details stored in the wallet. Likewise, this could elevate the adoption of SoulBound NFTs in near future. For artists and others, this is a far better method to prove their ownership.

2. Souldrops

The development of new crypto projects generally involves a community effort with the creation of new communities. Crypto projects can launch airdrops alongside conducting different token sales. However, the process is generally associated with Sybil attacks, with whales consuming the majority of the drops. On top of it, airdrops cannot reach the target community. SoulBound tokens can solve the problem by ensuring airdrops based on details and analysis of SBT on the Soul of a user. For instance, projects focused on enhancing sustainability could ensure the airdrop of governance tokens to Souls with tokens verifying their association with various sustainable activities.

3. Uncollateralized loans – Provable Reputation

SBTs could track a user's DeFi borrowing history as well as other metrics that determine their risk profile. As we know, all assets in web3 are tokenized, transferrable and hence work as collaterals. The absence of uncollateralized loans is one of the major drawbacks of existing DeFi. On the other hand, the traditional financial system uses centralized credit scores to qualify a borrower. Soulbound tokens provide a solution that not only supersedes the traditional system but also provides solutions for uncollateralized loans. Here is how it works – a loan could be represented through an SBT which is further stored in the borrower's Soul wallet. The wallet could be previously held the user's identity docs, financial history etc. Such a non-transferable asset works as reputation collateral until the borrower has repaid the complete amount. Subsequently, a NOC or any other proof of burn replaces the token. Moreover, non-transferability prevents the borrower from misusing the loan amount or hiding details about previous unpaid loans.

4. Soul-backed DAOs

As we know, DAOs are organizations governed by a community and smart contracting while eliminating the need for human leadership to take error-prone decisions. Despite the promising potential in the web3 realm, DAOs are always at risk of Sybil attacks. Sybil attacks are attacks wherein a single user creates multiple wallets to manipulate voting power. Here, the attacker could either be an individual or a group of individuals who illegitimately accumulate governance tokens in abundance for one-sided voting results. DAOs can use SBTs to validate the voters and if foul play wherein Souls is supporting a vote has a relation. No matter if this requires an intelligent algorithm, we expect this to be a popular application. Decoding a Soul's SBT structure to differentiate between legit Souls and bots. Subsequently, disqualifying Souls that may seem to be Sybil. Giving more voting power to Souls only those who have more recognized SBTs such as academic records, licenses, certificates and employment history. SBTs with proven success can be used as a reference for other DAOs to establish security protocols against Sybil.

What happens if someone lose their Soul? The Social Recovery Model

Loss of storage such as wallets or keys has been a continuous concern for all blockchain assets. Like NFTs, SBTs could also be vulnerable to rampant thefts. Developers are concerned about safeguarding confidentiality by preventing bad actors from identity theft. In their first paper on SBTs, Buterin and his team proposed a social recovery model meant for community-wide adoption. Here, users could appoint or nominate specific individuals or institutions as 'guardians'. When in doubt, the 'guardians' could access and change the private keys of the user's Soul wallet. The model implies that recovering the Soul's private keys would require consent from any member of the qualified majority of the Soul's respective community.

Benefits of Using Soulbound Tokens

Liberation from Centralized Services: In the current landscape, most services are centralized, allowing companies to access and exploit our data for various purposes. With SBTs, individuals regain control over their personal information. Users autonomously manage their data, deciding who has access and for what purposes.

Non-Tradability and Non-Transferability: Distinguishing themselves from NFTs, which are easily traded and accumulated, SBTs require effort to obtain. Their true value lies in purposes beyond profit, such as bolstering one's reputation, enabling access to loans, and participation in specific projects.

Document Authentication: Soulbound tokens incorporate digital verification and document storage, benefiting both individuals and institutions. Documents become effortlessly portable, and their authenticity verification process for agencies becomes expedited.

Augmented Trust in the Decentralized Realm: SBTs empower members of the decentralized society to assess each other's reputations, fostering greater trust among peers than what casual interactions on social media or digital projects can offer

Ownership Verification and Authenticity: Soulbound tokens offer a robust means of verifying ownership and ensuring the authenticity of digital assets, mitigating the risk of counterfeit or fraudulent tokens.

Creation of Unique and Rare Assets: Soulbound tokens enable the creation of one-of-a-kind, rare digital assets, granting collectors and enthusiasts the opportunity to possess exclusive items within the digital realm.

Enhanced Scarcity: By limiting the supply of soulbound tokens, they introduce an element of scarcity, potentially increasing their value and appeal among collectors and investors.

Immutable and Transparent Transactions: Operating on blockchain technology, soulbond tokens guarantee immutable and transparent transactions, fostering a high level of security and trust among participants.

