May 18, 2022

The Director
Bank Supervision Department
Central Bank of Kenya
P.O. Box 60000 - 00200
Nairobi
Kenya

Email: fin@centralbank.go.ke

Dear Director,

Ripple Labs Inc. ("Ripple") welcomes the opportunity to comment on the Discussion Paper on Central Bank Digital Currency (the "Discussion Paper") published by the Central Bank of Kenya ("CBK") on February 10, 2022.[1]

Ripple would like to thank the CBK for the in-depth and comprehensive analysis undertaken in the Discussion Paper, and for consulting on the way forward for a Central Bank Digital Currency ("CBDC") in Kenya. Ripple welcomes the opportunity to assist the CBK in the design and development of a CBDC.

*Introduction*

Ripple's software products enable financial institutions to send money globally, on a real-time basis, at a fraction of the cost of traditional services available to market participants. Using blockchain technology, Ripple allows financial institutions to process payments instantly, reliably, cost-effectively, and with end-to-end visibility anywhere in the world.

Ripple's aim is not to replace fiat currencies, but rather to enable a faster, less expensive, and more transparent method of making cross-border payments that is in the public's best interest. Ripple's customers and partners are regulated financial institutions - banks and payment service providers - who operate within the contours of the existing financial system.

[1] *See* https://www.centralbank.go.ke/uploads/discussion_papers/CentralBankDigitalCurrency.pdf, Central Bank of Kenya Discussion Paper on Central Bank Digital Currency.

*Interoperability*

As highlighted by the CBK in the Discussion Paper,[2] Ripple also believes that interoperability - achieved through alignment of national payment protocols and adoption of international standard protocols - will ultimately be core to any successful CBDC design and will help enhance cross-border payments as well as domestic retail payments.

Ripple itself applies protocols to drive the efficient globalization of value through multiple initiatives with financial services and open-source communities. RippleNet, our enterprise software solution which is powered by a standardized application programming interface ("API") and built on the market-leading and open standard Interledger Protocol, enables financial institutions to facilitate faster and less costly cross-border payments. RippleNet demonstrates that deep interoperability between commercial financial institutions can make payments truly efficient, particularly in eliminating the uncertainty and risk historically involved in moving money across borders using interbank messaging alone.

In addition, Ripple offers these entities an On-Demand Liquidity capability which leverages the digital asset XRP as a bridge between fiat currencies, further reducing the friction and costs for commercial financial institutions to transact across multiple global markets. XRP is the digital asset that is native to the XRP Ledger, a distributed ledger platform.

Although Ripple utilizes XRP and the XRP Ledger in its product offerings, XRP is independent of Ripple. The XRP Ledger is decentralized, open-source, and based on cryptography. Ripple leverages XRP for use in its product suite because of XRP's suitability for cross-border payments. Key characteristics of XRP include speed, scalability, energy efficiency, and cost.

Protocols used by global, cross-border payment networks and decentralized tools that support them should be considered and supported in this new age of domestic networks, including with respect to the development of CBDCs.

Embracing the capabilities of these global networks, and better enabling domestic institutions to connect their individual capabilities with other systems and markets, will result in optimized outcomes for Kenya's domestic needs as well as fulfill the potential that globalization of value holds.

[2] *See* Discussion Paper, Page 12.

*Ripple's CBDC Private Ledger and CBDC Manager*

On March 3, 2021, Ripple announced a pilot of a private version of the public, open-source XRP Ledger that provides central banks a secure, controlled and flexible solution for the issuance and management of digital currencies ("the CBDC Private Ledger").[3] The CBDC Private Ledger is based on the same blockchain technology that powers the XRP Ledger, which has supported the management of billions of dollars of value for over 8 years, without any significant security or operational issues. This also means that the CBDC Private Ledger is built for payments and designed for issuing currencies. Over 5,400 currencies have been issued on the XRP Ledger over the past 8 years, including XRP which can be leveraged as a neutral bridge asset for frictionless value movement between CBDCs and other currencies.

Therefore, we believe moving money on the CBDC Private Ledger will be cost-effective, reliable and close to instantaneous. Transactions can also happen at volumes required by central banks – the CBDC Private Ledger will handle thousands of transactions per second initially, with the potential to scale over time by using Federated Sidechains[4] or via the Interledger Protocol.

