Project Juno Moneta

An open-source wholesale cross- border CBDC platform

Concept Proposal Document

Abbreviations

CBDC: Central Bank Digital Currency, a liability issued by a central bank in digital form

Wholesale CBDC: A form of CBDC, which can be accessed by a number of entities supervised by the central bank, e.g. commercial banks, payment service providers, etc.

Retail CBDC: A form of CBDC, which can be accessed and used by the general public as a legal tender

Cross-border transaction: An international transaction, in which the cash leg settlement takes place in two different countries

DLT: Distributed Ledger Technology, a type of technological infrastructure and protocols that allows simultaneous access, validation, and record updating in an immutable manner across a network that's spread across multiple entities or locations.

Business requirements

In this part, we briefly summarize the business requirements that formed the need for Project Juno Moneta.

Background of development

Fundamental transformations are taking place in the payment market. The revolution around digital currencies has started with the use of Bitcoin. Later, the technology behind this brand new cryptocurrency was explored, and several thousand other cryptocurrencies have emerged from day to day. These cryptocurrencies (or rather crypto assets) challenged the status quo of already existing payment systems. Distributed ledger technology has the capability to build a modern and robust financial market infrastructure and CBDCs might be a cornerstone, operated by central banks. Project Juno Moneta is not a legal compliance driven

development project, it aims to validate the technical feasibility of an open-source wholesale cross- border CBDC platform based on DLT technology.

Business potential

Currently the correspondent banking system must face a number of challenges, that stems from the technology on which it was built. These include limited transaction transparency, different operating hours, interoperability, high correspondent fees, unclear FX conversion rates and legacy platform difficulties. The before mentioned challenges could be remedied and the cost of international wire transfers could be reduced with the introduction of a CBDC based DLT system that incorporates cross-border considerations.

Stakeholder requirements

Central bank
- Greater control over money supply
- Strengthening the position of the local currency, less exposure to major currencies
- Increasing the financial stability of the country
- Gaining first mover advantage in the region
- Further CBDC-based solutions or projects could be established (e.g., retail, domestic)

Commercial bank
- Gaining competitive advantage by utilizing DLT's performance, P2P capabilities
- Innovative profile building
- Keeping or even increasing customer base through a DLT ecosystem

End user
- Cheap, instant, and transparent international payments
- Clear FX and transaction fees
- High service availability
- Extended operating hours

Government
- Tool for strengthening bilateral/multilateral relations
- Raising the competitiveness of the country
- Enhancing foreign trade
- Improving country-specific macroeconomic figures (e.g., current account balance)

Functional requirements

Central bank has the capability to:
- mint fungible tokens
- destroy fungible tokens
- cannot transfer tokens
- can execute balance inquiry

Commercial banks have the capability to:
- transfer fungible tokens in an instant manner (but cannot mint or burn tokens)
- can execute balance inquiry

Non-functional requirements

- 24/7 availability
- Instant payment (less than 10 seconds)
- 150 TPS performance
- Integrability with other Hyperledger components
- Interoperability (if possible) with other DLT solutions (and platforms, e.g., Ethereum?)
- Open-source code
- No significant performance drops

Use cases

Actors:
- Central Bank A
- Central Bank B
- Commercial bank A
- Commercial bank B
- Payer
- Beneficiary

Prerequisites

- Common mCBDC shared corridor network based on Hyperledger Besu

- Central Bank A and Central Bank B each owning their CBDC smart contracts for issuance and tracking of CBDC A and CBDC B respectively
- Commercial Bank A and Commercial Bank B as transacting parties for cross-border payments
- Two central bank DLT accounts and two commercial bank DLT accounts are created on the shared corridor network. Both central banks will grant the rights to each of these commercial banks' DLT accounts to receive their respective CBDC tokens.
- Both Central Banks operate conventional domestic RTGS systems, where Commercial Bank A and B holds reserve accounts

