4.2.2 Digital Account Model

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Overview

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Almost all Cryptocurrencies implemented so far use the concept of tokens, accounts, wallets, transactions, and distributed ledgers. In essence, these approaches use a model of the way money is handled in bank accounts[1]. Underlying these Cryptocurrencies is the concept of Coins. As a general rule, the Coin's value fluctuates and can be quite volatile:

- As with most commodities, assets, investments, or other products, cryptocurrency's price depends heavily on supply and demand
- As an asset, it can be adopted quickly by investors, traders, and speculators and is often based on emotion rather than underlying value. This contributes to price movements and plays a critical part in a cryptocurrency's value at any given moment. In other words, the cryptocurrency value is fickle
- Contributing to the cryptocurrency value are opinions put forth by media outlets, influencers, opinionated industry moguls, and well-known cryptocurrency fans fueling investor demands and concerns, further contributing to price fluctuations

Typically, these coins' values can be defined by the Gartner Group's Hype curve (See OMG's DIDO-RA problem statement).

Figure 1: Gartner Group Hype Cycle

For many cryptocurrencies, the hype curve is not considered much of an issue since the life expectancy for cryptocurrencies is in the order of decades at best, while the life expectancy of CBDC needs to be much, much longer.

Obviously, the Federal Reserve does not want CBDC to follow the hype cycle. That is why it is important for the Federal Reserve to move slowly and with a well-thought-out plan for CBDC.

One method proposed to avoid this volatility is the use of Stablecoins instead of traditional cryptocurrencies like Bitcoin, Ethereum, Ripple, etc. (See the OMG DIDO-RA discussion on Consensus Platforms for a more detailed list).

Digital Account Theoretical User Scenario

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> **Note:** The following Digital Account Theoretical User Scenario is only provided for discussion

purposes. Actual User Scenarios would be developed during systems analysis and modeled using a Model-Based Systems Engineering (MBSE) approach and address the problem is far more detail with a team of experts.

In the following example, the CBDC is modeled as a Digital account, each account representing an End User. The End Users would actually "own" a wallet that contains account information where money is recorded as a balance that can be added to or subtracted from. For example, a retail purchase would deduct the amount of the purchase from the customer End User's account and add it to the Store's account.

Figure 2 represents a stylized use of a Digital Account flow.

Figure 2: Simplified Digital Account Flow

- Table 1 represents the initial contents of a Digital Account Wallet of an End User. Each Digital Account Certificate in the wallet, such as the \$1,489.72 balance, is signed by the owner of the Digital Account Wallet.
- Table 2 represents the initial contents of at Digital Account Till at a store. Each Digital Account Certificate, such as the \$1,910.00 balance, is signed by the store that owns the Digital Account Till.

Table 1: Example of the initial contents of an End User Digital Account Wallet.

Account	Balance
98761234	$1,489.72
TOTAL	$1,489.72

Table 2: Example of the initial contents of a store's Digital Account Till.

Account	Balance
456712349876	$1,910.00
TOTAL	$1,910.00

In this example, the End User's Digital Account Wallet is used to purchase an item in a store that lists for \$488.78.

Table 3 provides a possible withdrawal from the End User's Digital Account Wallet. If the withdrawal is accepted by the Digital Account Wallet's owner, the Digital Account certificates ownership is changed to the stores.

Table 3: The Digital Account from the wallet required to make the \$488.78 purchase.

Item	Quantity	Sum
8642-97531	1	$488.78
TOTAL		$488.78

Note: there are many ways the \$488.78 could have been achieved using the Digital Account Wallet provided in Table 1. This is one way. In an actual implementation, the contents of the composition of cash could be modified by the End User as long as it summed to \$488.78, just as would occur in a real wallet.

- Table 4 represents the contents of the Digital Account Wallet of the End User after the transaction.
- Table 5 represents the contents of the Digital Account Till of the store after the transaction.

Table 4: Example of a Digital Account Wallet and its contents for an End User after transaction.

Account	Balance
98761234	$1,000.94
TOTAL	$1,000.94

Table 5: Example of a Digital Account Wallet and its contents for a store after transaction.

