



Central Bank Digital Currency Paper for Swift

Note:

The Payments Market Practice Group (PMPG) is an independent body of payments subject matter experts from Asia Pacific, EMEA and North America. The mission of the PMPG is to:

- Take stock of payments market practices across regions
- Discuss, explain, and document market practice issues, including possible commercial impact
- Recommend market practices, covering end-to-end transactions
- Propose best practice, business responsibilities and rules, message flows, consistent implementation of ISO messaging standards and exception definitions
- Ensure publication of recommended best practices
- Recommend payments market practices in response to changing compliance requirements

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1. [Executive Summary](#)

In the last few years, many Central banks have started exploring the possibility of "issuing" a digital form of central bank money as an alternative to physical cash; these alternatives are known as Central Bank Digital Currencies or CBDCs¹.

CBDCs may be issued to be spent by citizens in shops and in their everyday life, and/or for the wholesale use among financial intermediaries.

The use for retail of a CBDC is easy to imagine; even the idea of using a CBDC among intermediaries is appealing because it would be a central bank liability, and therefore, it would offer an immediate and risk-free settlement finality.

Working on a roadmap to make cross-border payments quicker, cheaper, and more transparent, the G20 is suggesting, with the help of the CPMI², exploring the possibility of using CBDCs in cross-border transactions.

Models of cross-border payments using the CBDCs might be simpler than today's ones, but face two main obstacles:

- 1) Lack of interoperability: CBDCs are developed independently by the diverse central banks on different technological platforms, focusing on domestic needs, and therefore are not interoperable by design;
- 2) Multi-jurisdiction geography: to keep control of the monetary sovereignty, non-resident intermediary banks will probably be excluded from owning directly digital currency portfolios in jurisdictions under which they are not licensed and regulated, exactly as it happens today with the central bank money.

Without a change in the central banks' rules to access their central bank accounts/currencies, non-resident intermediaries will always need a local **correspondent bank** to operate in a foreign country; even to handle foreign CBDCs.

In addition to that, the lack of **interoperability** will remain an obstacle, and it will be of paramount importance for intermediaries to use platforms able to "connect" a conditional settlement between two different CBDCs.

To create an interoperability mechanism, Swift is exploring a solution based on the use of the transaction management platform. A "**Swift CBDCs sandbox**" proof-of-concept is currently underway, with the help of several central banks and a few Commercial Banks.

The use of CBDCs in cross-border payments might become a further opportunity for Swift to deliver quality services to the banking world.

¹ [CBDC Tracker](#)

² Committee for Payment Market Infrastructure of the Bank for International Settlements

2. The retail case for CBDCs

The central banks of the countries which run about 90% of the world's economy started studying the possibility of "substituting" part of physical cash with a more modern means of payment: the "Central Bank Digital Currency" or CBDC.

The CBDCs would be the **digital form** of a **central bank liability** (exactly like cash) and could, in theory, have the same acceptance as physical cash today although in the digital space.

In some countries, the CBDC could act as **legal tender**³, and CBDC payments would have, exactly like cash, a **low cost** for both vendors and consumers.

It is quite easy to imagine that the digital euro (or yen, or dollar, ...) could quickly gain popularity and partially substitute the use of cash; it will be used, among others, to pay merchants and for person-to-person payments.

In short, we may assume that retail CBDCs will have an impact on the physical cash substitution and partially substitute cards in POS payments and person-to-person transactions.

Any CBDC shall be accessible to residents⁴ in the issuing countries; the d-USD would be accessible to US residents, the d-GBP to Britons and so on. In Europe, the digital euro would be accessible to euro-area countries' residents, and it is not yet known to which extent EU residents from non-euro countries will have access to it.

If the various CBDCs remain accessible only to resident citizens, it would lose its potential to be used for remittances and money transfer abroad, *e.g.*, used by foreign workers to send money to their families at home.

It is manifest that a "strong" CBDC circulating freely in another country would threaten the local currency and add a parallel monetary mass, undermining the local central bank's sovereignty. Some countries might just adopt "foreign" CBDCs as local currency, as might be the case with the USD or the euro.

An additional consideration will be the cost to hold and transact in a retail CBDC. Holding cash and using it as payment is largely free to the user; physical cash can be in someone's pocket, under the mattress or in an expensive leather wallet. Retail CBDC will place certain technical requirements on the user that might exclude certain parts of the population.

³ Legal tender definition may be change in different countries

⁴ Temporary residents (visitor) or permanent

3. wCBDC, the wholesale case

Besides the retail use case for CBDCs, a few central banks started studying the possible advantage of having a wholesale one, for intermediaries only.

