
HOW CAN CBDC HELP DRIVE DIGITIZATION AND RESPONSIBLE INNOVATION?



VISA
everywhere you want to be



The world is becoming more digital everywhere we look.

We believe that digitization will help drive new value created in the global economy in the coming decade. However, the rate of adoption and degree of digitization across society has not been uniform. From our observation, businesses and individuals who are more tech-savvy—and who can afford to participate in digital innovations—are doing better, are more resilient to technological disruption and economic swings, and have more opportunities.

As a result, digital divides exist in society today and can contribute to widening existing economic and social divides. For digitization to instead help close these gaps and foster inclusive economic growth and social well-being, it will require our current system to evolve responsibly. As we design the future, it will require answers to questions around how governments along with the private sector can consider and develop use cases that build toward long-term goals while addressing existing short-term challenges. It will also require delivering a smooth and equitable transition to a more digital future and incentivizing its widespread adoption.

Central bank digital currency (CBDC) represents a significant step in the evolution of money, representing a new form of currency with the long-term potential to:

1 | **Create a more inclusive economy, allowing everyone to participate in digital financial markets and commerce**

2 | **Be better prepared in critical situations where funds must be disbursed safely, transparently, and efficiently to individuals**

MOST VALUED



Security



**Universal
access**



**Speed of
transaction**



Anonymity

CONCERNS



**Lack of places
of acceptance**

CBDC has the potential to provide the general public access to central bank money the same way cash does today but in an entirely digital experience. This would be particularly valuable in countries where the infrastructure for distributing cash is unavailable or limited. A user-centric approach is therefore critical to help ensure that people and businesses can use CBDC easily and intuitively. If not, technology-driven newness may pose a barrier to adoption for some. Over time, the role and utility of CBDC should evolve to include more and diverse use cases, to help realize the longer-term potential of monetary evolution and to support national agendas.

As with any new solution, driving early adoption is going to be one of the most important and challenging tasks that Central Banks will face should they decide to adopt a CBDC. A preliminary study by Visa on digital currencies shows that people surveyed in Argentina, Germany, Spain and the United States value security, universal access, speed of transaction and anonymity¹. On the

flip side, those same surveyed people worry about not being able to use CBDC for payments. In other words, the surveyed consumers worry that the places they shop won't accept CBDC.

Experiences with CBDC to date show that people expect a similar best in-class experience from CBDCs that they have today with fiat currencies—an experience that is ultimately convenient, familiar, and trustworthy.

To help incentivize retail banks, payment providers, fintechs and other institutions to accept CBDC from day one of CBDC launch in the regions that they operate in — and to ensure business continuity — the cost of transitioning must be low. Hence, when launching CBDC, Central Banks can leverage established financial standards and regulations to tap into existing infrastructure and services. From an engineering perspective, prioritization of CBDC adoption from the start requires any new CBDC system to be backward compatible with existing payment rails.

