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Currency

**Taxonomy and definition of terms for digital fiat
currency**

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Focus Group Technical Report

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FOREWORD

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Deliverables of focus groups can take the form of technical reports, specifications, etc., and aim to provide material for consideration by the parent group in its standardization activities. Deliverables of focus groups are not ITU-T Recommendations.

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Taxonomy and definition of terms for digital fiat currency

About this Report

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Executive Summary

Terminology in money is currently evolving as new technologies aiming at enhancing the experience of the exchange of value between persons and/or organizations are being developed and tested. This report compiles the current, typical uses of terms and presents them on a money taxonomy, which includes the core topic of the present ITU-T Focus Group: the Digital Fiat Currency (DFC).

DFC is a tokenized, digital representation of a *sovereign currency*, including the concepts of central bank digital currency (CBDC), if distributed by a governmental monetary authority, and e-money, if distributed by private entities to the general public. As being denominated in sovereign currency, the DFC completely distinguishes from virtual currencies, which are denominated in their own unit of account. The report also includes a definition for currency-pegged stablecoin. Currency-pegged stablecoins are deemed to be more stable compared to cryptocurrencies where the price is driven by market dynamics.

Money distinguishes from *currency* as the meaning of the former term is mainly related to the instrument allowing the exchange of value between persons and/or organisations, while the meaning of the latter term includes concerns on how the exchange instrument's value is measured – its unit of account function. The Report follows the economic perspective on the currency term, being concerned on how persons and/or organisations freely choose to measure value, while the legal use of this term typically requires a sovereign law to designate any instrument as such. Thus, *currency* does not imply any legal status, unless it is designated as *sovereign currency*.

The Report also compiles DFC relevant terminology on related underlying technology and on the digital representation of value. If the exchange instrument includes in itself information on its value, value can be exchanged between persons and/or organisations on its own, on a *token-based accounting system*. On the contrary, if the exchange instrument is not self-sufficient on the information of its value, the sum of registered transactions, summing on an outstanding balance, is required and consists of an *account-based accounting system*.

1 Introduction

New technologies are driving monetary discussions regarding the future of money. In addition, monetary terms deal with a broad range of nuances that accommodate economic and financial characteristics, which require a precise definition of the relevant terms that are usually unobserved by common knowledge.

Money is at the core of our society, as it enables the exchange of value between persons and/or organizations. As technology develops, the instruments allowing seamless and efficient value exchanges also develop and so does their supporting terminology.

This glossary aims to put together the relevant terminology as well as provide a taxonomy framework in which they are included, contributing to the work carried by the ITU-T Focus Group digital currency including digital fiat currency (FG DFC).

2 Taxonomy of relevant terminology in money

Economic literature usually characterizes money by three core functions:

- (1) being a unit of account;
- (2) being a medium of exchange and
- (3) being a store of value.

Function (1) identifies that money is used as a unit of measurement, while function (2) expresses it as an instrument for the exchange of assets between agents. Indeed, money is understood as a way of solving the double coincidence of wants problem - on a barter trade system, one individual would have a cost for finding some other individual offering the goods or services he wants and willing to accept his offer of goods or services in exchange¹. This matching problem is wider as the number of individuals and the number of goods and services in the economy increase². Function (3) may be interpreted as an extension of Function (2) due to time. Storing value implies someone trading his supply of goods or services for money today, hoping he is able to exchange money back for other goods or services in a sufficient long-run period³.

As money plays these three roles, one shall observe how novel technologies may impact each of them. Additionally, money may be made available by different players – ie a sovereign government; a regulated financial institution or an unregulated agent – and assumes different states – physical or electronic. The resulting multi-dimensional matrix from money roles, launching agents and instrument tangibility comprises the mentioned nuances and is shown in Figure 1.

¹ See Jevons, 1875.

² See Kiyotaki and Wright, 1989; 1993.

Unit of account	Sovereign currency (denominated in)					Private currency (denominated in)	
	Distributed by the monetary authority			Distributed by private agents			
Medium of exchange	Central bank money			Commercial bank money	E-money (legally recognized, in broad sense)	Virtual currency	
	Cash (banknotes and coins)	CBDC	Central bank deposits (reserve requirements and voluntary deposits)			Social currencies	Centralized
	Physical money			Digital money		Physical money	

Notes:

- (1) Digital Fiat Currency (DFC) is represented in orange, as central bank or private distributions, always denominated in sovereign currency.
- (2) Private currency (denominated in) means any private monetary value which is not denominated in any sovereign currency.
- (3) Typically, the currency term imply reference to a specific unit of account. The herein use does not imply any specific legal status.

