

NFT and Tokenization of Real World Assets

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Non-Fungible Tokens

- First, what does token mean in the context of BlockChain?
- Eg.: You draw a beautiful picture on your computer
- Your drawing is unique! Well appreciated by all
- But You Can't Patent it nor Copyright it. How do you protect it?
- But what makes it unique?
 - First of all, you, the artist.
 - The date of your drawing.
 - The technique (tools, medium, and etc.)
 - you used to draw Your drawing is unique!
 -and so on

Tokenization

- To protect and promote your drawing,
- you can record all this proof in a book on internet
- (a "virtual register") and
- create a kind of "ID card" of your drawing.

A Friendly
Robot Capsule

Created by:
BKM



A Friendly Robot Capsule

Created By: Dr BK Murthy

Contact: bkm@meity.gov.in

Date: 02.02.2024 at 11.00 am

Website: <https://www.bkm.in>

Cost: Rs.100

NFT

- But not on any book!
- On a book (called "Blockchain") written with "indelible ink" , on which everybody can write but nobody can delete anything
- And to easily find your drawing in this book, you will add a number. <BKMDW5637892>
- Well, all your drawing info in this book is called a token!
- To access your drawing, you need to have access to this token that allows you to get all the info, and tells you where this image is hosted - mostly on a website and is available for cost
- Then what is non-fungible?

Fungible and Non-Fungible

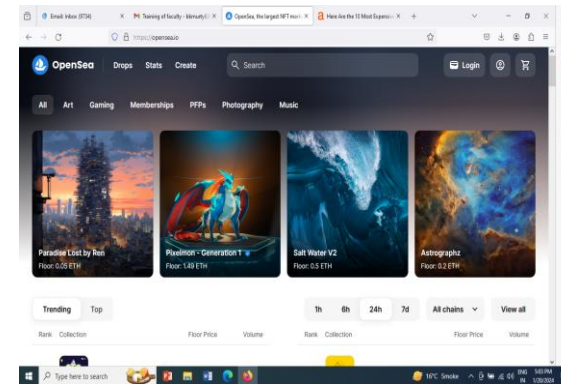
- Some thing Fungible means it can be replaced by identical thing.
- Rs. 500 note can be replaced by identical note which is not fake and has same value
- But the drawing is not fungible
- Any other similar one is either different or fake
- So, a Non-Fungible Token is a tool to guarantee the private property of a digital work
- You are the owner of the drawing you made, and the NFT proves it.
- Now that you have created your NFT, you can sell it if you want!



NFT

- An NFT in its most simple form is a piece of artwork (or, more generally, any Digital Asset) with a form of digital signature
- There are many such digital arts available in the form of NFT. They contain their Signature on them and Experts can verify which piece is real.
- But how can a digital artist sign their work if everything can be copied and pasted across any site?
- This is where the blockchain comes in.

NFT Examples and Platforms



OpenSea

NFT Example

NON FUNGIBLE TOKEN
REAL WORLD | DIGITAL WORLD

AUTHOR

ART PIECE

PLACE

PLACE

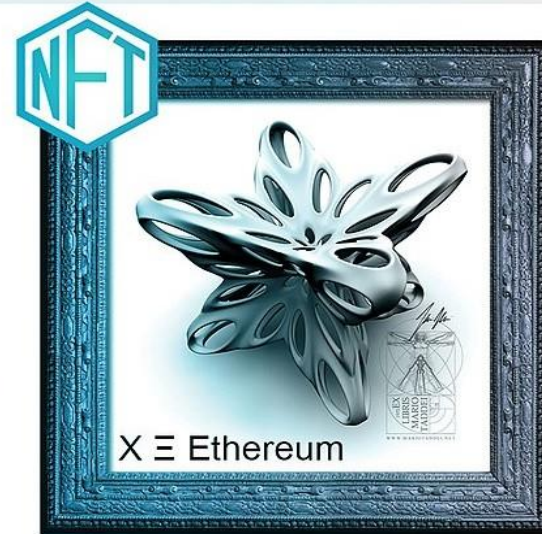
ART PIECE

AUTHOR

Leonardo da Vinci



The Louvre



Mario Taddei

REAL UNIQUE SUBJECT - NON FUNGIBLE

NON FUNGIBLE - DIGITAL UNIQUE SUBJECT

REAL MONEY CASH or BANK - FUNGIBLE

FUNGIBLE - DIGITAL MONEY - BLOCK CHAINS



FIORINO - EURO -

DOLLARS



BITCOIN - ETHER - LITECOIN - BlockChain\$

Non-Fungible Tokens

- Non-fungible tokens (NFTs) are assets that have been tokenized via a blockchain.
- Tokens are unique identification codes created from metadata via an encryption function.
- These tokens are then stored on a blockchain, while the assets themselves are stored in other places.
- The connection between the token and the asset is what makes them unique

NFT Trading

- NFTs can be traded and exchanged for money, cryptocurrencies, or other NFTs
- It all depends on the value the market and owners have placed on them.
- For instance, you could draw a smiley face on a banana, take a picture of it (which has metadata attached to it), and tokenize it on a blockchain.
- Whoever has the private keys to that token owns whatever rights you have assigned to the token.