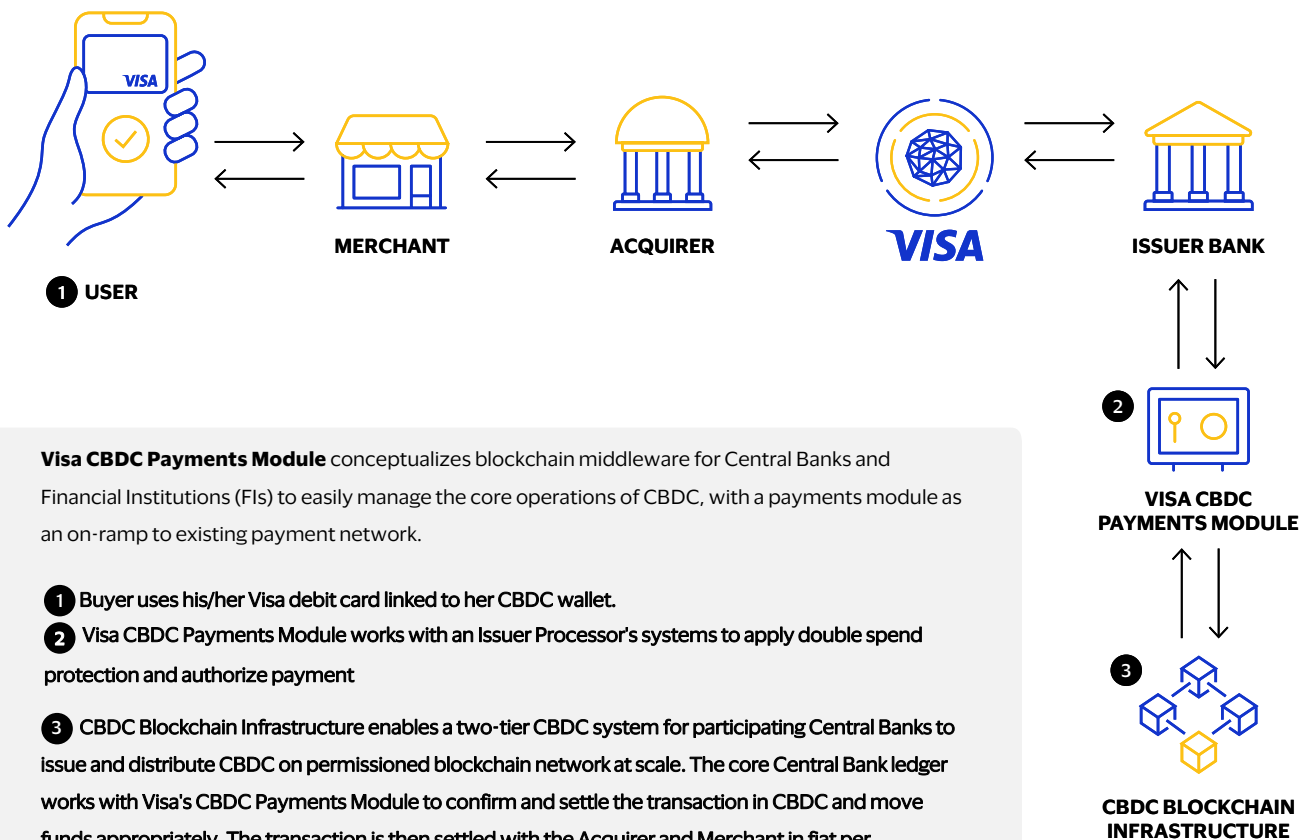
¹ Visa Cryptocurrency A&U Global Study: 3 focus groups with 47 individuals and 10 in-depth interviews in Argentina, Germany, and United States. July 14-26, 2021. Digital Currency Quantitative Research in UK, Germany and Spain. July 22, 2021

CBDC Payments Module² – Digital currency, seamless acceptance: A familiar user experience to help drive CBDC adoption responsibly

Here is where CBDC Payments Module and Visa's thoughts on what needs to be considered to design a successful CBDC roll-out comes in: For the MAS CBDC Global Challenge, ConsenSys and Visa have developed an alpha prototype that can be deployed in a sandbox environment with the vision to help drive early CBDC adoption for everyone, everywhere from day one.

CBDC Payments Module is a proof-of-concept that envisions to bring web3 assets into a web2 user experience by providing an on-ramp for individuals, business owners, governments, and users of all kinds.

The POC is designed to be a bridge connecting a CBDC system with existing forms of payment products and outlets. In linking CBDC with card payments – whether in the form of prepaid or debit cards – CBDC becomes a fast, nearly ubiquitous, and additional choice users can easily adopt alongside existing forms of money, all while benefiting from economies of scale derived from today's mature payment networks. The illustration below captures the flow of a payment transaction that integrates Visa's scale and messaging protocols with a participating Central Bank's ledger technology.



Visa CBDC Payments Module conceptualizes blockchain middleware for Central Banks and Financial Institutions (FIs) to easily manage the core operations of CBDC, with a payments module as an on-ramp to existing payment network.

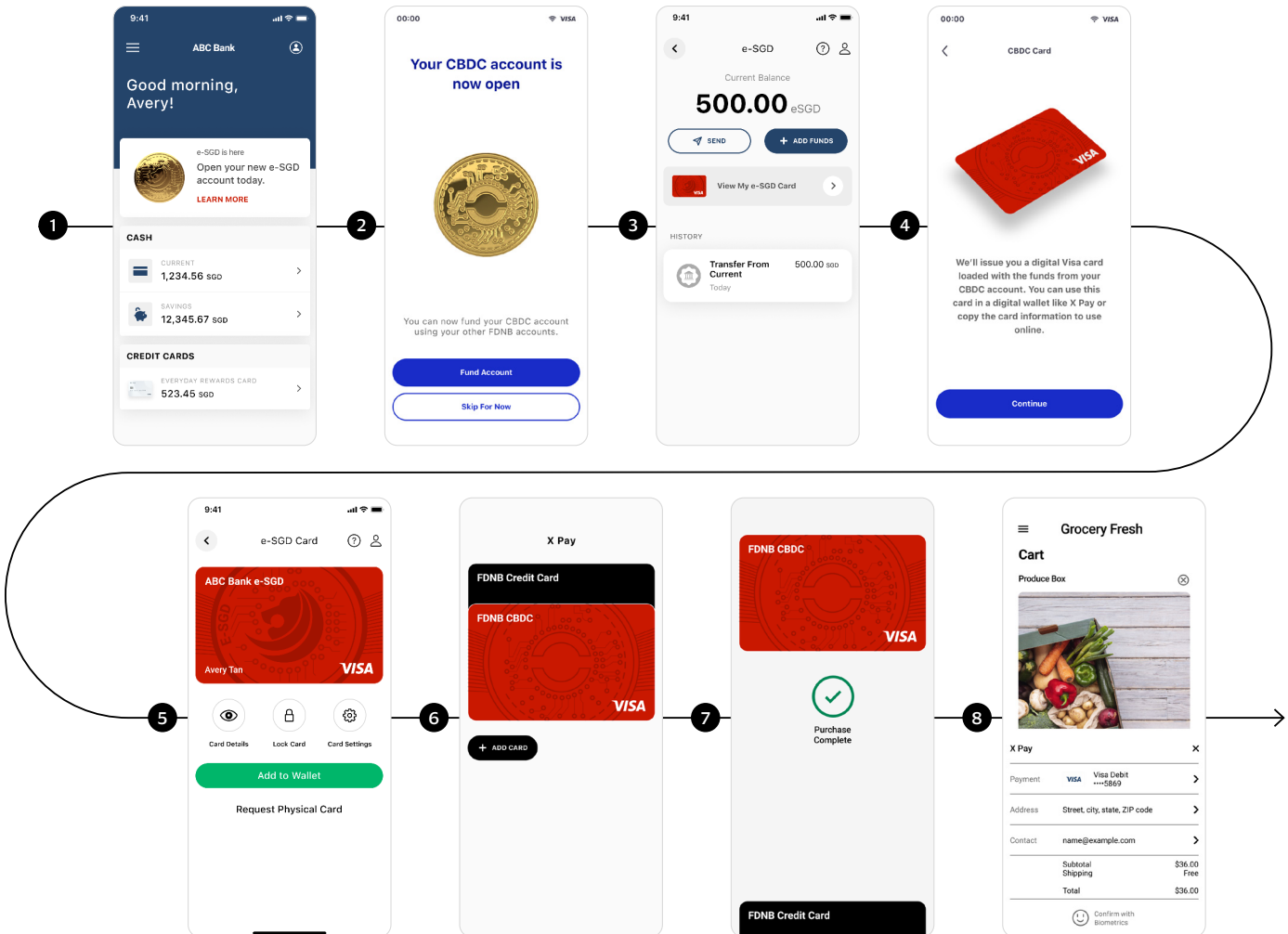
- 1** Buyer uses his/her Visa debit card linked to her CBDC wallet.
- 2** Visa CBDC Payments Module works with an Issuer Processor's systems to apply double spend protection and authorize payment
- 3** CBDC Blockchain Infrastructure enables a two-tier CBDC system for participating Central Banks to issue and distribute CBDC on permissioned blockchain network at scale. The core Central Bank ledger works with Visa's CBDC Payments Module to confirm and settle the transaction in CBDC and move funds appropriately. The transaction is then settled with the Acquirer and Merchant in fiat per established standards and processes.

² Disclaimer: Visa CBDC Payments Module is an alpha ready product that can be deployed in a sandbox environment. The descriptions and depictions of this product should be understood as a representation of the potential features of the fully deployed product. The final version of this product may not contain all of the features described in this document.

The magic happens at the backend without major disruption for users, businesses, and financial intermediaries.

First, CBDC Payments Module envisions to enable users to pay in the way they find most convenient by linking CBDC with existing and supported forms of digital payment—from contactless in-person

payments with tap-to-pay, to e-commerce transactions with in-app payments, to click-to-pay or scan-to-pay on a website. This way, CBDC Payments Module will help make paying with CBDC a familiar experience for users to adopt easily, helping to ensure maximum continuity in user interface and user experience.



Under Visa CBDC Payments Module, **1 2 3** when the user sets up a CBDC digital wallet account with his/her financial service provider, **4** a digital Visa credential will be automatically issued to use at any merchant and business location around the world that accepts Visa. User will be able to **5** digitally add the Visa payment credentials to an existing xPay wallet (Apple Pay, Google Pay, Samsung Pay, etc.) as well as provision their payment credentials with Click-to-Pay or any other ecommerce wallet (i.e. Paypal) at any online merchant. **6 7** When paying at a Point of Sale via tap-to-pay or **8** checking out at an online merchant, user will authenticate using existing supported authentication methods they are familiar with.

Concurrent to the POC in CBDC Payments Module, Visa is exploring how CBDC can be used as a bearer instrument that may also be used offline^{4,5}, increasing overall accessibility, including in areas without an internet connection. The concept of using chip (or, in the future, smart chip) as a store of value is not entirely new. In India, for example, through the National Common Mobility Card (NCMC) program, the government has had an operational card solution for public transit since 2019. We envision the next generation of secure e-cash cards may be a natural conduit for CBDC in small-size transactions, as CBDC may be carried and spent as easily as cash is today. In this way, providing offline CBDC alongside online CBDC accounts has the potential to address an important issue of accessibility for financial inclusion. Visa's research on offline payment system (OPS) proposes a point-to-point secure channel to complete a transaction without needing online connectivity, or communicating with any payment intermediary. The OPS protocol is also designed to ensure funds cannot be double-spent during offline payments given that no trusted intermediary is present in the payment loop to protect against replay of payment transactions. The technology will be designed to rely on trusted execution environments (TEEs) and we will be exploring the viability of different hardware devices to enable offline capability for CBDC.

Second, should a government's Central Bank decide to issue a CBDC, merchants should be able to accept CBDC from day one without having to upgrade their infrastructure. Through CBDC Payments Module, people would be able to spend their CBDC at any of the 80 million merchant locations in over 200 countries and territories that Visa is accepted. The solution is designed so that it will not require any upfront investments from smaller businesses and merchants to set up digital wallet infrastructure, and they will be enabled to participate in the CBDC economy. Over time, we expect businesses to invest in infrastructure upgrades for new acceptance points (e.g. merchant CBDC wallets) if there are meaningful economic benefits in the long run.

Third, financial intermediaries (FIs) would continue to play a crucial role in the CBDC Payments Module design, providing capabilities such as CBDC-linked card issuance, consumer CBDC wallets, digital currency settlements and value-added services. When it comes to user-centric services including fraud-risk management, data protection and dispute resolutions, FIs can tap into their long-proven solutions to help better ensure widespread CBDC usage and adoption.

Driving innovation, responsibly

Last but not least, one of the most exciting possibilities for digital currencies is programmability. In this POC, CBDC Payments Module envisions a future government disbursement program with customized attributes, such as time expiration and merchant categories, to help direct CBDC fund usage. While programmability may offer substantial possibilities for future economy, they should also be weighed against the operational complexity to run such a system in light of existing infrastructure in the long-term, along with other considerations such as consumer privacy.

Recognizing the power of programmability, CBDC Payments Module is designed to be open and interoperable with future use cases in mind, including government disbursements, streaming employee payrolls, worker payouts, and loyalty. Greater coordination between public and private sector needs to happen to help ensure that future smart contracts which enable programmable money will be interoperable with existing payments infrastructure to prevent disintermediation. Part of the product roadmap for CBDC Payments Module is therefore to innovate responsibly together. As a critical payment infrastructure provider, we aim to innovate future retail programmable solutions with key stakeholders including the Central Banks, policymakers and technologists.

4. Mihai Christodorescu, Wanyun Catherine Gu, Ranjit Kumaresan, Mohsen Minaei, Mustafa Ozdayi, Benjamin Price, Srinivasan Raghuraman, Muhammad Saad, Cuy Sheffield, Minghua Xu, Mahdi Zamani
· Towards a Two-Tier Hierarchical Infrastructure: An Offline Payment System for Central Bank Digital Currencies, December 2020.

5. Visa and Innoviti partner to enhance offline payments, September 2021.

Conclusion⁶

Introducing new forms of money and innovative retail solutions to help drive real positive impacts for everyone will require the involvement of a wide range of stakeholders across society.

This kind of cross-sector collaboration is fundamental for creating a ubiquitous, accessible, and robust CBDC solution, as we explore and introduce new features that help drive responsible innovation in the global payment space. In doing so, we can allow transactions to begin in one network and end in another.

But we do not stop there: we also offer value-added capabilities to multiple networks in areas such as data, privacy, risk and security. In the wake of COVID-19, more individuals are going digital for everyday needs, adopting touchless payments such as tapping to pay and relying more on eCommerce. With a growing number of ways to help enable the movement of money, standards and interoperability will rise again in importance to enable participation, security and efficiency of money movement capabilities across all types of flows. By evolving the current infrastructure in payment, and ensuring common standards, Visa can help governments, consumers, small businesses, and companies all over the world send and receive money securely, easily, and efficiently. We strive to lead responsible innovation and deliver exponential benefits to society at large.

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**This document was developed
by Visa payment experts:**

Catherine Gu – Head of CBDC & Protocol
Vanessa Meyer – LAC Head of Innovation & Strategic Partners
Amina Tirana – Social Impact Sr. Director
Adriana Bonifaz – Innovation Manager
Laura Diaz Milan – Product Design
Stuart Smith – Crypto Product Manager



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