

Principles of Digital Asset (token) Classification

Definitions and pre-conditions

A *digital asset* is anything that exists in binary format, and comes with the right to use it. Digital assets are scarce - meaning that at any particular moment of time there can be only one defined owner (or group of owners) of the asset.

A *token* is an accounting unit that represents its owner's balance in a designated digital asset.

There are 5 processes in a digital asset system, which may have at least three states (centralized, decentralized, not possible), and which can be managed by one or separate roles:

1. Governance
2. Custody
3. Issuance and distribution
4. Transaction processing
5. Audit

Different combinations of the ways these processes are managed leads to the different types of digital assets (which we call the *distributed periodic table*).

Below we will define only some types of digital assets that are most common for now and will use some established terms for them.

1. Cryptocurrency

A network that performs the issuance and initial distribution of a currency, in addition to processing transactions in a decentralized way, using a secure, provable mathematical algorithm. All five processes are managed by this algorithm, which is run independently by each participant. The key property of a cryptocurrency is the level of decentralization (the number of participants, and the correlation between their decisions). Another important property is permissionless participation, which requires a censorship-free system. The extreme conditions for cryptocurrency are 1) undefined number of participants-validators, 2) who are fully anonymous 3) who have no reputation 4) and whose transactions are fully private. Good examples are proof-of-work-based currencies such as Bitcoin and Monero.

2. Central bank currency

A system with all 5 processes centralized and managed by a central bank, in which digital currency is pegged to a national currency on a 1:1 ratio.

3. Digital currency

In some systems, processes such as validation of transactions, fee set-up, and updates can be handled by the decentralized network of users - while currency issuance and initial distribution is managed by a centralized organization.

Custody is not-applicable, because there is no collateral at all. Good examples are Ripple, Stellar, IOTA.

4. Commodity-backed tokens

A commodity is an item produced to satisfy wants or needs. Commodity-backed tokens represent ownership rights in a particular amount of a commodity. Tokens are managed in a system with centralized governance, custody and issuance. These processes are performed by a service provider, or by the custodian of a physical commodity. One token is always backed by a fixed quantity of the commodity, and the 1:1 ratio is guaranteed by a designated party. Examples are - 1) the US dollar prior to 1971, which was a token which represented gold, or 2) warehouse receipts - in these cases processing and audit is done in a centralized way too. An example from the crypto world would be Tether, whose processing is decentralized.

5. Equity tokens

A security is a fungible financial instrument that represents some type of financial value. Equity represents ownership in a company or participation in its revenue stream. Security tokens represent ownership of an underlying security, or a share in a cash flow generated by the system. Tokens are managed in a system with a centralized governance, custody and issuance. These processes are performed by a depository, or by a company itself. One token always represents a certain number of shares, or a percentage of cash flow. Processing can be done in a centralized way by a depository. An example from the crypto world would be DAO tokens, whose processing is decentralized.

6. Accounting tokens

Accounting tokens represent something that makes sense to account, yet doesn't make sense to transfer. Governance, issuance, custody and audit are centralized. Identity, reputation, and rating are examples of such assets.

Web-of-trust identities belong to this category, although in that case issuance, custody and audit are decentralized.

7. Digital collectibles

A collectible is any object regarded as being of value or interest to a collector. These objects are unique and non-fungible. Token represents ownership of a particular object. Governance and issuance are centralized. Crypto kitties are examples of such assets.

8. Utility tokens

A utility is a quality of object's usefulness. Utility tokens represent the right to use system functionality. The role of utility tokens is to make system usage simpler than it was without them, which is true under certain conditions. Utility tokens provide several functions — as internal currency, accumulation of system's value, or accounting. In the long run, utility tokens have to fragment into divisions— digital currency, security tokens, accounting tokens. Governance and issuance are centralized.

Sample questions for determining the type of a digital asset

1. Does the token represent a designated asset?
 - a. is the asset fungible?
 - b. does the provenance matter?
2. Is emission of the token is predefined by a mathematical algorithm (constitution)?
 - a. is there a process of changing the constitution by the users?
3. Does it make sense to transfer tokens between owners?
4. Does token ownership represent participation in profits (the value or business model) generated by the system?
5. Does the system have a particular owner who is providing the service or is guaranteeing custody of an underlying asset?
6. Does any transaction with the token affect all the participants in the system?
7. Does token ownership represent a share in a particular business?
8. Does it make sense if the token's price rises indefinitely?
 - a. how would the fees in the system be affected?
 - b. if the system provides a service, would this become too expensive?
9. Can the system function without a token?
 - a. can it use other tokens (cryptocurrencies etc) for payments and rewards?
 - b. does the system need its own monetary policy (balancing supply and demand)?
 - c. if the token is used for the DDoS attack prevention, are there alternative ways of protection?