How Does NFT work?

- NFTs are created through a process called minting, in which the asset's information is encrypted and recorded on a blockchain.
- At a high level, the minting process entails a new block being created, NFT information being validated by a validator, and the block being closed.
- This minting process often entails incorporating smart contracts that assign ownership and manage NFT transfers.

How Does NFT work? Contd.

- As tokens are minted, they are assigned a unique identifier directly linked to one blockchain address.
- Each token has an owner, and the ownership information (i.e., the address in which the minted token resides) is publicly available.
- Even if 1,000 NFTs of the same exact item are minted each token has a unique identifier and can be distinguished from the others.

Tokenization of Real World Assets

- Tokenization implies that accounts are managed using cryptographic keys, which results in direct account management instead of mere execution of orders.
- Tokens are Fungible or non-fungible
- It makes accounting systems secure than traditional database records which makes them transparent, expandable and scalable.
- A blockchain based ledger is the primary source of information
- In theory, anything of value can be tokenized and brought on Blockchain.

Real World Assets (RWAs)

- RWAs in blockchain are digital tokens that represent physical and traditional financial assets, such as currencies, commodities, equities, and bonds.
- Tokenization (both Fungible and Non-Fungible) is one of the largest market opportunities in the blockchain industry, with a potential market size in the hundreds of trillions of dollars.
- The tokenization of RWAs marks a significant shift in how these assets can be accessed, exchanged, and managed.
- New opportunities for both blockchain-powered financial services and a wide variety of non-financial use cases underpinned by cryptography and decentralized consensus.

Steps for Tokenization Real-World Assets

Asset selection:

- Determining the real-world asset to be tokenized.

Token specifications:

- ERC20 tokens are fungible and represent a uniform asset, while ERC721 tokens are non-fungible and symbolize a set of unique assets.
- Determining the type of token (fungible or non-fungible), the token standard to be used (like ERC20 or ERC721), and other fundamental aspects of the token.
- ERC 3643: a modified version of ERC-20 which brings permission to the distributed tokens.

Steps for Tokenization Real-World Assets

Blockchain selection: Choosing the public or private blockchain network on which to issue the tokens.

- Integrating Chainlink Cross-Chain Interoperability Protocol (CCIP) helps make the tokenized RWA available on any blockchain.