Account	Balance
456712349876	$2,398.78
TOTAL	$2,398.78

Examples

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There are three categories of "desirements" alluded to in the White Paper and identified within the Object Management Group White Paper Analysis:

- **Digital Cash Model** - these are "desirements" with CBDC characteristics most closely aligned with the simple coin cash model
- **Digital Account Model** - these are "desirements" with CBDC characteristics most closely aligned with the Digital Account Model (i.e, savings, checking, investment, direct pay, credit, debit cards, etc.)
- **Research Areas** - these are "desirements" with CBDC characteristics most closely aligned with "research" models such as Stablecoins

In this discussion, only the "desirements" identified during the White Paper Analysis are considered. Table 6 represents the allocation of "desirements" germane to the Digital Account Model.

Table 6: Example of mapping a subset of "desirements" identified during the White Paper Analysis conducted by the OMG's CBDC WG

Topic	Desirements
Digital Account Model	B: B0005, B0010, B0022-4, B0038, B0047, B0048, B0049, B0051, B0054 P: P0002, P0012, P0013, P0017, P0018, P0019, P0020, P0021, P0023, P0024, P0025, P0017, P0028, P0030 R: R0002, R0009, R0012, R0015, R0020, R0023 D: D0001, D0002, D0003, D0005, D0008, D0010, D0012, D0013,
B = Benefit Considerations	
P = Policy Considerations	
R = Risk Considerations	
D = Design Considerations	

Discussion of Examples

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Table 7 provides a summary of using a Digital Account Model instead of a Digital Cash or Stablecoin Models. Many of the OMG identified "desirements" found in the Money, and Payments: The U.S. Dollar in the Age of Digital Transformation **White Paper** during the White Paper Analysis appear to be appropriate for a CBDC **"Account Model"**. The **"Account Model"** uses Digital Money in an analogous model as Accounts for CBDC. For example, the "desirements" **B0005**, which is a requirement to *"Protect*

against criminal activity| In this context, criminal activity is either Money Laundering or Fraud. Fraud is an intentionally deceptive action designed to provide the perpetrator with an unlawful gain or to deny a right to a victim. Types of fraud include tax fraud, credit card fraud, wire fraud, securities fraud, and bankruptcy fraud. Fraudulent activity can be carried out by one individual, multiple individuals, or a business firm as a whole", is easily associated with **Accounts**.

Table 7: List of "desirements" (i.e., desirements) identified in the **White Paper** indicating a **Account Model**.

Requirement	Statement	Comment
B0005	**Protect against criminal activity**	In this context, criminal activity is either Money Laundering or Fraud. Fraud is an intentionally deceptive action designed to provide the perpetrator with an unlawful gain or to deny a right to a victim. Types of fraud include tax fraud, credit card fraud, wire fraud, securities fraud, and bankruptcy fraud. Fraudulent activity can be carried out by one individual, multiple individuals, or a business firm as a whole.
B0010	**Expand consumer access to the financial system**	A financial system is the entire set of non-cash-based institutions (i.e., banks, thrifts, insurance companies, stock exchanges, etc.) permitting and facilitating the exchange of funds. The expansion would entail adding people to these institutions
B0022	**Provide a CBDC that is:** **1. NOT Privacy-Protected** **2. Intermediated** **3. NOT Widely Transferable** **4. Identity-Verified**	*Intermediated* generally implies accounts or digital wallets. *Identity-Verified* generally implies validating and verifying a person's identity to gain access to their accounts
B0038	**Allow private-sector innovators to focus on:** **1. new access services** **2. distribution methods** **3. related service offerings**	These innovations would predominately be account-based.
B0047	**Lower transaction costs**	Normally, there are no transaction costs for using cash
B0048	**Provide a secure way for people to save**	People save money in accounts unless we are offering piggy banks
B0049	**Promote access to credit**	Credit is, by definition, using cash you do not have access to.

Requirement	Statement	Comment
B0051	Generate data about users' financial transactions similar to the current Commercial Bank[2)] and **Nonbank Money**	This kind of data is collected on the activity in accounts.
B0054	Attract risk-averse users to CBDC	Risk Adverse investments usually pay little to no incentive to investors, but their value remains constant. Cash represents that kind of investment
P0002	Provide Yield benefits more effectively than alternative methods	Cash generally offers no yield, therefore, this would require accounts
P0005	Protect against criminal activity	See: **B0005**
P0012	The firms that operate interbank payment services are subject to federal supervision	These services typically use accounts to move payments unless it is referring to armored guards and vehicles
P0013	Systemically important payment firms are subject to 1. heightened supervision 2. regulation	Refers to the accounting practices used by the payment firms
P0017	The PWG report recommends CBDC complement existing authorities regarding: 1. market integrity 2. investor protection 3. illicit finance	Refers to the accounting practices for CBDC accounts
P0018	The Federal Reserve Act does not authorize direct Federal Reserve accounts for individuals	Refers to accounts
P0019	Federal Reserve accounts for individuals represent a significant expansion of the Federal Reserve's role in the financial system and the economy	Refers to accounts
P0020	The private sector would offer accounts or digital wallets to facilitate the management of CBDC holdings and payments	Refers to accounts
P0021	The intermediaries would operate in an open market for CBDC services	Refers to accounts
P0023	CBDC would need to be readily transferable between customers of different intermediaries	Intermediaries imply accounts
P0024	CBDC would need to comply with the U.S. robust rules	Implies accounting and oversight rules
P0025	CBDC intermediary would need to verify the identity of a person accessing CBDC	Intermediaries imply accounts
P0027	CBDC a risk-free asset	See: **B0054**

Requirement	Statement	Comment
P0028	Require significant international coordination to address issues such as: 1. common standards 2. infrastructure, 3. the types of intermediaries able to access any new infrastructure, 4. legal frameworks 5. preventing illicit transactions 6. the cost and timing of implementation	
P0030	The Federal Reserve will only take further steps toward developing a CBDC if: 1. Research points to benefits for households, businesses, and the economy overall that exceed the downside risks 2. Indicates that CBDC is superior to alternative methods	See: **B0054**
R0002	Risk to the cost and availability of credit	See: **B0054**
R0009	Increased Risk of "runs" or other instabilities to the financial system	
R0012	Risk of increased concern related to the potential for: 1. destabilizing "runs" 2. disruptions in the payment system 3. concentration of economic power	See: **B0054**
R0013	CBDC offers no associated credit or liquidity Risk	See: **B0054**
R0015	Require mechanisms to reduce liquidity Risk	See: **B0054**
R0016	Require mechanisms to reduce credit Risk	See: **B0054**
R0020	Risk that interest-bearing CBDC could result in a shift away from other low-risk assets, such as shares in money market mutual funds, Treasury bills, and other short-term instruments.	See: **B0054**
R0023	Risk of financial panic causing outflows from Commercial Banks to CBDC without prudential supervision, government deposit insurance, and access to central bank liquidity	See: **B0054**
D0001	Design should be for a non-interest-bearing CBDC, for example, would be less attractive as a substitute for commercial bank money	Commercial bank money implies accounts
D0002	Design should allow the central bank to limit the amount of CBDC an End-User could hold	These restrictions imply accounts
D0003	Design should allow a limit on the amount of CBDC an End-User could accumulate over short periods	These restrictions imply accounts

Requirement	Statement	Comment
D0005	**Design could affect monetary policy implementation and interest rate control by altering the supply of reserves in the banking system**	These restrictions imply accounts
D0008	**Design should allow for interest-bearing at levels of the CBDC to be controlled independently of other safe assets**	These restrictions imply accounts
D0010	**Design should consider the potential for interest-bearing CBDC as a new policy tool on the channels of influence in monetary policy**	These restrictions imply accounts
D0011	**Design should generate data about users' financial transactions in the same ways that commercial bank and nonbank money generates data today**	These restrictions imply accounts
D0012	**Design should address privacy concerns by leveraging existing tools already in use by intermediaries**	These restrictions imply accounts
D0013	**Design should facilitate compliance with a robust set of rules already intended to combat 1. money laundering 2. the financing of terrorism 3. customer due diligence 4. record-keeping 5. reporting requirements**	These restrictions imply accounts

[1)]

99% (if not all) issued Initial Coin Offering (ICO) tokens on top of the Ethereum implements the ERC-20 standard.

https://www.omgwiki.org/dido/doku.php?id=dido:public:ra:xapend:xapend.b_stds:defact:ethereum:eip:erc_0020

[2)]

Commercial banks include banks licensed either by federal or state banking agencies, credit unions, and thrifts from the **White Paper**.