The G20 endorsed the vision to use CBDCs to simplify the settlement of cross-border payments, and the Bank for International Settlements (BIS) introduced this idea as a “pillar” of the roadmap to have cheaper, faster, and more transparent cross-border payments⁵.

Among the expected advantages of using a wCBDC in cross-border payments, there is the possibility to have an instant settlement finality, with extended operational hours; ideally 24/7.

The BIS papers, and most of the proofs-of-concept developed so far, describe also the hurdles which create a distance between the theoretical use of CBDCs against the real operational or legal constraints.

The BIS themselves declare in their paper: “Connecting Economies through CBDCs³”:

“<omissis> a key question for central banks to consider is whether commercial bank participants can access the CBDCs of jurisdictions where they are not themselves locally domiciled and regulated”.

Let’s focus on the reasons for this statement.

A central bank allows only intermediaries that they authorize and supervise, to open central bank accounts and to own and transfer the central bank currency. It is in this way, that central banks may keep under control their monetary aggregates and guarantee a **sovereignty** on the currency.

Today, a non-domestic intermediary can only open accounts with domestic intermediaries, not directly with the central bank, unless they are a central bank themselves and open an account with another central bank (e.g., foreign central banks have accounts with the Federal Reserve and the ECB).

Therefore, domestic banks can hold and use **central** bank money, whereas non-domestic ones can hold and use only **commercial** bank money. In this way, no foreign intermediary can have a claim directly against the central bank.

Under these conditions, no foreign bank would be allowed to hold any foreign CBDC deposit. With the CBDCs, we may imagine three different theoretical scenarios:

- 1) **Closed access:** only domestic intermediaries may access the CBDC;
- 2) **Open access:** both resident and non-resident intermediaries are allowed to hold a CBDC’s deposit and non-resident intermediaries might be restricted to CBDC only and not be allowed to access any other central bank service;
- 3) **Indirect access:** only domestic intermediaries access the CBDC, but they are allowed to intermediate services on behalf of non-resident intermediaries.

⁵ [FSB: Enhancing cross-border payments](#) – Sept 2020

[BIS: Central bank digital currencies for cross-border payments](#) – July 2021

[BIS: Central bank digital currencies for cross-border payments](#) - July 2022

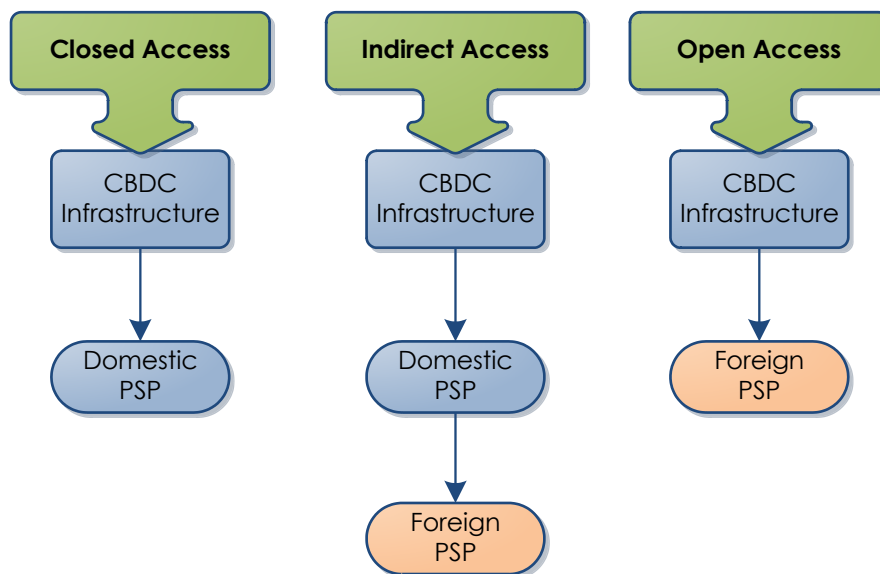


Figure 1: Possible multijurisdictional models

In the **closed access model**, non-residents cannot access the digital currency, therefore, this model would require correspondent banks to offer a bridge solution to support indirect access via commercial bank issued tokens against bank deposits.

To exchange cross-border payments, the **direct access model** would be the simplest because it would allow non-resident intermediaries to transfer a foreign central bank liability directly, e.g., a European intermediary could send “central bank” USDs directly to an Asian one, without any intervention, control, and supervision of US-based intermediaries, or central bank⁶.

The **indirect access** would allow domestic and non-domestic intermediaries to exchange transactions, replicating the correspondent banking model. The advantage would be that, after executing all the pre-validations, including AML/CFT screening, the settlement would be a direct “payment” between the subaccount of the debtor and the subaccount of the creditor, regardless of the countries of residence of the two. The transaction will be simplified like those occurring today between two banks sharing the same correspondent bank.

Using CBDCs instead of traditional money would allow for **shortening the chain** of intermediaries necessary to close the transaction, having an efficient settlement **finality** directly with central bank money, and having a **faster** payment because the settlement would be available on 7/24.

Another important question for wCBDC is whether they will support forms of **programmable conditionality**. Should a central bank emit a token (virtual banknote) having a conditionality, it would be priced less than the normal FIAT currency. Therefore, we would expect that central banks will not issue conditional CBDCs. Programmability would be left to the market and managed in the payment system.

Impact in forex exchange and tokenized asset settlement availability of a wholesale CBDC might become very important in several different business cases, such as FX transactions, trade, securities

⁶ If the CBDC is a bearer instrument.

settlement, and theoretically any PvP (payment versus payment) and DvP (delivery versus payment) transaction.

CBDCs are expected to be based on technology allowing programmable solutions, which would secure PvP or DvP transactions. Programmability will be used to ensure that one leg is delivered to the legitimate recipient only when the second one is secured in favour of the counterparty; unfortunately, we may expect that several problems will remain:

- ✓ If CBDCs were programmable, intermediaries would offer better and more secure services, including PvP and DvP; the best example of programmability is “conditionality”: execute the payment if, and only if, a certain condition is satisfied (*e.g.* if securities are ready to be delivered).
- ✓ Probably, central banks will not “issue” conditional CBDCs, to guarantee the par-value and avoiding the have a part of their CBDC priced less than the traditional “banknote”; if we consider a “banknote” which can be spent for any purpose, and another one that can be used only to buy a specific type of good, we can say that on a “monetary” market the second would be priced less.
- ✓ Different CBDCs will not be natively interoperable with each other; they will be based on different platforms and technologies.
- ✓ To create DvP and PvP mechanisms, it will be necessary to build forms of smart “interfaces” which **connect** a smart contract of one payment with a CBDC, with another smart contract with another CBDC.
- ✓ The possibility to create these connectors has been the object of different POC driven by the market and by a few central banks; they are called “Triggers”, “Bridge”, “mBridge”, ... The BIS themselves took part in a number of these POC⁷.

The realization of efficient “connectors” will be mainly left to the private initiative and the Payment Market Infrastructures (PMIs). Predictably, there will be many different connectors, specialized in diverse business cases and currency corridors.

For treasurers, it will be of paramount importance to have the possibility to swap instantly “values and risks” from one asset to the other; therefore, it will be necessary also to have an immediate exchange between the FIAT currency to the CBDC, which implicitly means that central banks offering CBDC have to support 24x7 deposit and RTGS services.

Triggers should allow securing DvP between two different CBDCs, between one CBDC against one FIAT currency leg, or digital asset, trade contract, and theoretically any other digital form of value.

⁷ [BIS Connecting Economies through CBDCs \(OCT 2022\)](#)

4. Swift CBDC Sandbox

In this scenario, Swift started in 2022, and continued in 2023, a POC called CBDC Sandbox⁸.

The sandbox demonstrated the importance of considering interoperability for cross-border as well as domestic payments at the design stages of a CBDC, i.e., to mitigate potential global fragmentation by 'building it in' from the start.

It appeared clear the need to extend the scope for interoperability between existing RTGS systems, faster payments systems, and market infrastructure interlinking initiatives.

Swift aims, with this POC, to design a new solution to help intermediaries to improve their services in this innovative market; Swift will support the industry to achieve full interoperability between existing and new forms of payment.

⁸ [SWIFT Connecting Digital Island;](#)
[SWIFT CBDC sandbox project](#)

5. Appendix

United States

In the US the focus is on wholesale CBDC only and a retail CBDC is not considered at this time. To explore the wholesale use case the U.S. community created a working group, comprised of commercial banks, payment system operators, and the Federal Reserve Bank of New York Innovation Center (NYIC), to explore how regulated money can apply shared ledger technology to deliver programmable, near-real-time transactions with finality of settlement. In this model the current two-tier financial system of central and commercial bank money is not replaced with a new bearer instrument but maintains it by incorporating wholesale central bank digital currency (wCBDC) and commercial bank deposit tokens within a shared ledger, a concept referred to as Regulated Liability Network (RLN).

Spanning 12 weeks, the working group participated in a Proof of Concept (POC), testing a series of hypotheses exploring shared-ledger technology's application to regulated financial services. The work was structured into business, legal, and technical workstreams to obtain a holistic view of the viability of the RLN concept. A detailed report will be published in June/July 2023.

EURO Area⁹

Retail

The ECB is working with the National Central Banks of the euro area to investigate whether to introduce a **retail** digital euro. It would be a central bank digital currency, an electronic currency equivalent to cash, and it would complement banknotes and coins, giving people an additional choice about how to pay.

Recently, the EU Commission submitted to the Parliament the Proposals for a Regulation on the digital euro¹⁰. The Regulation also pronounces that the digital euro shall have a legal tender status, laying the foundation to a wide acceptance in retail commerce.

Since the Proposal contains politically sensitive issues, such as data protection and financial stability, it is unlikely that a conclusion will be reached before the European Parliament elections in June 2024; the date for the introduction of the digital euro remains still uncertain.

Wholesale

The European Central Bank is also exploring the possibility to issue a **wholesale** digital euro to ensure that developments in central bank money keep pace with and contribute to digital innovation. A dedicated group (**NTW-CG** or New Technology Wholesale digital euro Contact Group) has been set to define and experiment the use of different technologies, and to analyse and compare if and which of these is more suitable for a wholesale digital euro.

In the scope of NTW-CG are different scenarios of DvP and Pvp¹¹:

⁹ <https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.pr230428~6a59f44e41.en.html>.

¹⁰ [REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the establishment of the digital euro](#)

¹¹ Delivery versus Payment and Payment versus Payment.

- 1) a digital leg versus a traditional one;
- 2) a digital leg versus another digital leg on a different DLT;
- 3) two digital legs on a unique DLT.

The third case would imply to have a new “digital” version of T2S¹².

So far, there are three main technologies under scrutiny:

- Trigger solution of Deutsche Bundesbank ([link 1](#); [link 2](#)),
- TIPS Hash-Link solution of Banca d’Italia ([link](#)),
- Full-DLT Interoperability solution of Banque de France ([link](#)).

To be able to measure costs and benefits of every solution, some trials will be executed in 2024, also involving market stakeholders.

United Arab Emirates

The Central Bank of the United Arab Emirates (CBUAE) is going to launch the digital dirham, its central bank digital currency (CBDC) for both domestic and cross-border transactions.

According to a March 2023 release, the CBUAE signed a contract with Abu Dhabi's G42 cloud and R3 to be the technology suppliers of the CBDC implementation.

Digital Dirham will support the UAE's digital transformation program by solving the challenges associated with domestic and cross-border transactions, promoting financial inclusion, and accelerating the transition to a cashless society.

The first phase of UAE's CBDC strategy consists of three steps: the launch of mBridge to facilitate real-value cross-border CBDC payments for international trade settlement; proof-of-concept work for bilateral CBDC bridges with India, and as the last step a proof-of-concept work for domestic CBDC issuance for both wholesale and retail segments.

The completion of this first phase should be in the upcoming 12 or 15 months.

The first pilot of project mBridge, which has tested cross-border payment and has allowed multiple central banks to issue and trade their central bank digital currencies, was successfully concluded in October 2022 by CBUAE in collaboration with the Hong Kong Monetary Authority, the Bank of Thailand, the Digital Currency Institute of the People's Bank of China, and the Bank for International Settlements.

To enable cross-border CBDC transactions for trade and remittances, CBUAE and RBI will work together to perform a proof-of-concept (PoC) of a bilateral CBDC bridge.

¹² T2S or Target 2 Securities is a system to settle securities in Europe. It is based on Central Bank Money (Target2) and a common accounting platform for the European Central Securities Depositories.

India

The Reserve Bank of India (RBI) launched digital rupee pilots, its central bank digital currency (CBDC), for both wholesale and retail segments.

The Digital Rupee-Wholesale (₹-W) pilot was introduced on November 1, 2022, including nine locally operating banks, with the settlement of secondary market deals in government securities as the only use case.

The Digital Rupee-Retail (₹-R) pilot was introduced on December 1, 2022, to a closed user group (CUG) of customers and merchants. The ₹-R is a digital token and financial intermediaries like banks are responsible for its distribution. They offer users a digital wallet through which customers can make transactions. QR codes can be used to pay merchants. Transactions include both P2P and P2B.

On February 2023, the RBI reported that the Digital Rupee-Retail (₹-R) pilot has involved 50,000 users and 5,000 merchants. Eight banks and four cities have been selected for this phase and 700,000 transactions have been recorded. Plans include adding more cities gradually.

The digital rupee won't replace the currently accepted methods of payment, but its use would reduce transaction costs.

Saudi Arabia

The Saudi Central Bank (SAMA) is focusing on domestic wholesale CBDC use cases; however, no decision has been made about issuing it.

In 2019, SAMA and CBUAE successfully conducted experimentation now as "Project Aber" in which they find out that a dual-issued CBDC is viable for cross-border payments.