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 has to 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 drop

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.

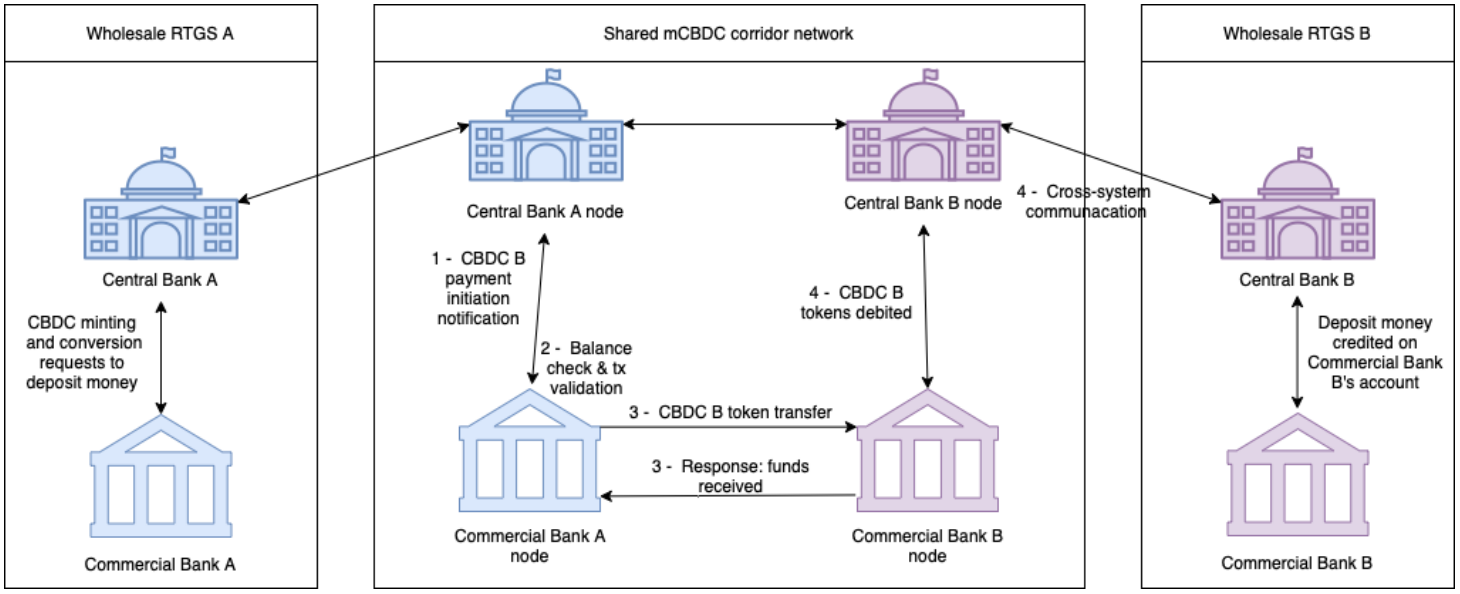
2. The central banks instruct their CBDC smart contracts to transfer an equivalent amount of CBDC tokens to the commercial bank's balance. The respective CBDC smart contracts track the total supply and circulation of tokens, and the balance held by each commercial bank in its wallet.

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.

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Future business use case:

0. The Arab corporation transports the goods ordered (e.g., crude oil) to a Chinese corporation (0). As a result, its inventories in the balance sheet decrease by the transferred amount in Arab Emirates dirham (AED).

1. The Chinese corporation receives the goods, and its inventories increase by the ordered amount in renminbi. Then it informs its bank, the Chinese Bank A, which is a participating commercial bank, to transfer 1 million renminbi (RMB) to the Arab corporation's account at the Arab Bank (1). As a result, the Chinese corporation's deposit is charged 1 million RMB by the Chinese Bank A.