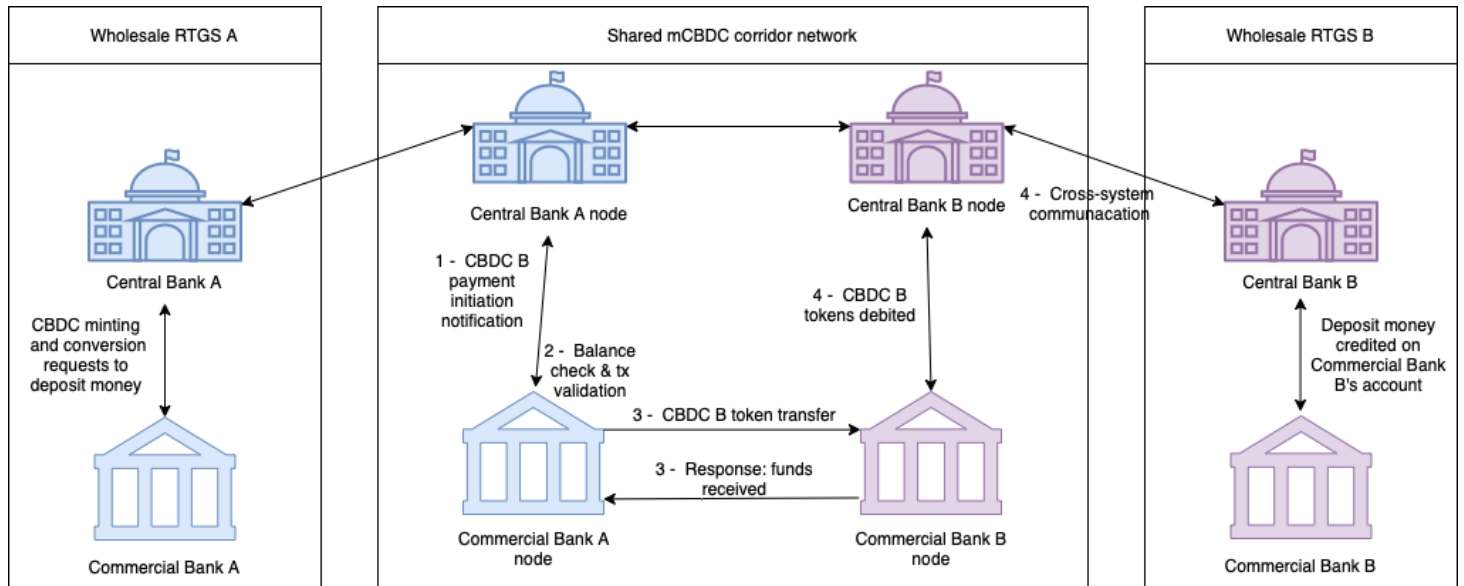# Proof of Concept use cases

CBDC token issuance and balance query

1. Commercial Banks initiate on chain requests for CBDC token issuance, then the successful debiting of commercial banks' funds from their central bank deposits takes place.

2. The central banks instruct their CBDC smart contracts to transfer an equivalent amount of CBDC tokens to the commercial bank's balance. The respective CBDC smart contracts track the total supply and circulation of tokens, and the balance held by each commercial bank in its wallet.

3. Commercial banks can query the CBDC smart contracts to check their balances.

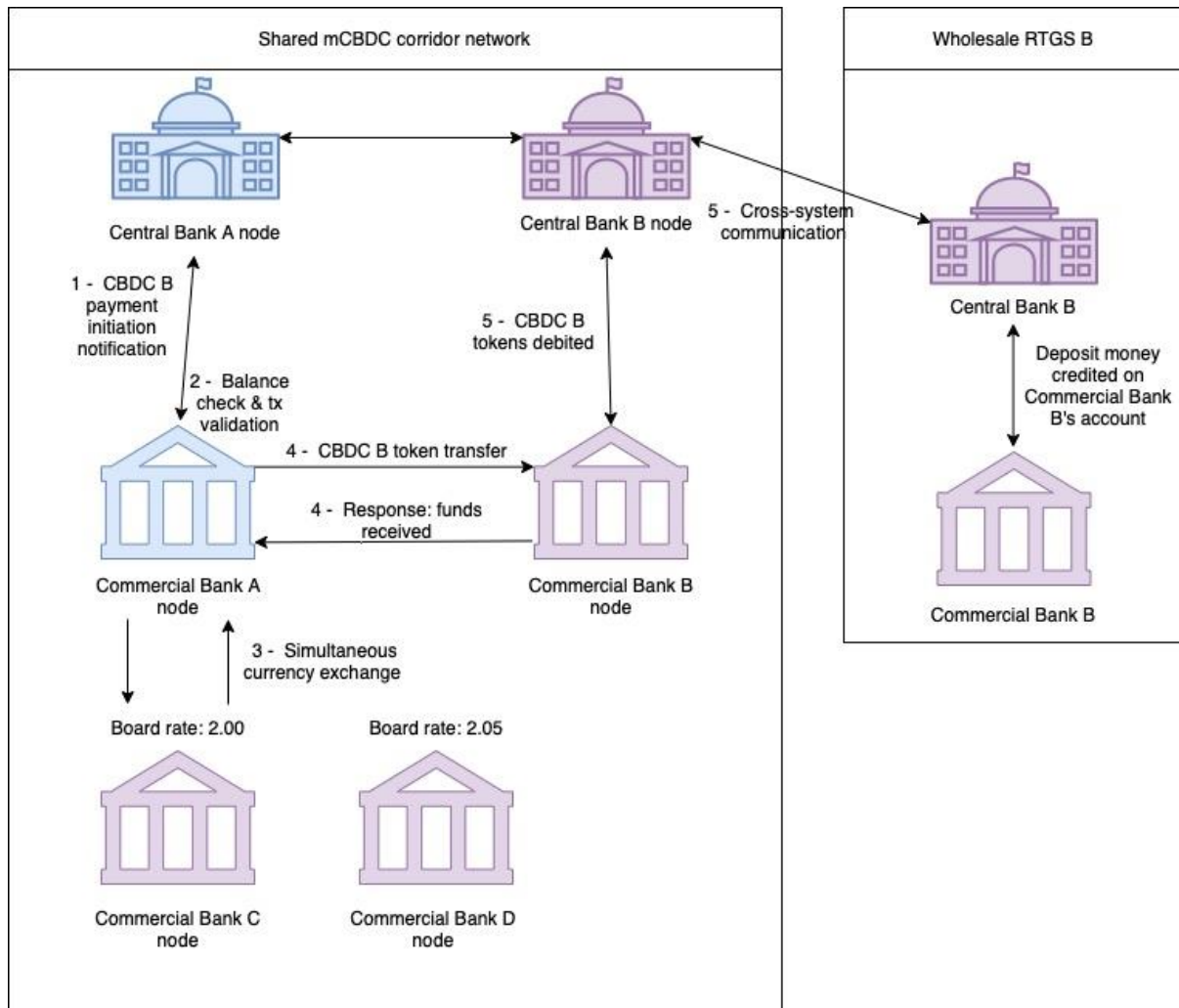**Cross-border payment without currency conversion**