Transactions on the CBDC Private Ledger are verified by the same consensus protocol used by the XRP Ledger, which is far less expensive and more efficient than public blockchains that leverage proof-of-work. The CBDC Private Ledger is also carbon-neutral and 120,000x more energy-efficient than proof-of-work blockchains.[5]

In addition to leveraging the XRP Ledger technology, the CBDC Private Ledger is also supported by RippleNet technologies and the Interledger suite of protocols, to enable ultra-high throughput use-cases such as micropayments.

The CBDC Private Ledger meets even the highest of security standards for central banks, with each having complete sovereignty and ability to customize based on their own unique privacy and policy requirements. While the CBDC Private Ledger has been designed on the basis of an open-source solution - the XRP Ledger - Ripple has adapted it for use so that central banks such as the CBK can run a private network, allowing complete control over the system.

As part of the Ripple CBDC Private Ledger, the Digital Currency Manager ("CBDC Manager") enables central banks such as the CBK to perform all critical tasks of the lifecycle of a CBDC.

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[3] *See* https://ripple.com/lp/cbdc-whitepaper, Ripple Report: The Future of CBDCs.
[4] *See* https://ripple.com/insights/a-vision-for-federated-sidechains-xrp-ledger/, A Vision for Federated Sidechains on the XRP Ledger for more information on Federated Sidechains.
[5] *See* https://xrpl.org/assets/pdf/xrpl-sustainability-methodology-2020.pdf, Measuring the Environmental Impact of Cryptocurrency.

Each user of the CBDC Manager is provided with their own user account and a set of entitlements that determines their level of access (both to accounts and functions within the CBDC Manager). Such entitlements include:

- *Lifecycle Management* - The CBDC Manager provides central bank users with the ability to mint (or issue) a CBDC. Once minted, the CBDC can be distributed to third party accounts or to other central bank accounts. Access to the accounts is controlled through entitlements within the user interface, allowing operational access and processes to be defined in accordance with central bank policy. The central bank can also receive CBDC back to their account when a third party wishes to redeem their CBDC, i.e., credit a bank account or convert to physical cash etc.

- The CBDC Manager also enables a central bank to destroy CBDC. Such functionality is important where the CBDC issued needs to reconcile to another ledger held outside of the CBDC platform, i.e., when managing CBDC on a 1:1 basis with reserves held with the central bank. All of these activities can be controlled through the multi-signing process, thereby reducing risk and ensuring clear audit trails.

- *Multi-signing* - Leveraging the CBDC Private Ledgers multi-signing capabilities, the CBDC Manager can be configured to require all transaction authorizations to use multi-signing so that at a minimal number of humans are required to cryptographically sign any transaction, thereby ensuring a strong connection between robust human approval processes and actual on-ledger activities. Individual users can be assigned a signing weighting as well as a minimum signing count, allowing internal central bank signing hierarchies to be applied.

- *Freezing* - The CBDC Private Ledger and CBDC Manager allow any account holding CBDC to be frozen by the issuer of the CBDC or a global freeze on all accounts. Once frozen the CBDC can only be returned to the issuing central bank - no other payments can be made. The CBDC Manager also allows the issuer to perform an unfreezing action to reverse the individual or global freezing action. These activities are also subject to the multi-signing process within the CBDC Manager described above.

With respect to real world applications of the CBDC Private Ledger, on September 22, 2021, Ripple announced a partnership with Bhutan's central bank, the Royal Monetary Authority of Bhutan, who will use Ripple's CBDC Private Ledger solution to pilot retail, cross-border, and wholesale payment use cases for a digital Ngultrum.[6] Ripple also announced a partnership with the Republic of Palau on November 23, 2021, which will initially focus on developing strategies for cross-border payments and a USD-backed digital currency for Palau.[7]

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With this overview, Ripple respectfully submits the following responses to the questions set forth in the Discussion Paper in the attached Appendix.

Ripple appreciates the opportunity to provide feedback on the Discussion Paper as the CBK studies these important issues, and we would encourage and support further dialogue with all stakeholders. Should you wish to discuss any of the points raised in this letter, please do not hesitate to contact Rahul Advani (Policy Director, APAC) at radvani@ripple.com.

Sincerely,

Ripple Labs, Inc.

[6] *See* https://www.rma.org.bt/pressrelease/PRESS%20RELEASE%20CBDC.pdf, Royal Monetary Authority of Bhutan Press Release on Pilot Project on CBDC.

[7] *See* https://ripple.com/insights/featured/republic-of-palau-partners-with-ripple-to-develop-digital-currency-strategy/, Republic of Palau Partners with Ripple to Develop Digital Currency Strategy.

## APPENDIX

Ripple respectfully submits the following responses to the questions set forth in section 8 of the Discussion Paper.

**Question 1: Which institution/group do you believe is responsible for tackling financial exclusion in any given domestic market? [Multiple answer question]**
**a. Central Bank**
**b. National Government**
**c. Commercial Banks**
**d. Non-Profits/Third Sector**
**e. The individual**

Ripple believes that financial exclusion needs to be tackled by all stakeholders in the ecosystem, across the national government and central bank (by ensuring policies support financial inclusion), commercial banks (by ensuring equitable access to financial services), and non-profits and individuals (by providing timely feedback to ensure exclusion issues can be addressed).

However, it is also worth noting here that one of the bigger drivers of financial inclusion over the past decade has been the rise of financial services from outside the banking sector, such as remittances providers and digital wallets. As the Discussion Paper has noted,[8] these services are pioneering new offerings and alternative experiences for traditional banking users. Therefore, we feel that technology companies such as Ripple also have a responsibility to support tackling financial exclusion issues.

**Question 2: How important do you believe the topic of financial inclusion to be in relation to the development of domestic retail CBDC? [Only one answer]**
**a. Vital (It won't develop without it)**
**b. Important**
**c. Somewhat important**
**d. Not important**
**e. Completely unrelated (no bearing whatsoever)**

Ripple believes that in emerging markets such as Kenya, the topic of financial inclusion is vital when considering the development of a retail CBDC.

[8] *See* Discussion Paper, Page 9.

**Question 3: How would a CBDC impact financial inclusion, either as part of a wider strategy or in isolation?**

A recent paper published by the Bank for International Settlements and World Bank[9] explores CBDCs and their role in financial inclusion. The paper explores three main areas - existing barriers to financial inclusion that could be addressed with the introduction of a CBDC, CBDC design features that many jurisdictions view as critical to addressing these barriers, and the challenges foreseen, along with legal and regulatory changes needed for CBDC implementation.

The paper finds that barriers to financial inclusion differ across countries, but there are 6 main common elements:[10]

- Geographic barriers related to vast territories and remote locations;
- Institutional and regulatory factors, such as a lack of public goods like identity credentials, as well as informality and a lack of consumer protection;
- Economic and market structure issues, including limited competition, inefficiency in the financial sector and a lack of profitability of serving excluded groups;
- Characteristics of vulnerability, such as barriers by age, gender, income or disability status like visual and hearing impairments;
- Lack of education and financial literacy; and
- Low trust in existing financial services.

In Kenya's context, CBK's 2021 FinAccess Household Survey[11] found that formal access expanded to 83.7 percent in 2021 from 82.9 percent in2019, and that this growth is due to financial technology and innovations, especially in mobile money and mobile banking.[12]

In order for such formal access to continue to grow, Ripple believes that the issuance of a retail CBDC could occur in tandem with the creation of associated digital wallets that give consumers ownership and access to the CBDC, and allows for a faster and more efficient method of distribution of money by the CBK and Kenyan government to its citizens. Digital wallets that enable payments, whether made domestically or cross-border, without requiring a bank account could succeed in promoting financial inclusion for the unbanked and underbanked population, which may not be adequately served by the traditional banking system.

