

The Faster Payments Council (FPC) Cross-Border Payments Work Group is proud to present the third issue of the Work Group's Bulletin focused on Central Bank Digital Currencies (CBDCs) and their effect on cross-border faster payments.

This series of Bulletins is designed to educate the payments industry on the developments of new payment methods supporting cross-border faster payments and provide an ongoing source of information on their benefits, risks, and other considerations.¹

Bulletin.03 focuses on the ongoing domestic and regional CBDC initiatives and the different implementation approaches being taken and frameworks being considered. The bulletin examines two possible design uses and choices, reviews the different stages and motivation of and for CBDC adoption.

In this edition:

- CBDC Market Landscape
- Wholesale versus Retail Distribution
- Liquidity Management

Central Bank Digital Currency (CBDC)

As described on the Federal Reserve's website, a Central Bank Digital Currency (CBDC) "is generally defined as a digital liability of a central bank that is widely available to the general public. Today in the United States, Federal Reserve notes (i.e., physical currency) are the only type of central bank money available to the general public. Like existing forms of money, a CBDC would enable the general public to make digital payments. As a liability of the Federal Reserve, however, a CBDC would be the safest digital asset available to the general public, with no associated credit or liquidity risk."² This is a broad definition of a CBDC. Some other definitions limit a CBDC to being used for transactions between central banks, between central banks and commercial banks, or between commercial banks.³

CBDCs can currently be implemented in at least three different ways:

- For transactions only between central banks, e.g., for transactions between the U.S. Federal Reserve and the Bank of England or the Bank of Canada. This might be one way to facilitate faster cross-border transactions.
- For transactions between commercial banks and between commercial banks and the central bank, e.g., the Federal Reserve. In the method of implementing CBDCs in this and the previous bullet, retail or consumer accounts would not have access to the CBDC.
- For transactions between all types of accounts, including retail accounts. In this case the CBDC could be used for any transaction which supports a digital currency.

No decision has been made in the U.S. about if, when or how a digital currency will be implemented. In addition, while there have been pilot or demonstration projects around the world showing the viability for using a CBDC for transactions between central banks, there have not yet been successful pilots or demonstration projects proving the viability of using CBDCs for transactions between commercial banks and for using CBDCs for digital transactions in the general economy.^{4 5}

This third edition of the bulletin will focus on some of the ongoing in-country, regional, and cross-border CBDC initiatives and the different implementation approaches being taken, and frameworks being considered. The bulletin examines two possible design uses and choices, reviews the different stages and motivation of and for CBDC adoption.

It is recognized that the exploration of CBDCs is continuing and ongoing. The shape and form of the exploration is far from determined and will likely vary between countries and regions. The research, pilot testing, and initial implementations will continuously unearth and expose different risks as well as the operational and procedural modifications needed for the adoption of this new form of currency.

Note: Recent comments from some policymakers indicate that any new CBDC should be accompanied by industry-level education and awareness of what a CBDC is and how it operates differently from existing payment systems.

Central Bank Digital Currency Market Landscape

Digital assets and more specifically Central Bank Digital Currencies are seeing an acceleration of exploration across many countries and central banks. It is important to distinguish some of the characteristics between privatized currencies (e.g., Bitcoin or Ethereum), distribution methods, public/private key management. Additionally, one of the key challenges of CBDC adoption is interoperability among new CBDC implementations as well as with legacy clearing and settlement systems (e.g., Fedwire and CHAPS). Recently, there has been an attempt by SWIFT to bridge the interoperability gap. In March of 2023 SWIFT announced the successful testing of their solution to enable CBDCs to move between Digital Ledger Technology (“DLT”) -based and fiat-based systems using existing financial infrastructure.⁶

It is interesting to understand the motivations of exploring and eventually deploying a CBDC in the market. It is important to keep in mind how regional differences and technological advancements help drive the design choices that support those differences. In traditional implementations of fiat currency, the central bank delivers value to facilitate commerce and the ability to pay taxes in country. Fiat money is a government-issued currency that is not backed by a physical commodity, such as gold or silver, but rather by the government that issued it.^{7 8}

Today methods of funds deployment include direct connection to participant banks domiciled within the country to be the custodians of this fiat currency. The central bank maintains a master set of centralized books and records distributing funds to downstream participants. Within a digital asset world and more specifically a CBDC world, given technological advancements (e.g., advanced computing power and telecommunications) funds distribution can take on many different forms (e.g., Central Bank to Central Bank, Central Bank to Commercial Bank, Commercial Bank to Commercial Bank, Central Bank to Consumer, etc.).