Central bank: Only trusted parties can validate transactions on the ledger. These parties could be nodes managed by the central bank or a trusted blockchain service provider.

Commercial Bank: A restricted list of parties can submit transactions to the ledger. The list of restricted participants is decided by the central bank and governing bodies.

1. Commercial Bank A initiates a cross-border payment transaction that contains the details of the payment instruction, then debits its wallet with the specified amount of CBDC B tokens, while sending a notification to the respective central bank node.

2. Commercial Bank A has sufficient CBDC B tokens in its wallet. If the validation is successful, and there are no AML/CTF issues, the payment will proceed. Otherwise, the transaction aborts with a failure.

3. Commercial Bank A then transfers the ordered amount of CBDC B tokens to Commercial Bank B's account. This settlement is done atomically on the DLT. Bank A and Bank B can then check the new balances with the respective CBDC smart contracts. Commercial Bank B confirms that it has received the funds.

4. Commercial Bank B initiates an exchange of the CBDC B tokens to account money. Central Bank B debits Commercial Bank B's CBDC B wallet in the shared corridor network and credit Commercial Bank B's central bank deposit account.
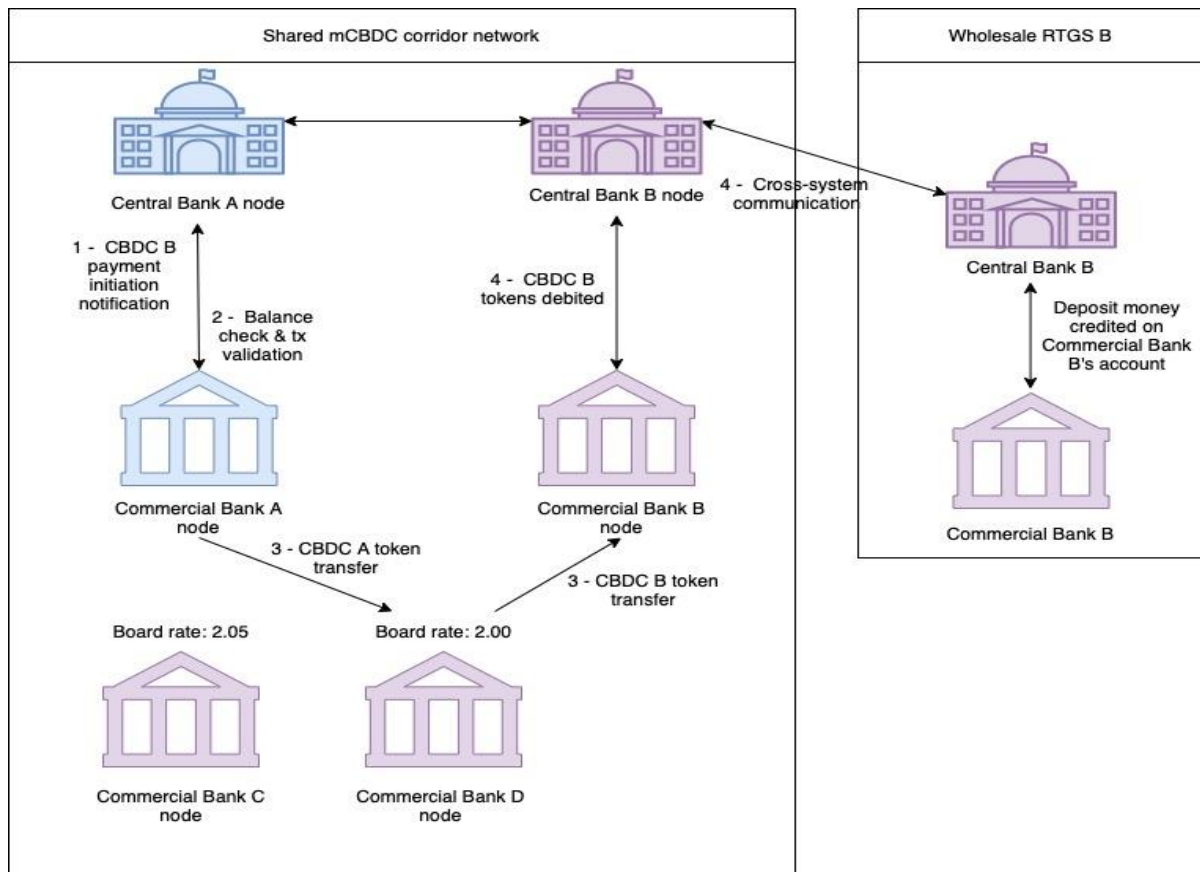
Cross-border payment with embedded FX execution