Sources: Inspired from CPMI (2015), CPMI (2018), BCB (2017).

Figure 1: Core money-related terms, by money function, issuer characteristics and tangibility

2.1 Digital Fiat Currency

It is a tokenized, digital representation of a *sovereign currency*. It may be distributed by a monetary authority – case in which it is a central bank digital currency (CBDC) – or by a private entity – case in which is often backed on central bank money, becoming e-money. In Figure 1, the orange area highlights the DFC.

Digital Fiat Currency is an evolving term proposed at the ITU FG DFC. The term may be replaced by *digital currency*, for simplicity, or by *digital sovereign currency*, for clarity.

2.2 Sovereign currency⁴

A *sovereign currency* is the one set as such by a sovereign law, issued by an authorised issuer, and whose value results from a statutory rule. The sovereign law defines it as a standardised unit of value (unit of account) and as an instrument available for value transfer between individuals (medium of exchange).

⁴ This section is based in BCB (ed.), 2017.

The value of modern sovereign currencies usually arises from the issuing state recognising to be liable against the holders of the value transfer instrument, which is measurable in the unit of measurement (unit of account) defined by the issuer itself.

The representation of sovereign currencies typically includes money in physical format (*banknotes* and *coins*, with legal tender status⁵) and money in different digital forms – ie bank reserves and voluntary bank deposits, commercial bank money and e-money.

Frequently, the term *fiat currency* is used interchangeably with *sovereign currency* and as an opposite to the term *commodity or private money*. Technically, this use of *fiat currency* is somehow misleading, as *fiat* refers to value arising without an underlying asset, by trust or credibility. This is how value arises for state-issued currencies (instated by law) but also how value arises from any private issuance without an underlying asset. Thus, *sovereign currency* is a preferred term in contrast to *virtual currencies/money/assets*, as the later have not any kind of underlying asset and their value comes from the credibility granted to a private issuer (or even no issuer at all but an open algorithm).

2.2.1 Money issuance by the monetary authority

Money is issued when the monetary authority increases the amount of available sovereign currency in the economy, increasing the monetary base. It increases the monetary authority's liabilities.

Contemporary, rather than banknote and coin printing and distribution, money issuance occurs mainly through open market operations, when the monetary authority buys securities in the financial market increasing the money supply. An additional method is to remunerate central bank deposits (see item 2.4) by increasing central bank liabilities.

2.2.2 Money distribution by the monetary authority

Money distribution refers to the monetary authority making available the monetary instrument to the public – ie cash or any electronic representation of value. It is a logistic function and it does not alter the total amount of money in the economy. For example, when some financial institution withdraws cash from the monetary authority, the total cash amount is typically deducted from the financial institution's reserve account balance – no new money is issued by the monetary authority; instead the monetary authority has distributed money.

The money distributions are frequently mistaken by money issuance, as originally cash distribution used to have relevance in increasing the monetary base. After the digitalization of financial systems, this use is anachronous.

2.3 Money issuer

An entity that issues money or, more broadly, it is also an entity that distributes e-money (see also e-money issuer, item 2.7.1).

2.4 Physical money

2.4.1 Cash

Cash is the set of government printed banknotes and minted coins. Governments traditionally print or mint them aiming to provide a physical representation of the sovereign currency.

⁵ Legal tender is not a uniform concept though. It may include acceptance of public bodies to be paid in such currency or an obligation on the wider economy to accept payments in such currency.

When sovereigns provide cash as a legal tender status, it becomes a preferred medium of payment regarding its capability of releasing debts⁶.

2.4.2 Social currencies

Social currencies, also known as community or local currencies, are issued and distributed by private entities to be used in a particular community. These currencies typically are a payment instrument accepted at previously registered local business and maintain a fixed exchange rate to the sovereign currency denomination. Generally, they are viewed by central banks as an instrument for financial inclusion⁷ and some are migrating from the physical to the digital form.

2.5 Central-bank money

This type of money is a liability of a central bank and, per extension, it is a liability of the government that has legally introduced it. The typical forms of central-bank money are cash and bank reserves, the financial institutions' deposits at the central bank.

2.5.1 Cash

See 2.4.1

2.5.2 Central-bank deposits (bank reserves)

Deposits at the central bank kept by financial institutions and, in some jurisdictions, by some non-banks and financial market infrastructures. These deposits are kept as digital balances recorded on the central bank ledger. Mandatory balances are known as *reserve requirements* and are usually required for monetary policy or macroprudential purposes. Financial institutions sometimes also keep *voluntary deposits*.