Wholesale versus Retail Distribution

An important distinction of CBDCs is their origination point is not only derived from the central bank, but it is also a direct liability. This means that the liability and therefore risk is directly with the central bank. There are of course trade-offs with this approach. While third-party risk is mitigated, know-your-customer (KYC), customer relationships and functions such as lending become more challenging. Related to this is the idea of single (retail) versus multi-tier (wholesale) distribution where differences from traditional fiat mechanisms become more apparent. In a retail model entities or individuals can either host their own “digital private keys” or custody with a third party such as a commercial bank. The former or single tier type distribution allows for greater flexibility by central banks in some use cases such as stimulus or tax payments but hinders others such as lending. In a multi-tier or third-party held key management model the third-party holds custody and potentially the liquidity for these assets, akin to traditional financial operations today.

Liquidity Management

There are several mechanisms that are observed across the CBDC spectrum. In a loose definition one would conceptualize settlement in the traditional fiat world where ledgers are reconciled based on debit/credit entries as a result of customer payment instructions (e.g., SWIFT). In a digital asset world, money movement is synonymous to the payment instruction associated with it. Therefore, in a CBDC world, this movement between participants needs an orchestration of liquidity especially in a multi-tier construct based on a standard set of rules.

There are several methods that are important to note.

- In one of the more straightforward methods in a cross-border use case (as an example) is the central bank hosted FX exchange. This is where the central bank would work in coordination of the host or recipient country to manage and maintain liquidity to handle FX conversion and distribution to end beneficiaries.
- A second model expounds upon the central bank construct but leverages a third-party intermediary to manage this liquidity on behalf of participants. Advantages could be objective key management and technological advancements that the central bank may not be able to maintain.
- The third and newer observed method is an Automated Market Maker or AMMs. These AMMs can operate on a set of rules established by a consortium and can operate across regions and time zones with greater efficiency.

The following table provides a description of some of the recent CBDC projects and their status as of March 2023. This is followed by a more detailed explanation of these individual projects.

Project	Description	Status
Project Sela	The BIS Innovation Hub Hong Kong Centre, the Hong Kong Monetary Authority and the Bank of Israel have joined forces in Project Sela to explore the cyber security and technical feasibility of a two-tier retail CBDC architecture that allows intermediaries to provide CBDC services without any related financial exposure. The goal is to complete the project and publish the findings by mid-2023.	Research
Project Jasper	In 2017, the Bank of Canada launched Project Jasper, which concluded after four phases, and included cross-border testing with the Bank of England and the Monetary Authority of Singapore. The experiment provided significant insights into the relative strengths and weaknesses of using DLT for financial market infrastructures.	Pilot
Project mBridge/ Multiple CBDC Bridge	Project mBridge is a collaboration between the BIS Innovation Hub Hong Kong Centre, the Hong Kong Monetary Authority, the Bank of Thailand, the Digital Currency Institute of the People's Bank of China, and the Central Bank of the United Arab Emirates. After experimenting with different technology architectures in earlier phases of the project, the project team developed a new blockchain – the mBridge Ledger – custom-built by central banks for central banks to serve as a specialized and flexible platform for implementation of multi-currency cross-border payments using CBDCs.	Pilot
Project Aurum	In March 2021, the BIS Innovation Hub in Hong Kong, in partnership with the Hong Kong Monetary Authority released a prototype CBDC which could issue both wholesale and retail tokens. Aurum is a full-stack (front-end and back-end) CBDC system comprising a wholesale interbank system and a retail e-wallet system. The aim was to bring to life two very different types of tokens: intermediated CBDC and stablecoins backed by CBDC in the interbank system.	Pilot
Project Mariana	In November 2022, Banque de France, Monetary Authority of Singapore, and the Swiss National Bank in partnership with the Eurosystem BIS Innovation Hub announced a cross-border automated market maker (AMM) project. This is aimed at exploring using AMMs to facilitate exchanges between Swiss Franc, Euro, and Singapore dollar on the wholesale level.	Pilot
Onyx/Multiple wCBDC	In July 2021, Banque de France announced the successful completion of a cross-border payment experiment with the Monetary Authority of Singapore that used JP Morgan's Onyx unit.	Pilot

Project Sela

Project Sela is an interesting concept based on a two-tier distribution method and looks to leverage third parties for liquidity management. One of the signature design elements of this concept is that liquidity does not sit on the intermediary's balance sheet. The main thesis of this project is that by mitigating the distribution of balance sheet risk and costs the central bank can distribute further through the value chain. The project is also seeking to explore how cyber risk can be mitigated by reducing balance sheet exposure but keeping data opaque eliminating attacks on individual entities on the infrastructure.⁹

Project Jasper

This longstanding project has undergone several phases of exploration. The most recent version of this project sought to explore wholesale distribution of a CBDC to commercial banks for cross-border use cases. This project utilized third parties to facilitate the movement of liquidity and smart contract technology to perform execution functions. The project used two different ledgers (one in each market) to demonstrate interoperability across markets.¹⁰

Project mBridge / Multiple CBDC

Similar to Project Jasper, Project mBridge seeks to test CBDC movement between two distinct markets. The biggest differentiator is mBridge looks to utilize a common ledger platform between two central banks. This design element is seeking to prove that one universal platform will increase efficiency while keeping costs down. This does assume one platform is robust enough to withstand security, throughput strains, uptime, and many other considerations.¹¹

Project Aurum

Project Aurum is a project between the Bank of International Settlements and the Hong Kong Monetary Authority (HKMA). This two-tiered system solves for use cases across the entire economy. The first, a wholesale CBDC, is a token that is distributed at the wholesale or bank level for inter-bank funding payments. The second, a retail CBDC, is a stablecoin that is backed by the wholesale CBDC-token. This system keeps the pure CBDC directly with the banks and uses an alternative currency for retail distribution. This keeps ledger systems separate and therefore enhances security. Legal, operational and policy considerations are also mitigated with such an approach as much of the debate lies with a direct linkage, retail to central bank relationship.¹²

Project Mariana

Liquidity is a constant theme when assessing different CBDC project constructs. Project Mariana seeks to solve the liquidity conundrum through the use of Automated Market Makers or AMMs. This becomes particularly important in a cross-border situation. In this model algorithms and pooled liquidity structures are combined to deliver an automated distribution and pricing (FX) mechanism to participants on the network. Specific objectives of this project were: (i) explore the design and application of AMMs for wholesale CBDCs; (ii) investigate if a supra-regional network could work as an efficient and trusted hub for cross-border settlement; and (iii) research wholesale CBDC governance models within that network.¹³

Project Onyx

Project Onyx combines the power of central bank liquidity with commercial bank like distribution through traditional FIAT mechanisms leveraging Real-Time Gross Settlement (“RTGS”) in a retail setting. The project conceptualized a multi-CBDC that leverages common liquidity pools to atomically swap currencies in a cross-border use case. This keeps both costs and liquidity usage down while keeping transparency and security in mind. The project relies on allocating (aka “staking”) idle balances to the general liquidity pool. Contributors to the general pool are compensated based on usage which generates yield for participants on the network.¹⁴

Conclusion

The global cross-border payments space has been under scrutiny for roughly ten years due to perceived high costs, lack of transparency, operational complexity, and generally slow transaction settlement.

This bulletin examined a few of the ongoing CBDC pilots. These and other ongoing projects are being looked at differently some are wholesale while others are retail, some are domestically focused while others are cross-border. These CBDC pilots can be central bank to central bank, among commercial banks and between the central bank and the commercial banks or available to all players including retail customers.

The ongoing pilots and research projects have already provided some lessons learned:

- There is no universal case for CBDCs because each country/economy is different. So central banks need to tailor plans to their specific circumstances.
- Security and privacy are paramount: Central banks must ensure their digital currency projects are secure and protect user privacy. This includes implementing strong encryption and authentication protocols, as well as ensuring that the system is resilient to cyber-attacks.
- Cooperation in areas like regulation, interoperability and standard setting and more knowledge sharing between banks will be critical for development and adoption.
- The lack of coordination on technology and messaging standards in the initial stages of development could imply that retrofitting CBDC for cross-border use will be costly and complex.

At the same time, these CBDC pilots and research efforts have reinforced traditional payment processing procedures:

- Clearing and settlement - Authorities are researching how central bank digital currencies (CBDCs) could make payment and settlement systems faster and more efficient.
- Contingency – Payments made using a CBDC necessitate the ability to process, clear, and settle continuously 24x7x365 and require back-up systems and stand in processes to keep funds moving in real time.

- Exceptions - The need for the creation of schemes with rules and standards to handle multiple conditions, such as exceptions and returns.
- Interoperability - CBDCs need to interface with not only other CBDCs but with other payment systems, private and public blockchains. The global CBDC ecosystem risks becoming fragmented with numerous central banks developing digital currencies based on different technologies, standards, and protocols. If left unaddressed, this fragmentation could lead to 'digital islands' springing up across the globe.¹⁵
- Liquidity - In a CBDC world, the movement of funds between participants needs an orchestration of liquidity especially in a multi-tier construct based on a standard set of rules.
- Local rules and regulations - Current legislation in some jurisdictions may prevent or restrict the issuance of CBDCs.

These and future pilots and projects may lead to more research and ultimately industry acceptance of some form of CBDCs. CBDCs have the potential to enhance the efficiency of cross-border payments¹⁶ and transform traditional correspondent banking practices.

Future editions of these bulletins will be focused on industry initiatives affecting and impacting cross-border payments such as ISO 20022, Immediate Cross-Border Payments (IXB), and Open Banking while continuing to monitor ongoing cross-border CBDC projects and initiatives.

Cross-Border Payments Work Group Bulletin.03

Thank you to the members of the FPC Work Group who contributed to this 3rd edition of the Bulletin series. To view previous editions:

[Cross-Border Payments Work Group Bulletin.01](#)

[Cross-Border Payments Work Group Bulletin.02](#)

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About the Cross-Border Payments Work Group

The FPC Cross-Border Payments Work Group covers global industry initiatives, gathering information on various models and use cases for real-time payments across borders with the long-term goal of cross-border interoperability. The Work Group is currently focused on Central Bank Digital Currencies and their effect on cross-border real-time payments.

About the Faster Payments Council

The Faster Payments Council (FPC) is an industry-led membership organization whose vision is a world-class payment system where Americans can safely and securely pay anyone, anywhere, at any time and with near-immediate funds availability. By design, the FPC encourages a diverse range of perspectives and is open to all stakeholders in the U.S. payment system. Guided by principles of fairness, inclusiveness, flexibility, and transparency, the FPC uses collaborative, problem-solving approaches to resolve the issues that are inhibiting broad faster payments adoption in this country.

The contents of this bulletin are for educational purposes only and not intended to be an endorsement by the U.S. Faster Payments Council for Central Bank Digital Currency Solutions.

- [1] Note: The purpose of these bulletins is to discuss how a CBDC might be used to facilitate cross-border payments. There are many unanswered questions about CBDCs specifically in cross-border payments and their various attributes and potential advantages and disadvantages. This series of bulletins does not address such questions, and nothing in this bulletin should be read as a recommendation on the introduction of a CBDC in cross-border payments, the attributes of any CBDC in cross-border payments, interoperability of CBDCs in cross-border payments, or any other matter relating to regulatory policy.
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