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[9] *See* https://www.bis.org/fsi/publ/insights41.pdf, Central bank digital currencies: a new tool in the financial inclusion toolkit.
[10] *See* https://www.bis.org/fsi/publ/insights41.pdf, Central bank digital currencies: a new tool in the financial inclusion toolkit, Page 5.
[11] *See* https://www.knbs.or.ke/wp-content/uploads/2021/12/2021-Finaccess-Household-Survey-Report.pdf, 2021 FinAccess Household Survey.
[12] *See* https://www.knbs.or.ke/wp-content/uploads/2021/12/2021-Finaccess-Household-Survey-Report.pdf, 2021 FinAccess Household Survey, Page 11.

**Question 4: How would CBDC affect cross-border transactions, either as part of a wider strategy or in isolation?**

Ripple believes that there is an important role for CBK to play in the cross-border remittance space. Overseas workers are often saddled with high transaction fees when sending money home to their families. Additionally, these remittance corridors are sometimes too small to warrant adequate attention from major financial institutions, and therefore cannot reach the economies of scale needed in order to reduce costs. A CBDC used to facilitate cross-border remittances will be a service to overseas Kenyan workers, and will help support the country's economic growth.

Additionally, consumers and businesses in Kenya will inevitably have a need to transact with foreign suppliers and vendors. CBDCs that are interoperable with each other will give those countries a competitive advantage. Interoperable retail CBDCs also have the potential to help create linkages and cooperation between regional economies and trading blocs such as the East African Community and African Continental Free Trade Area, both of which Kenya is a member.

Finally, we also think an effective retail CBDC should allow for the processing of micropayments (i.e., payments made for very small amounts), including cross-border micropayments. Currently, the transaction costs associated with fiat micropayments are too high to support their execution. It is also important to note that since a retail CBDC is expected to substantially lower these frictional costs, the number of transactions (whether micropayments or not) is likely to be much higher than observed today, leading to greater cross-border demand.

As we can see from Figure 1 below, overseas Kenyans remitted approximately 3.1 billion USD into Kenya in 2021, which represents approximately a 250% increase over 10 years compared to the 890 million USD remitted inwards in 2011.

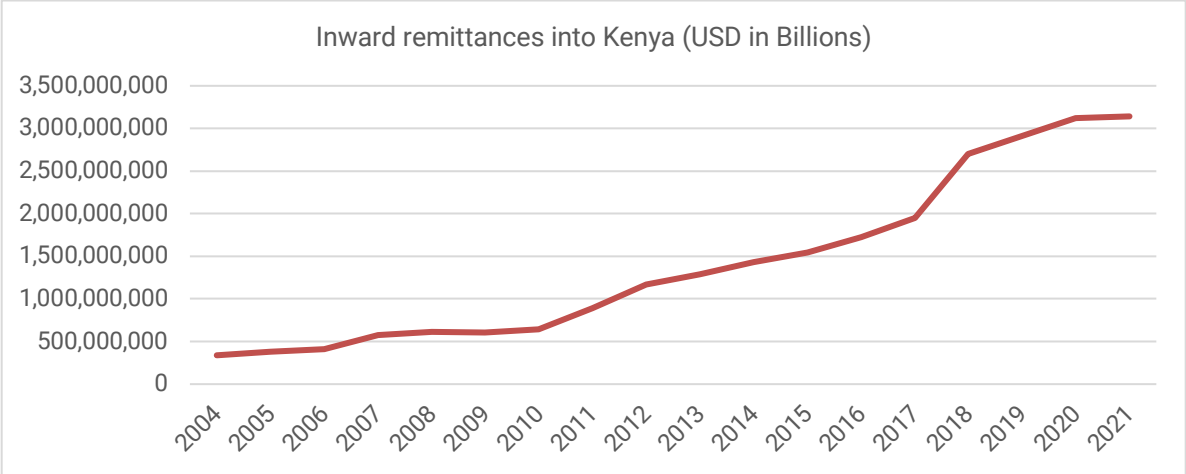


*Figure 1: Inward remittances into Kenya (USD in Billions), 2004-2021*[13]

[13] Data sourced from CBK Diaspora Remittances statistics. See https://www.centralbank.go.ke/diaspora-remittances/.

As noted in the Discussion Paper, efforts have been made to reduce the cost of cross border remittances to Kenya over the last 10 years.[14] Even so, international remittances to Kenya are costly, full of friction, and slow. Data from the World Bank indicates that the average cost of sending remittances to Kenya was around 8.4% in 2020.[15]

Ripple believes that enhancing efficiencies in such cross border remittances will be a key benefit of a retail CBDC.

**Question 5: How would a CBDC affect the financial sector? What tools could be considered to mitigate any adverse impact of CBDC on the financial sector?**

Ripple believes that a CBDC has the potential to offer new opportunities for innovation in domestic and cross-border payments, which will also benefit commercial banks and payment services providers, resulting in a competitive and diverse financial system that ultimately benefits the end-user and consumer. This could increase the resilience of the system overall.

However, the introduction of a CBDC could also lead to some structural changes that affect the functioning of the financial system. This will depend on a number of factors, including the level of adoption of the CBDC, the design of the CBDC, and attractiveness relative to deposits.

A material shift from bank deposits to a CBDC might have an impact on bank lending and intermediation, which could in turn affect lending conditions. However, these impacts may be limited if the system has time to adjust, and a two-tier system (discussed further in Question 10 below) could mitigate any such risks.

Ripple believes that a CBDC could, over time, increase the diversity of payment providers and other financial intermediaries. The introduction of a CBDC could make it easier for new financial service providers to enter the market for payments services, or for lending – increasing the diversity of financial service providers. This, in turn, could increase the resilience of the financial sector to shocks, and reduce the impact of financial crises overall.

**Question 6: What factors would determine the level of adoption of CBDC as a means of payment in Kenya?**

Ripple has no comments on this question.

[14] *See* Discussion Paper, Page 1.
[15] *See* https://data.worldbank.org/indicator/SI.RMT.COST.IB.ZS?locations=KE, Average transaction cost of sending remittances to a specific country (%) - Kenya.

**Question 7: What advantages and disadvantages do you believe CBDC would introduce over the existing digital payments landscape in Kenya?**

Ripple has no comments on this question.

**Question 8: What additional potential opportunities, considerations, or risks of a CBDC may exist that have not been discussed in this paper?**

Ripple appreciates the extensive analysis of the opportunities and risks of a CBDC undertaken by CBK in section 5 of the Discussion Paper.[16]

Ripple would like to note some additional opportunities and policy considerations for the CBK to consider in the design of a CBDC.

a. ***Tokenization[17] of assets:*** While not addressed directly in the Discussion Paper, Ripple would also like to highlight the ability for a retail CBDC to extend the benefits of tokenization to the public. The tokenization of assets can be extended through a retail CBDC by allowing the private sector to develop on the ledger established for the CBDC to create new opportunities for tokenization. Examples include protecting property rights for tangible property (such as property, art, and collectibles) as well as intangible assets (such as digital rights) via non-fungible tokens.

b. ***Optimizing supply chain workflows*****:** Additionally, the CBDC workflow being explored by the CBK can also support efficiencies in supply chains by being used to escrow funds and pay invoices. Decentralized exchanges (DEX),[18] such that are built into the CBDC Private Ledger, can ease friction in cross-border commercial payments by allowing the payor to choose the currencies they have, and the payee to choose the currencies they want to hold.

**Question 9: Are there additional ways to manage potential risks associated with CBDC that were not discussed in this paper?**

Ripple has no comments on this question.

[16] *See* Discussion Paper, Page 12.
[17] For the purposes of this comment letter, tokenization of assets refers to the process by which an issuer creates digital tokens on the blockchain which represent ownership of physical or digital assets.
[18] *See* https://xrpl.org/decentralized-exchange.html, Decentralised Exchange.

**Question 10: Which model of CBDC do you believe would be the most suitable in Kenya and why?**

Ripple feels that the creation of a two-tiered public-private payments platform approach, in which the CBK issues the CBDC (Tier 1) while private sector firms distribute the CBDC (Tier 2), could prove an effective model. Ultimately, the more open and extensible the payments platform, the more utility it will deliver. We believe that broad utility - and interoperability - will define success for CBDCs.

Private sector firms like Ripple are well positioned to innovate to solve the interoperability challenges that development of such a platform could ultimately create. Ripple plays an essential role in the XRP Ledger ecosystem by bringing together investment from many different entities (such as private companies, governments, and academia) to provide an open platform approach in which all entities have an equal opportunity to build value-adding services without friction from intermediaries.

We thus support the creation of a public-private payments platform approach that leverages the innovation that companies like Ripple have to offer. Such private sector innovation will also help boost adoption of a retail CBDC, mitigating any concerns around slow adoption.

Ripple believes that it is also important to have flexible architecture built into the model. The functional and operational architecture of the CBDC Private Ledger enables central banks to create flexible solutions that meet the needs of various participants. Hybrid solutions that consider different approaches at each stage of the CBDC lifecycle can be designed. This is important as each stage of the CBDC lifecycle will have a unique set of distribution requirements, as outlined in Figure 2 below.

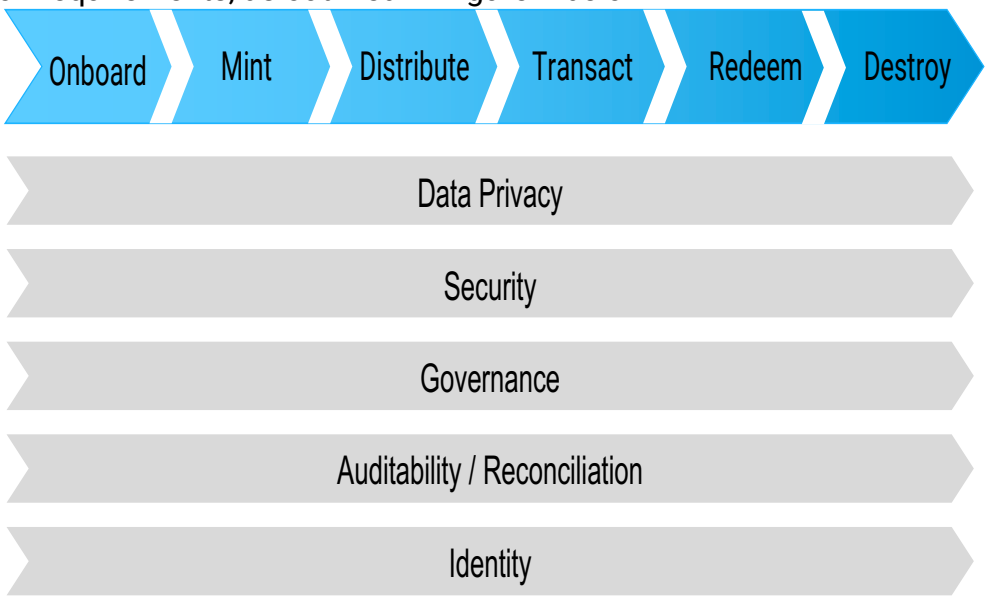


*Figure 2: CBDC Lifecycle Requirements*

The CBDC Private Ledger supports both an intermediated and direct approach as well as a hybrid of these methods across the lifecycle. Transactions can occur both directly between participants and/or via intermediaries, or approaches can be combined where the CBDC is distributed through an intermediary, but transactions can occur directly between participants. These models are outlined in Figure 3 (Direct Transaction), 4 (Indirect Transaction), and 5 (Hybrid Transaction) below.

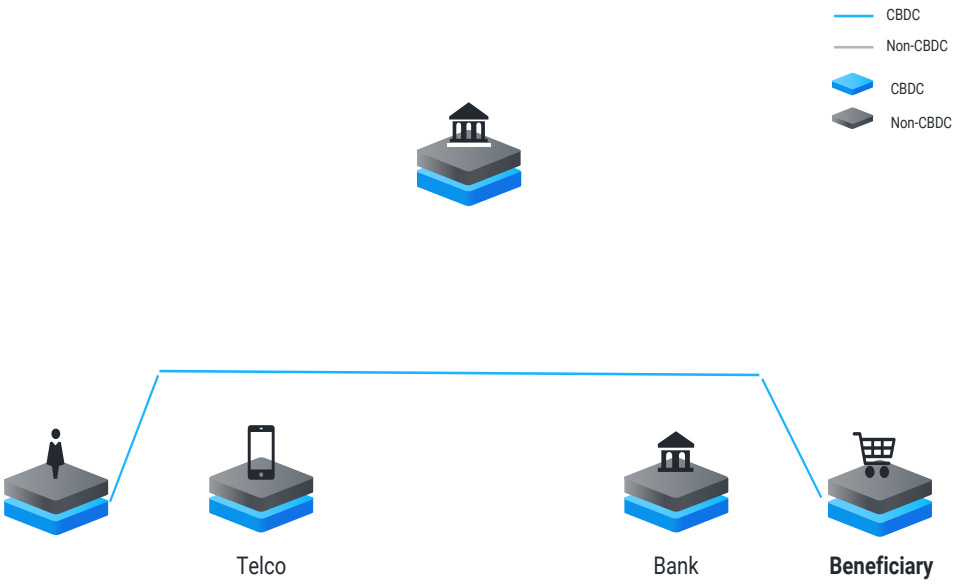


*Figure 3: Direct Transaction*

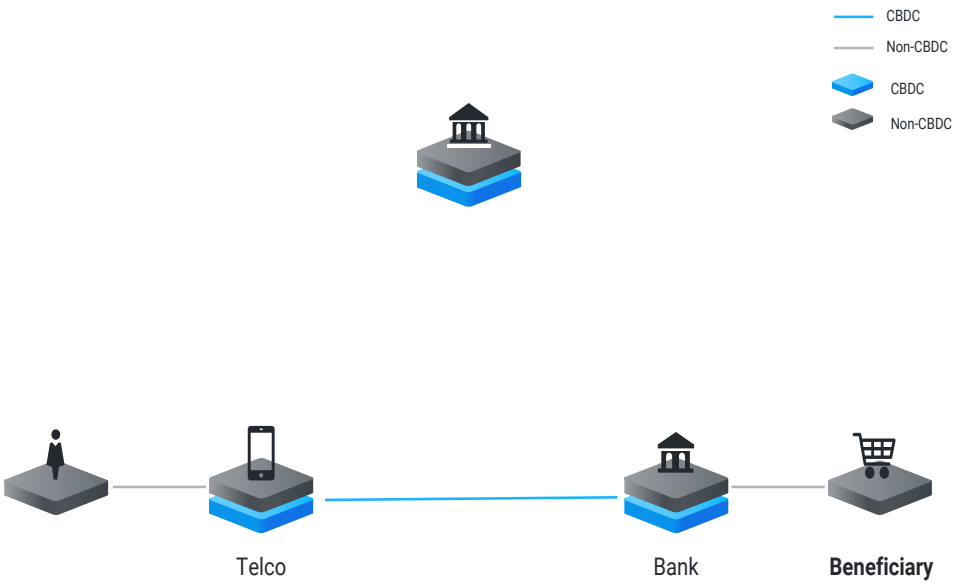


*Figure 4: Indirect Transaction*

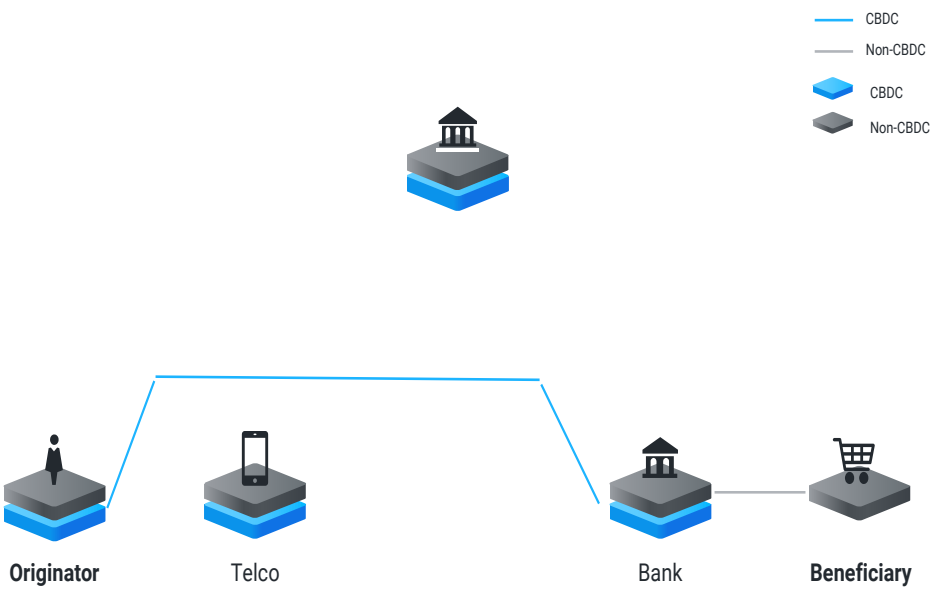


*Figure 5: Hybrid Transaction*

**Question 11: Are there additional design principles that should be considered that were not discussed in this paper?**

Ripple respectfully submits that it is important for CBK to consider user experience and adoption as a design principle, as a retail CBDC is heavily reliant on user experience to drive adoption.

It is important to note that payments are a two-sided market, and the use of a new service depends both on user adoption as well as merchant acceptance. Therefore, if a CBDC issued by CBK is to achieve its policy goals, it will need to be widely adopted by both consumers and merchants. Any assessment of user experience to encourage user adoption will need to be forward looking, and take into account both the present and possible future demands of consumers. At the same time, it will likely be necessary to quickly onboard a large merchant base in the beginning, in order to drive user adoption and ensure the CBDC is useful to users right from the start.

The CBDC design principles should therefore encourage and incentivise user adoption in order to build the required network effects.

**Question 12: How could a CBDC be designed to achieve maximum interoperability with the existing payment platforms in Kenya?**

Ripple has been integrating enterprise blockchain solutions into conventional Financial Market Infrastructures ("FMIs") and Distributed Ledger Technology ("DLT")-based systems for over 8 years through our flagship RippleNet solution, and we are in active discussions with multiple central and commercial banks regarding the use and operation of the CBDC Private Ledger.

To ensure full interoperability between intermediaries involved in the distribution of a retail CBDC, the CBDC Private Ledger uses a combination of software and governance. We have learned from our experiences in creating RippleNet, an international cross border payments system, that technology alone is not enough to ensure interoperability. While technology can support interoperability, governance is required to ensure the technology is implemented correctly. Ripple works with the central bank to create governance that requires intermediaries to follow standards for interoperability facilitated by the software and technology of the CBDC Private Ledger. These include using standard messaging formats like ISO 20022,[19] and network service level agreements ("SLAs"). Ripple is an active participant in the ISO 20022 Standards Body, and the first member focused on DLT.[20]

Ripple is also a leader at enabling digital currency transactions for commercial banks and payment service providers around the world. This experience has led to the CBDC Private Ledger being able to interoperate with existing systems. The APIs and libraries created, and proven, with the public XRP Ledger can be exposed and made available for integrations by stakeholders.[21] While utilizing the same technology as the XRP Ledger, the CBDC Private Ledger solution provides each central bank with its own private blockchain ledger, which is permissioned by the central bank.

The CBDC Private Ledger also has the potential to integrate by using Federated Sidechains[22] or via the Interledger Protocol, allowing the CBK to integrate with any other DLT-based platform (for example, Corda, Hyperledger Fabric, or Ethereum). This will enable developers to implement new features such as native smart contracts that interoperate seamlessly with the CBDC Private Ledger, while also allowing the CBDC Private Ledger to maintain its existing features. The advantages of using Federated Sidechains for a retail CBDC is that it will allow for development and specialization in parallel with the main CBDC Private Ledger. For example, the CBK can run multiple Federated Sidechains, some of which may be more private while others are more open. This essentially means that each Federated sidechain would function as its own blockchain, and the CBDC could be moved seamlessly from one chain to another.

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[19] *See* https://www.iso20022.org/about-iso-20022, About ISO 20022.
[20] *See* https://ripple.com/lp/iso-overview/, Shaping the Future of Cross-Border Payments.
[21] Further details and documentation for developing on the XRP Ledger can be found at https://xrpl.org.
[22] *See* https://ripple.com/insights/a-vision-for-federated-sidechains-xrp-ledger, A Vision for Federated Sidechains on the XRP Ledger.