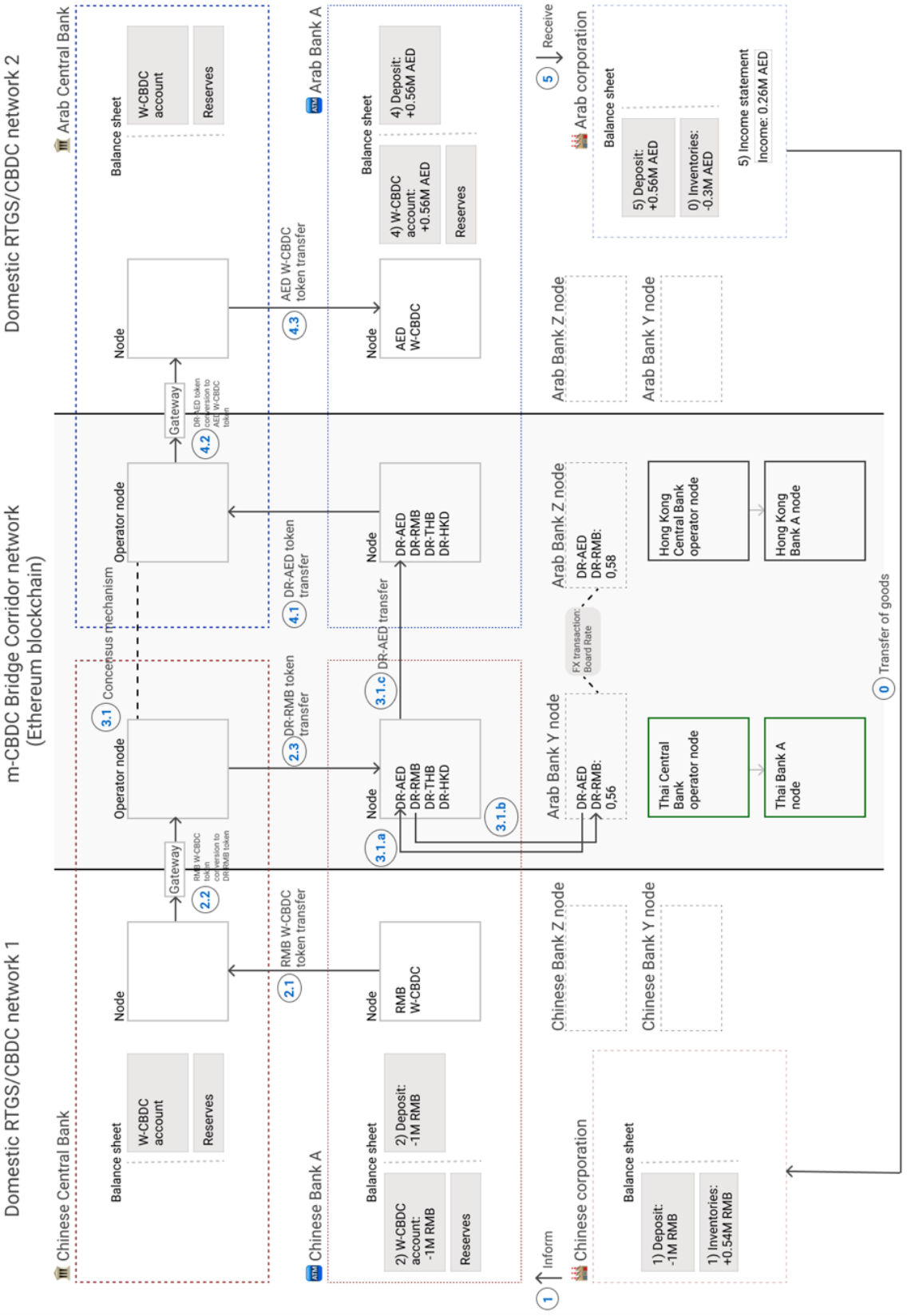
2. The balance sheet of Chinese Bank A shrinks via a decrease in its deposits and W-CBDC account as a result of the 1 million RMB cross-border local currency fund transfer. For the cross-border fund transfer, the Chinese Bank A node initiates the conversion of the RMB W-CBDC token from the domestic network into DR-RMB token in the corridor network, and inputs a smart contract feature which codes the details of the agreement into the transfer. The Chinese Central Bank node in the corridor issues DR-RMB in response to the DR conversion request by the participating Chinese Bank A node. Figure 1 shows the path of the RMB W-CBDC token from the Chinese Bank A node (2.1) into the corridor gateway. The RMB W-CBDC token is converted to DR-RMB token in the gateway (2.2). Then, the DR-RMB token enters the corridor network, and arrives to the node of Chinese Bank A (2.3). The corridor network leverages DLT-based Ethereum Blockchain technology.

3. The Chinese Bank A processes the transfer with an embedded FX transaction via the Board Rate method. The system discovers that Arab Bank Y offers the best Board Rate available in the corridor network at 0.56 DR-AED for 1 DR-RMB. The settlement of the transaction occurs, which comprises:

3.1.a) Chinese Bank A node receives 0.56 million DR-AED from Arab Bank Y node, 3.1.b) Chinese Bank A node delivers 1 million DR-RMB to Arab Bank Y node, and 3.1.c) Chinese Bank A node transfers 0,56 million DR-AED to Arab Bank A node. 3.1. a) - b) - c) happen simultaneously and instantaneously in an atomic PvP manner owing to the consensus mechanism and authorization of the nodes of the Chinese and Arab Central Banks in the corridor network (3.1). A liquidity saving mechanism is programmed in the corridor to resolve gridlocks if they occur.

4. The Arab Bank A node transfers the DR-AED token from the corridor into the corridor gateway (4.1), and initiates the conversion of the DR-AED token into AED W-CBDC token (4.2). The Arab Central Bank node destroys DR-AED in response to the DR conversion request by the participating Arab Bank A node. The AED W-CBDC token is transferred to the node of the Arab Bank A (4.3). Arab Bank A books the transfer in its balance sheet. As a result, the W-CBDC account and deposit of Arab Bank A increase 0.56 million AED.

5. Finally, the Arab corporation is informed about the payment (5). The deposit in the balance sheet of Arab corporation increases 0.56M AED, and the firm books an income of 0.26M AED in its income statement.



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