Limitations of SoulBound tokens

It's early days for SBTs and it comes with its disadvantages. Currently, SBTs is facing following challenges:

Lack of Standardization and Interoperability: The concept of soulbound tokens is still emerging, resulting in a lack of standardization across various platforms and ecosystems. This can lead to fragmentation and interoperability challenges. Like most NFTs, SBTs are often created on specific blockchains which can limit their flexibility and potential for use in applications outside of the chain it lives in. This is partially solved by the integration of EVM-compatible chains on popular web3 apps — and if most users stay within one blockchain ecosystem.

Limited Use Cases: Currently, soulbond tokens primarily find use in collectibles and digital art, with broader adoption in other industries expected to take time due to the technology's early stages.

Market Volatility: Soulbound tokens can be susceptible to market volatility, leading to price fluctuations and financial risks for investors.

Scalability Concerns: As the popularity of soulbound tokens grows, scalability becomes a pressing issue. Blockchain networks may encounter difficulties in handling the increased demand and transaction volume, potentially resulting in performance issues

Privacy: Because these tokens are tied to a specific individual, they can be used to track and monitor that person's online activities. Technological advances for great anonymity on the blockchain, such as zero-knowledge proofs, will mitigate this.

Security: If a user's non-custodial wallet gets hacked, bad actors can use the soulbound tokens within the account — especially those with exclusive access or governance rights — to act against the user's best interest, and that of the communities that they are a part of. This can be solved by storing assets in custodial wallets, or vaults.

Non-transferability: While non-transferability enables a lot of positive things, it can also be a double-edged sword. If a token is non-transferable, then it can cause problems if issued to an unwilling recipient. This can be fixed by better permissioned front-ends being built on top of the blockchain, enabling all of the benefits of SBTs while also allowing users to hide or remove SBTs from their profile.

Adoption of SBTs will require ironing out these issues — but if done correctly, SBTs can help create a fairer, yet privacy-focused digital society.

What is the difference between SBTs and NFTs?

SBTs as non-transferrable NFTs. However, both NFTs and SBTs have totally different purposes except protection of user confidentiality in web3.

Metric	SBTs	NFTs

Purpose	Proof of identity	Proof of ownership of assets
Recovery	Can be recovered via a social recovery model	Cannot be recovered
Transferability	Non-Transferable	Transferable
Buy/Sell	No. Bound to Soul	Yes Marketplaces
Example	Tokenizing academic qualification records	Tokenizing real-estate records

Soul Bound Token: The Future of Decentralized Society

Soulbound tokens are still in development and will not see full-scale adoption until 2024. Nevertheless, their potential impact on a decentralized society is immense, with countless yet-to-be-imagined applications. While practical uses like streamlining the hiring process, simplifying mortgage applications, and enhancing medical records management are already in progress, the possibilities for SBTs in mainstream society are boundless.

Soulbound tokens play a pivotal role in supporting a decentralized society by facilitating efficient data management and ensuring the accurate transfer of information. Moreover, they hold the promise of promoting fair social scoring systems, mitigating discrimination, and preventing abuses. Shortly, we might see SBTs being used to assist individuals in college applications, contractor selection, job candidate evaluation, charity organization selection for donations, and much more.

In a Web 3.0 society, individuals gain direct control over their data, enabling swift and precise data exchange. As soulbound token technology continues to evolve and becomes commonplace, it will lead to enhancements in privacy, speed, equality, and various other aspects of our digital lives.

1. **Proto-Soulbound NFTs:** These NFTs can create and manage SBTs, issuing or revoking them to other wallets as needed.
2. **Multisig Community Wallets:** These wallets can issue SBTs to community members and also can revoke or recover them if they are lost.
3. **Proto-Souls and Proto-Wallets:** SBTs can be issued directly to other Souls or wallets.
4. **Whitelist Passes:** NTSTs can be offered as whitelist passes to community members who actively contribute to a project and its community.
5. **Identity Documents:** SBTs can serve as digital citizenship passes or identity documents, such as driving licenses, passports, and voter IDs.
6. **Defi Lending:** SBTs can revolutionize decentralized finance (DeFi) lending:
7. **Social-Credit Score:** DeFi protocols can issue loans based on Soul's real-time relationships across different communities, replacing the need for upfront collateral with a reputation in the form of SBTs.

8. **Soulbound NFTs:** These non-transferable non-fungible tokens (NFTs) or non-transferable social tokens (NTSTs) are gaining attention, with Vitalik suggesting their importance in the Metaverse. They can be awarded as achievements for completing specific tasks, similar to how Guinness World Records recognizes achievements.
9. **Loan Representation:** Loans and credit lines can be represented as non-transferable but revocable SBTs, simplifying the lending process.

Summing up

Nevertheless, SBTs can only gain momentum when there is a rise in adoption by the bodies and institutions that issue them. So, for example, schools, recruiting companies, and event organizers are all prime examples of entities where SBTs might become relevant. Which can only happen once they have the infrastructure to interact with tokenized assets. Since web3 assets are gaining widespread momentum, expect the SBTs to outperform NFTs.

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