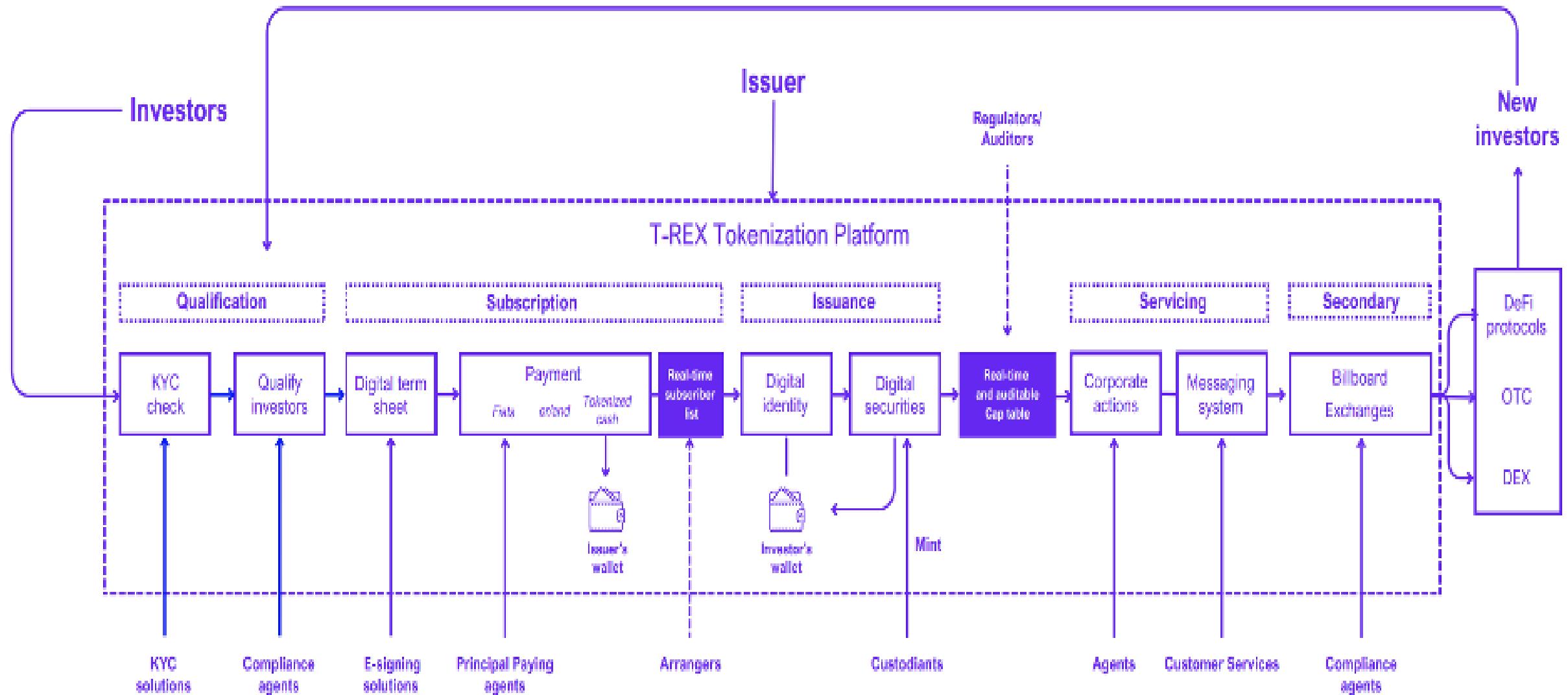
Offchain connection:

- Most tokenized assets require high-quality offchain data from secure and reliable Chainlink oracles.
- Using a verification service, such as the industry-standard Chainlink Proof of Reserve (PoR), to verify the assets backing the RWA tokens is essential for maintaining transparency for users.

Issuance:

- Deploying the smart contracts on the chosen network, minting the tokens, and making them available for usage.

Process of Token Regulated Exchanges



Token Issuer	Token Name	Token Blockchain	Blockchain Type	First Issued
European Investment Bank	Bond-specific tokens	GS DAP	Permissioned	Nov-22
European Investment Bank	Bond-specific tokens	HSBC Orion	Permissioned	Jan-23
Onyx by J.P. Morgan	Repo security-specific tokens	Onyx Digital Assets	Permissioned	Nov-20
Obligate	Bond-specific tokens	Polygon	Permissionless	Mar-23
Franklin Templeton	BENJI	Stellar & Polygon	Permissionless	Apr-23
Ondo Finance	OUSG	Ethereum	Permissionless	Jan-23
RealT Tokens	Multiple, property specific tokens	Ethereum	Permissionless	Nov-21
MatrixDock	STBT	Ethereum	Permissionless	Feb-23
Lofty	Multiple, property specific tokens	Algorand	Permissionless	Aug-22
Tangible	USDR	Polygon	Permissionless	Oct-22
Aktionariat	DAKS	Ethereum	Permissionless	Jan-21
Agrotoken	SOYA	Ethereum	Permissionless	Mar-21
Agrotoken	CORA	Ethereum	Permissionless	Sep-21
Agrotoken	WHEA	Ethereum	Permissionless	Dec-21
Paxos Trust Company	PAXG	Ethereum	Permissionless	Sep-19
TG Commodities Limited	TXAUT	Ethereum	Permissionless	Jan-20
Vave	Property-specific token, bundled token	Ethereum	Permissionless	Aug-23
Toucan Protocol	TCO2	Polygon& Celo	Permissionless	Oct-21
Centrifuge	DROP/TIN	Ethereum	Permissionless	Jun-21
Goldfinch	Pool-specific tokens	Ethereum	Permissionless	Nov-21

Token Issuer	Token Name	Reference Asset	Reference Category	Redemption Option	On or Off-chain Asset
European Investment Bank	Bond-specific tokens	Bonds	Financial asset	No	On-chain
Onyx by J.P. Morgan	Repo security-specific tokens	Intraday repo	Financial asset	No	On and off-chain
Obligate	Bond-specific tokens	Corporate Bonds	Financial asset	No	On-chain
Franklin Templeton	BENJI	MMMF shares	Financial asset	Yes	On and off-chain
Ondo Finance	OUSG	iShares Short Treasury Bond ETF	Financial asset	Yes	Off-chain
RealT Tokens	Multiple, property specific tokens	Residential properties	Real asset - Real estate	No	Off-chain
MatrixDock	STBT	Short-term Treasury Bill	Financial asset	Yes	Off-chain
Lofty	Multiple, property specific tokens	Residential Properties	Real asset - Real estate	No	Off-chain
Tangible	Real USD	Real Estate	Real asset - Real estate	Yes	Off-chain
Tangible	Item specific Tangible NFTs (TNFTs)	Wine, gold, watches, or real estate	Real asset - Other	Yes	Off-chain
Aktionariat	DAKS	Private Equity Investments	Real asset - Other	No	Off-chain
Agrotoken	SOYA	Soybeans	Real asset - Commodity	Yes	Off-chain
Agrotoken	CORA	Corn	Real asset - Commodity	Yes	Off-chain
Agrotoken	WHEA	Wheat	Real asset - Commodity	Yes	Off-chain
Paxos Trust Company	PAXG	1 fine Troy ounce of gold	Real asset - Commodity	Yes	Off-chain
TG Commodities Limited	TXAUT	1 fine Troy ounce of gold	Real asset - Commodity	Yes	Off-chain
Toucan Protocol	TCO2	Carbon credits	Real asset - Other	No	Off-chain
Centrifuge	DROP/TIN	Pools of reference assets	Multiple assets	Yes	Off-chain
Goldfinch	Pool-specific tokens	Pools of reference assets	Financial asset	Yes	Off-chain

Opportunities

Market Opportunities (Sector-wise Distribution)

- Real Estate: Tokenizing real estate properties allows for fractional ownership, making it one of the most popular sectors for tokenization
- Art & Collectibles: Tokenization has made it possible for investors to own expensive artworks or collectables
- Private Equity: Tokenization can provide liquidity to the traditionally illiquid private equity market
- Commodities: Commodities like gold and oil are also being tokenized to allow for fractional ownership
- Currencies: Tokenization of fiat is yet another use case which can be seen as a massive opportunity

Opportunities contd...

Market Opportunities (User Demographics)

- Institutional Investors: Many institutional investors are exploring tokenized assets to diversify their portfolios
- Retail Investors: With the democratization of previously inaccessible markets, there's a growing interest among retail investors in tokenized assets
- Millennials and Gen Z: These demographics show a higher propensity to invest in alternative assets and are more open to new technologies like blockchain

Benefits of Real-World Asset Tokenization

Reduced Transaction Costs:

- Traditional asset transfers involve intermediaries like banks, brokers, and lawyers, leading to high fees. Blockchain eliminates or reduces the need for intermediaries, significantly lowering transaction costs.

Transparency:

- Every transaction on the blockchain is recorded on a public ledger, ensuring that all stakeholders can verify and audit transactions independently where the tokenization process and the related transaction happen on-chain.

Simplified Fractional Ownership:

- Assets like real estate or art can be tokenized and divided into smaller units, allowing multiple people to invest in fractions of the asset, and democratizing access.

Benefits of Real-World Asset Tokenization contd..

Instantaneous Transactions:

- Asset transfers, especially cross-border ones, can take days in traditional systemsJ With blockchain, this can be reduced to minutes or even seconds

Immutable:

- Blockchain's decentralized nature and cryptographic hashing make it secure against malicious attacks.
- Once a transaction is added, it becomes immutable, ensuring that no single entity can alter past transactions.

Global Market Access:

- Tokenization can open up assets to investors globally, breaking down geographical barriers, subject to relevant rules and regulations

Challenges

Clear regulatory framework

- Lack of Clear definitions for different types of digital assets and avoidance of ambiguity and facilitation of regulation compliance.

Stablecoin regulations

- One of the regulatory challenges presented by stablecoins is of maintaining a stable value.
- To address this challenge, issuers must maintain adequate reserves to back the coins effectively.
- An instrument which speculative in nature can't be used as currency
 - This is the reason Bit coins are not accepted in many countries as Currency

Challenges

Market accessibility

- Ensuring that all participants have fair access to the market, in alignment between international rules and local standards for seamless cross- border transactions.

Technology governance

- Incorporating standards for system performance, data quality, and data privacy, to ensure secure and reliable technology.

Risk-based approach

- Ensuring that regulatory measures are proportionate to the risks arising from digital assets through targeted regulation focused on areas with the highest potential harm

Thank You