Central-bank deposits are a central bank's liability and often play a crucial role as the settlement asset in payment systems, which transfer substantial values of funds each day and where there is significant potential for systemic risk⁸. In practice, most – although by no means all – large value payment systems settle in central-bank money.⁹

2.5.3 Central bank-issued digital currency (CBDC)

It is a central bank liability, denominated in the sovereign unit of account, which can serve both as medium of exchange and store of value.

CBDCs can be made available for settlement purposes, updating, complementing or replacing central-bank deposits technology. On the wholesale use case, CBDCs can be considered settlement assets, depending on their design. In addition, for a retail use case, CBDCs can be distributed by the central bank to the general public on a single or on multiple ledgers, possibly redesigning the central bank's role in the financial system. When its distribution to the public occurs through financial institutions, CBDC can be considered e-money, with a stronger peg to the sovereign currency¹⁰.

⁶ BCB (ed.), 2017, p. 2.

⁷ BCB (ed.), 2017, p. 2-3.

⁸ CPSS, 2003b, p. 8.

⁹ CPSS, 2003b, p. 2.

¹⁰ The stronger peg comes from the central bank's increased certainty about the financial institution having liquid assets corresponding to the value of the e-money distributed to the population.

2.6 Digital money and digital currency

Digital money is any form of payment that is made possible by an electronic representation. Currently, this is the most extensive concept in contrast to the concept of money in physical form. Digital money includes not only money exchanged between individuals – discussed as e-money in section 2.7 – but also the deposits of financial institutions at the central bank.

Digital currency is an associated term, which implies that the electronic representation of money is denominated in a specific unit of account.

2.7 Commercial-bank money

A liability of a commercial bank, in the form of deposits held at the commercial bank, which can be used for settlement purposes¹¹.

Commercial-bank money is denominated in the sovereign currency, thus banks exchange it for cash at par. However, commercial-bank money is not fully backed by central bank money, as it is created from the banks' lending activity. To mitigate the risks faced by depositors, the financial system regulation usually provides some kind of deposit insurance.

2.8 E-money

It is a digital representation of value denominated in a sovereign currency distributed by a private entity, which is subject to government regulation. The record of funds is stored on an electronic payment device such as prepaid cards, mobile phones, or on computer systems. The funds are held in a nontraditional account with a banking or non-banking entity and are used as an electronic medium of exchange. Typically, e-money convertibility in cash or bank deposits is granted by law at par¹².

2.8.1 E-money issuer

E-money issuer is a financial institution (bank or non-bank) that provides and distributes e-money for an end user. E-money can be created when the provider receives cash (*cash in*) from the end user (typically at an agent location) or when the provider receives a digital payment from another financial institution.

Typically, when e-money issuers are not banks, they are required to retain in central-bank money the corresponding amount of the issued e-money in order to guarantee the value of the digital representation issued to end users¹³.

2.8.2 Currency-Pegged Stablecoin

Currency-pegged stablecoin is a crypto-asset designed to be digital equivalents of the underlying sovereign currency or currency basket (eg, Special Drawing Rights). Most stablecoins are collateralized, or backed, by the assets they are pegged to, making it like e-money when regulated. It is intended to minimize price volatility versus a sovereign currency or baskets of sovereign currencies. When stablecoins are not regulated by the monetary authority and the currency-backing occurs at the private issuer's discretion, the peg is subject to the issuer's credit risk, moving the stablecoin to the far right of sovereign currencies denomination on Figure 1's representation.

¹¹ CPMI and IOSCO, 2012.

¹² See ITU, 2016 and BCB (ed.), 2017.

¹³ See ITU, 2016, p. 20 and BCB (ed.), 2017, p. 5.

Yet, some stablecoins are backed by other crypto-assets, moving them to the virtual currency framework (Figure 1's right-hand side)¹⁴. For example, USD-pegged DAI is currently 150% overcollateralized with Ether (ETH).¹⁵ Uncollateralized stablecoins use algorithmically governed approaches to control the stablecoin supply.¹⁶

Finally, stablecoins can also be distributed by a central bank. In this case, it radically differs from CBDCs. While in the CBDC case the central bank is the issuer of the underlying currency, in the stablecoin case another central bank is the currency issuer used as peg¹⁷. The Ecuador's *Dinero Electrónico* project was an example of central-bank-issued stablecoin—the Central Bank of Ecuador distributed an account-based monetary value for its users that was backed by US dollars, which is a currency issued by the US Fed.

2.9 Virtual currency

It is a digital representation of value, issued by private developers and denominated in their own unit of account.^{18,19}

As a value representation, virtual currencies are similar to contemporary sovereign currencies: no underlying asset backs them²⁰. Their value comes from end users' trust that they will remain being accepted as a medium of exchange in the long run.

Virtual currencies usually have no guarantee of being exchanged for any sovereign or official currency. Thus, virtual currencies are different from e-money, as e-money conversion into cash or bank deposits at par in the same currency denomination is usually granted²¹.

3 Relevant terminology on the technology

3.1 DLT related terms

3.1.1 Distributed ledger

A distributed ledger is a consensus of replicated, shared, and synchronized digital data spread across multiple sites, countries, and/or institutions²².

3.1.2 Distributed ledger technology

Distributed ledger technology (DLT) refers to the processes and related technologies that enable nodes in a network (or arrangement) to securely propose, validate and record state changes (or updates) to a synchronised ledger that is distributed across the network's nodes. In the context of

¹⁴ See also section 2.9.

¹⁵ DAI is created by users borrowing against locked collateral and destroyed when loans are repaid. When the value of the ETH collateral increases, borrowers are able to create new DAI. When the USD value of collateral falls, borrowers can choose to either repay borrowed DAI, or deposit more ETH.

¹⁶ If the algorithmically-pegged token is trading above (below) the peg, stablecoins are sold (purchased) to push the price back to the peg.

¹⁷ Monetary impacts substantially differ between CBDCs and central-bank-issued stablecoins but this discussion is beyond the scope of the present report.

¹⁸ See He et al., 2016, p. 7.

¹⁹ Note that virtual currencies differentiate from virtual assets as the later does not have any identifiably issuer nor are denominated in any sovereign currency

²⁰ Some recent virtual currencies claim to have some form of backing. In this case, the virtual currency is linked to some other unit of reference other than itself, moving away from the main characteristics that would make it to be considered a virtual currency.

²¹ See BCB (ed.), 2017, p. 5.

²² See IOSCO, 2017, p. 47.

payment, clearing, and settlement, DLT enables entities, through the use of established procedures and protocols, to carry out transactions without necessarily relying on a central authority to maintain a single “golden copy” of the ledger²³.

3.1.3 Consensus mechanism (in DLT)

The consensus mechanism is the process by which the nodes in a network agree on a common state of the ledger. This process typically relies on cryptographic tools, a set of rules or procedures reflected in the protocol, and, either, economic incentives (applicable to any network configuration) or governance arrangements²⁴.

3.1.4 Node (in DLT)

In computer science, a node is the basic computing unit of a network. In the context of this report, a node refers to a computer participating in the operation of a DLT arrangement²⁵.

3.1.5 Permissioned ledger (in DLT)

A permissioned ledger is one that is encrypted in order to allow nodes to only view in its decrypted form the elements of the ledger they are permissioned to see²⁶.

3.1.6 Permissionless DLT network

A ledger in which all participant nodes are able to view all elements of the ledger.

3.1.7 Validation

Validation is the process in which nodes identify state changes that are consistent according to the rules of the arrangement (that is, assets are available to the originator, and the originator and beneficiary are entitled to exchange the assets). In order to do so, each node needs to rely on a record of previous states, either as a “last agreed state” or as a “chain of previous states”²⁷.

3.2 Blockchain related

3.2.1 Blockchain

The technology underlying bitcoin and other cryptocurrencies—a shared digital ledger, or a continually updated list of all transactions²⁸.

3.2.2 Proof-of-work

Proof-of-work is a common form of consensus that requires nodes to agree on the transactions added to the ledger. In general, the mechanism waits for a majority of nodes to agree on a transaction before adding it to the ledger²⁹.

²³ See CPMI, 2017, p. 2.

²⁴ See CPMI, 2017, p. 4.

²⁵ See CPMI, 2017, p. 2.

²⁶ See CPMI, 2017, p. 18.

²⁷ See CPMI, 2017, p. 4.

²⁸ See ITU, 2016.

²⁹ See CPMI, 2017, p. 15.

3.3 Terms on digitally representing value

3.3.1 Token-based accounting system

It is an accounting system where the digital value is an information included in the instrument used for value exchange among users. Value that can be exchanged between individuals on its own. Token-based money (or payment systems) rely critically on the ability of the payee to verify the validity of the payment object³⁰.

3.3.2 Account-based accounting system

It is an accounting system where the digital representation of value consists on the sum of registered transactions, summing on an outstanding balance.

3.3.3 Smart contracts

Smart contracts are programmable electronic procedures that can trigger financial flows or changes of ownership if specific events occur and may be used to automate transactions and business processes³¹.

³⁰ See CPMI and MC, 2018, p. 4.

³¹ See FSB, 2017, p. 10; idem, p. 34.

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