1. Commercial Bank A initiates a cross-border payment transaction that contains the details of the payment instruction, then checks its wallet for the specified amount of CBDC B tokens, while sending a notification to the respective central bank node.

2. Commercial Bank A does not have sufficient CBDC B tokens in its wallet. If there are no AML/CTF issues, the payment will proceed with Cross-border payment with embedded FX execution function. Otherwise, the transaction aborts with a failure.

3. Commercial Bank A then checks the on-chain CBDC exchange market for the best board rate. Once the best rate is found, the simultaneous exchange of currency A and B happens with Commercial Bank C for the transaction's amount in a PvP manner. If the exchange cannot be executed for unknown reasons, Commercial Bank A searches and executes the exchange at the second-best board rate.

4. After Commercial Bank A created sufficient funds, it transfers the ordered amount of CBDC B tokens to Commercial Bank B's account. Bank A and Bank B can then check

the new balances with the respective CBDC smart contracts. Commercial Bank B confirms that it has received the funds.

5. Commercial Bank B initiates an exchange of the CBDC B tokens to account money. Central Bank B debits Commercial Bank B's CBDC B wallet in the shared corridor network and credit Commercial Bank B's central bank deposit account.

Cross-border payment with embedded FX execution (FX Overlay)

1. Commercial Bank A initiates a cross-border payment transaction that contains the details of the payment instruction, then checks its wallet for the specified amount of CBDC B tokens, while sending a notification to the respective central bank node.

2. Commercial Bank A does not have sufficient CBDC B tokens in its wallet. If there are no AML/CTF issues, the payment will proceed with Cross-border payment with embedded FX execution function including FX Overlay. Otherwise, the transaction aborts with a failure.

3. Commercial Bank A then checks the on-chain CBDC exchange market for the best board rate. Once the best rate is found, the transfer of currency A to Commercial Bank D will take place if, and only if, the transfer of currency B from Commercial Bank D to Commercial Bank B is executed. This mechanism ensures that the transaction with embedded FX conversion happens in a PvP manner. Bank A, Bank B and D can then

check the new balances with the respective CBDC smart contracts. Commercial Bank B confirms that it has received the funds. If the exchange cannot be executed for unknown reasons, Commercial Bank A searches and executes the exchange at the second-best board rate.

4. Commercial Bank B initiates an exchange of the CBDC B tokens to account money. Central Bank B debits Commercial Bank B's CBDC B wallet in the shared corridor network and credit Commercial Bank B's central bank deposit account.

Privacy

Balances & transactions:

Data type	Central Bank "A" node	Commercial Bank "A" node	Central Bank "B" node	Commercial Bank "B" node
Own balances - A currency	YES	YES	NO	YES
Participants balance - A currency	YES	NO	NO	NO
Own balances - B currency	NO	YES	YES	YES
Participants balance - B currency	NO	NO	YES	NO

Source: