



► Project mBridge Update

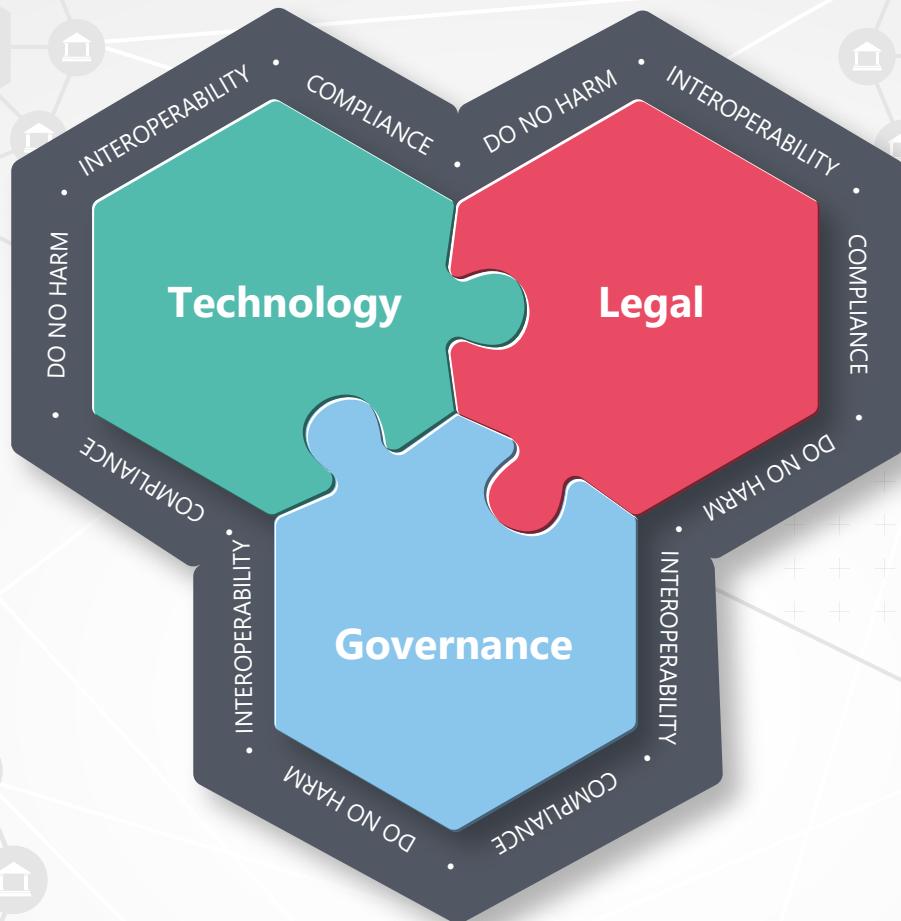
## Experimenting with a multi-CBDC platform for cross-border payments

October 2023



# What is Project mBridge?

Project mBridge experiments with a multi-CBDC common platform for wholesale cross-border payments focusing on the use case of international trade, which has the potential to connect central banks and commercial banks around the world as a public good. The platform developed for Project mBridge is underpinned by custom-built distributed ledger technology (DLT), a set of comprehensive legal rulebook documents and a fit-for-purpose governance structure.



## Project goals:

- **Tackle key pain points** of cross-border payments, such as high costs, settlement risks and low speed.
- Advance cross-border settlement in **central bank money**.
- Support use of **local currencies** in cross-border transactions.
- Create opportunity for **new and innovative payment products and services**.

All while **safeguarding the currency sovereignty and monetary and financial stability** of each participating jurisdiction.

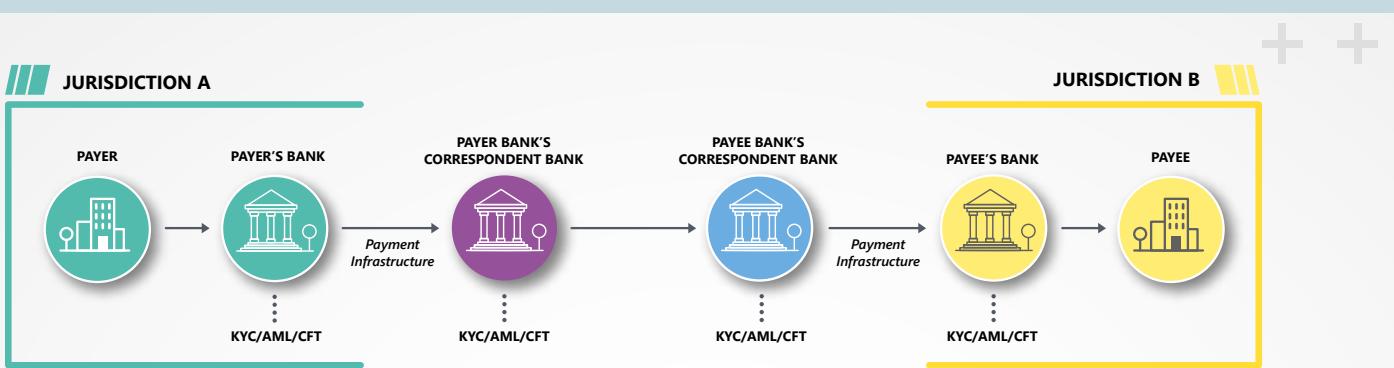
- Each central bank is the exclusive issuer/redeemer of its CBDC.
- Only domestic commercial banks can request issuance/redemption of the local CBDC.
- Central banks can set balance and transaction limits for their commercial banks.
- Each central bank has a full audit trail and transparency of its CBDC's transactions.

## Following the **principles** of:

- **Compliance:** the platform developed for Project mBridge complies with international standards and different jurisdictions' regulations, such as AML and CFT.
- **Do no harm:** central banks can still perform exchange-rate control and capital flow management measures on the platform.
- **Interoperability:** the platform supports interoperability with participants' existing financial infrastructures.

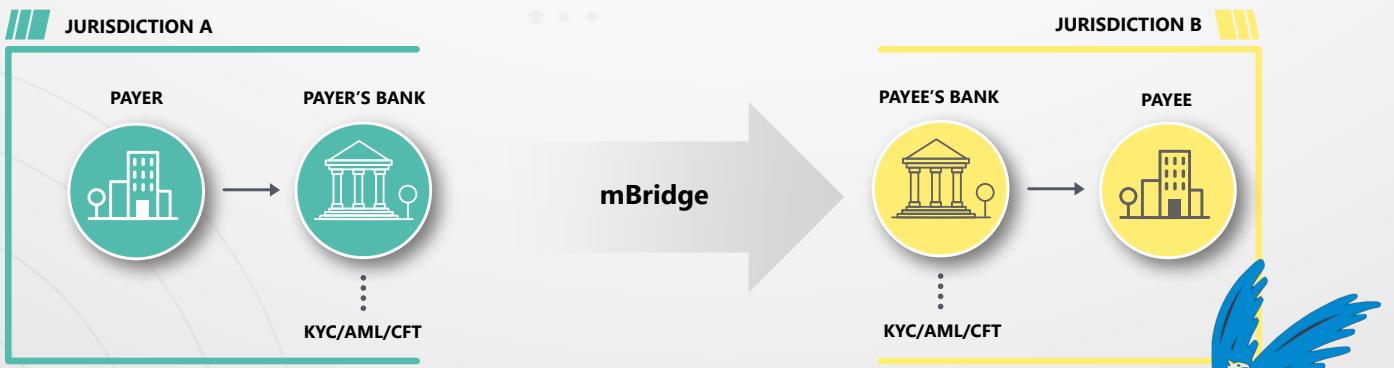
# Why experiment with Project mBridge?

Commercial banks often **lack direct relationships with offshore counterparties** and must rely on a global network of correspondent banks to make cross-border payments. A typical cross-border payment would involve not only the payer's and payee's local banks, but also their correspondent banks (which may or may not be in a third jurisdiction). While critical to the functioning of the international payments system, cross-border payments made in this manner tend to exhibit **high costs, settlement risks, low speed and operational complexities due to duplicated processes and steps in the payment chain**. There is also evidence to suggest that correspondent banks are cutting back their services worldwide<sup>1</sup>, leaving many without sufficient or affordable access to the global payments network.

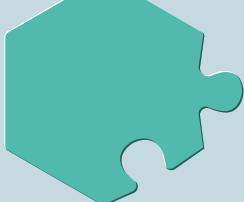


With Project mBridge, the number of steps can be significantly reduced by allowing direct, bilateral connectivity between the payee's and payer's local banks supported by interoperability with participants' domestic payment systems. As such, cross-border payments on the platform developed for Project mBridge can be:

- **Faster:** instant settlement within seconds.
- **Safer:** settled in the safest settlement asset – central bank money.
- **More accessible:** with direct, bilateral connectivity between any two banks on the platform.
- **Cheaper:** less settlement risk and fewer duplicated processes can lead to a reduction in overall costs.
- **Compliant:** with banks ensuring compliance with each jurisdiction's KYC/AML/CFT regulations off-bridge.
- **Settled with finality:** based on legal and/or contractual arrangements and protections.



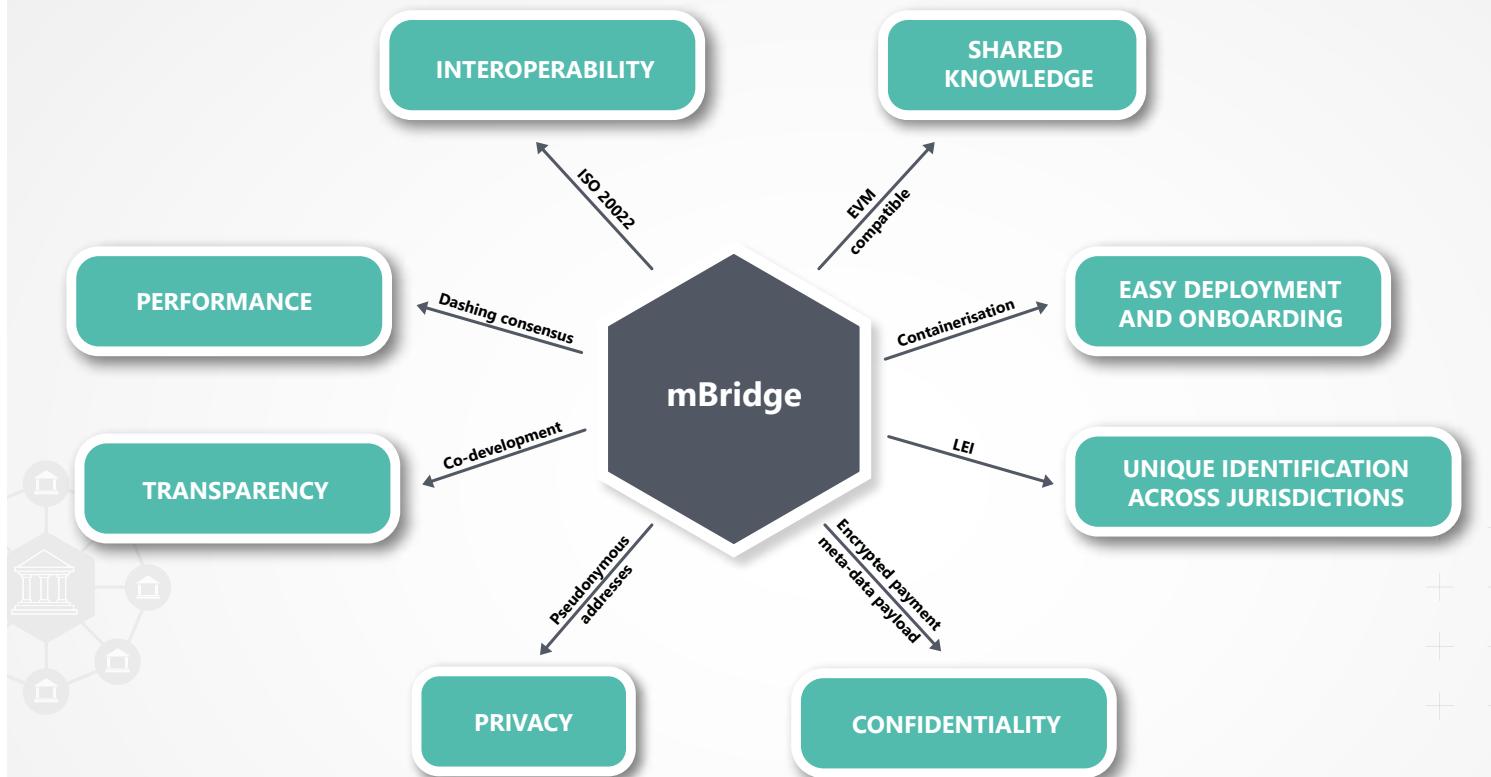
<sup>1</sup> See [On the global retreat of correspondent banks \(bis.org\).](http://On the global retreat of correspondent banks (bis.org).)



# Technology

At the heart of the experimental platform developed for Project mBridge is a **purpose-developed permissioned DLT** called the **mBridge ledger**, or mBL, that supports instant peer-to-peer and atomic cross-border payments and FX transactions using wholesale CBDCs.

mBL is an **EVM-compatible solution**, referring to the ability of a blockchain to process transactions based on smart-contract codes that can run on widely used blockchain platforms. Furthermore, CBDC issuance, redemption and payments are implemented through smart contracts written using the **Solidity programming language**. The code is shared and **open-sourced** among the participating central banks.



mBL employs the **Dashing consensus algorithm**, which is a Byzantine Fault Tolerance (BFT) consensus protocol that uses proofs of partial confirmation of a block validation to reduce the time needed to achieve consensus and to improve the overall protocol performance.

**Pseudonymous addresses** and **encrypted payment meta-data payloads** are used to support privacy and confidentiality in transactions.

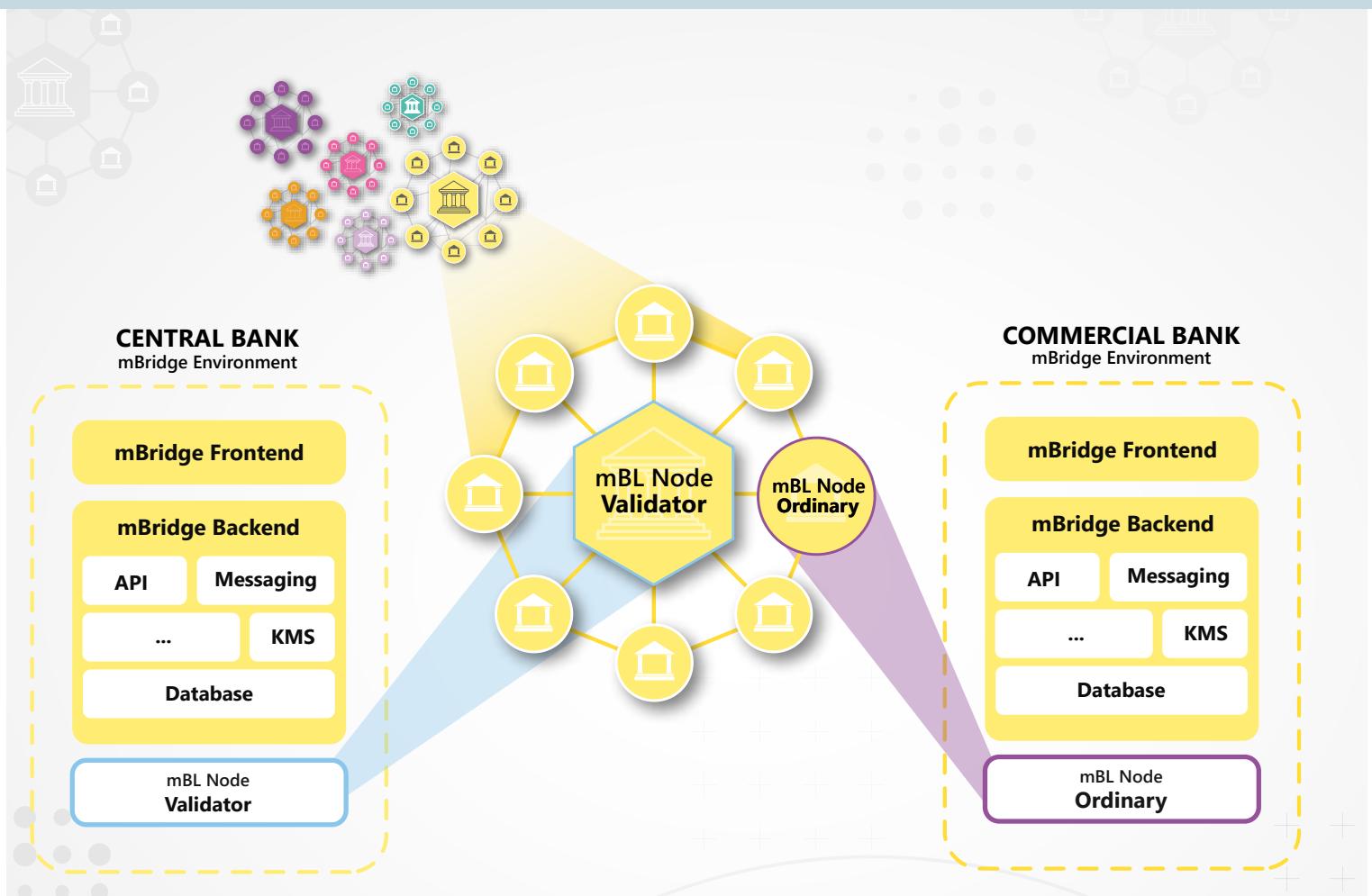
The platform also offers **APIs based on the global ISO 20022 messaging standard** for financial information to support interoperability and reduce friction when onboarding new institutions. Deployment and operation are streamlined using containers. **Legal Entity Identifiers** (LEIs) can also be used on mBridge to facilitate the identification of entities involved in transactions, facilitating AML/CFT checks.

## Project mBridge

### What does being a participant on the Project mBridge platform entail on the technology front?

Each participant on the Project mBridge platform is encouraged to have its own mBridge environment where a set of components are executed under a decentralised arrangement. This achieves full control by each participant over its infrastructure and operations. The core component is the **mBL node**, which is the DLT node used in the peer-to-peer network.

Central banks' mBL nodes are validator nodes that take part in the consensus protocol. Meanwhile, commercial bank nodes are ordinary mBL nodes that share the same capabilities as central bank nodes, but do not take part in the consensus mechanism.



Additional key components of the mBridge environment include the **frontend** providing the **user interface (UI)**, the **backend** implementing important application features such as key management services (**KMS**), application programming interfaces (**APIs**), **messaging module**, **relational database**, and other supporting components.

Each of these components has its own container and deployment configuration, allowing different approaches for redundancy and scalability, and simplifying the deployment in different cloud or on-premise environments.

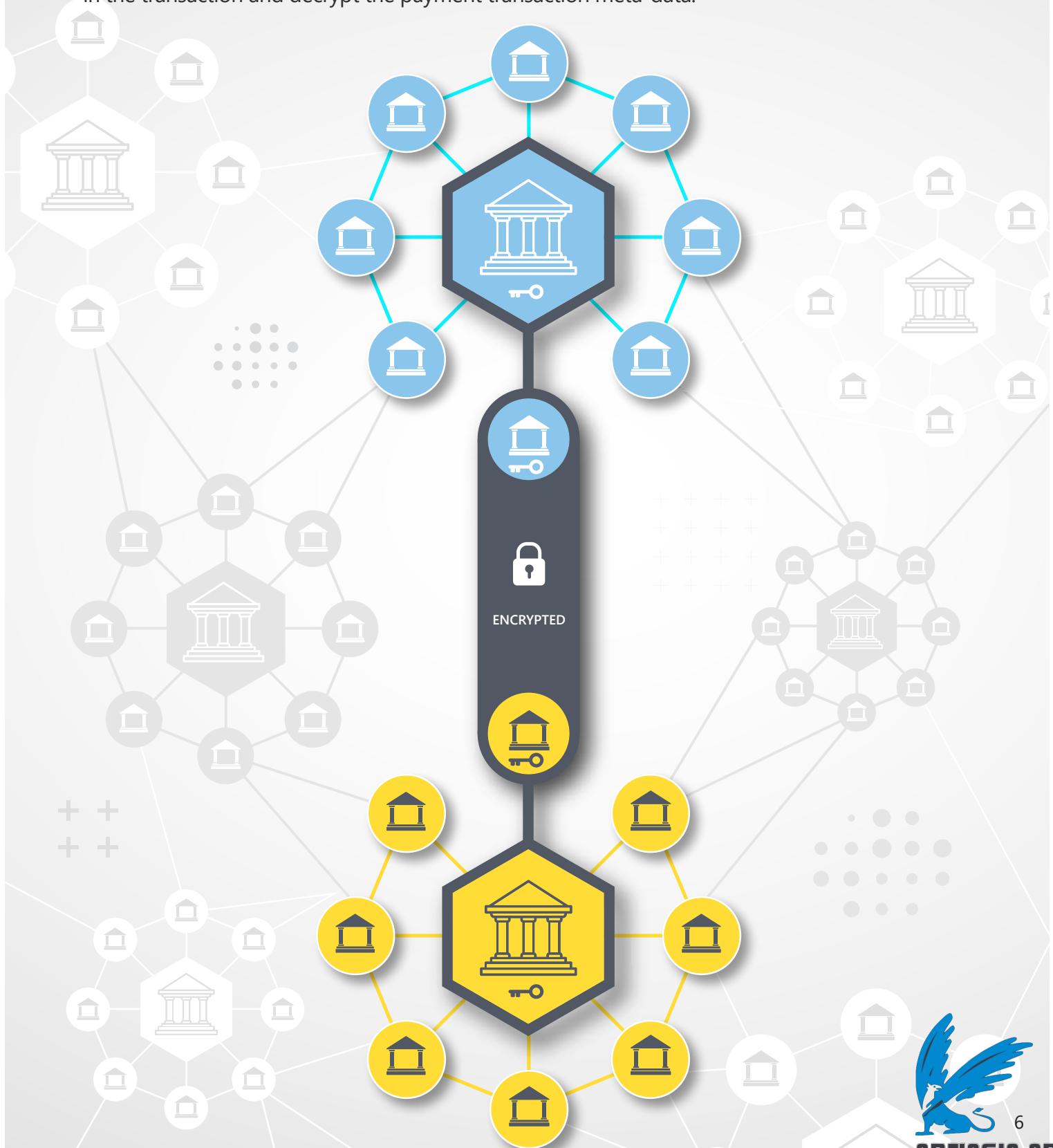
Apart from the mBL, which is common to all participants, any sensitive data (encrypted messages and private keys) are kept isolated from other environments as each mBridge environment instance is hosted by a specific participant.

## Project mBridge

### How is privacy protected on the Project mBridge platform?

Privacy controls are implemented for core transaction data, which comprise payer and payee identities and the details of the CBDC involved. Through an implementation of **pseudonymous addresses using randomly generated self-issued key pairs**, the platform ensures that **sensitive transaction details can be viewed only by the counterparties of the transaction and their respective central banks.**

For each cross-border transaction on the platform, only the two commercial bank counterparties, their respective central banks and the CBDC-issuing central bank can identify the parties involved in the transaction and decrypt the payment transaction meta-data.



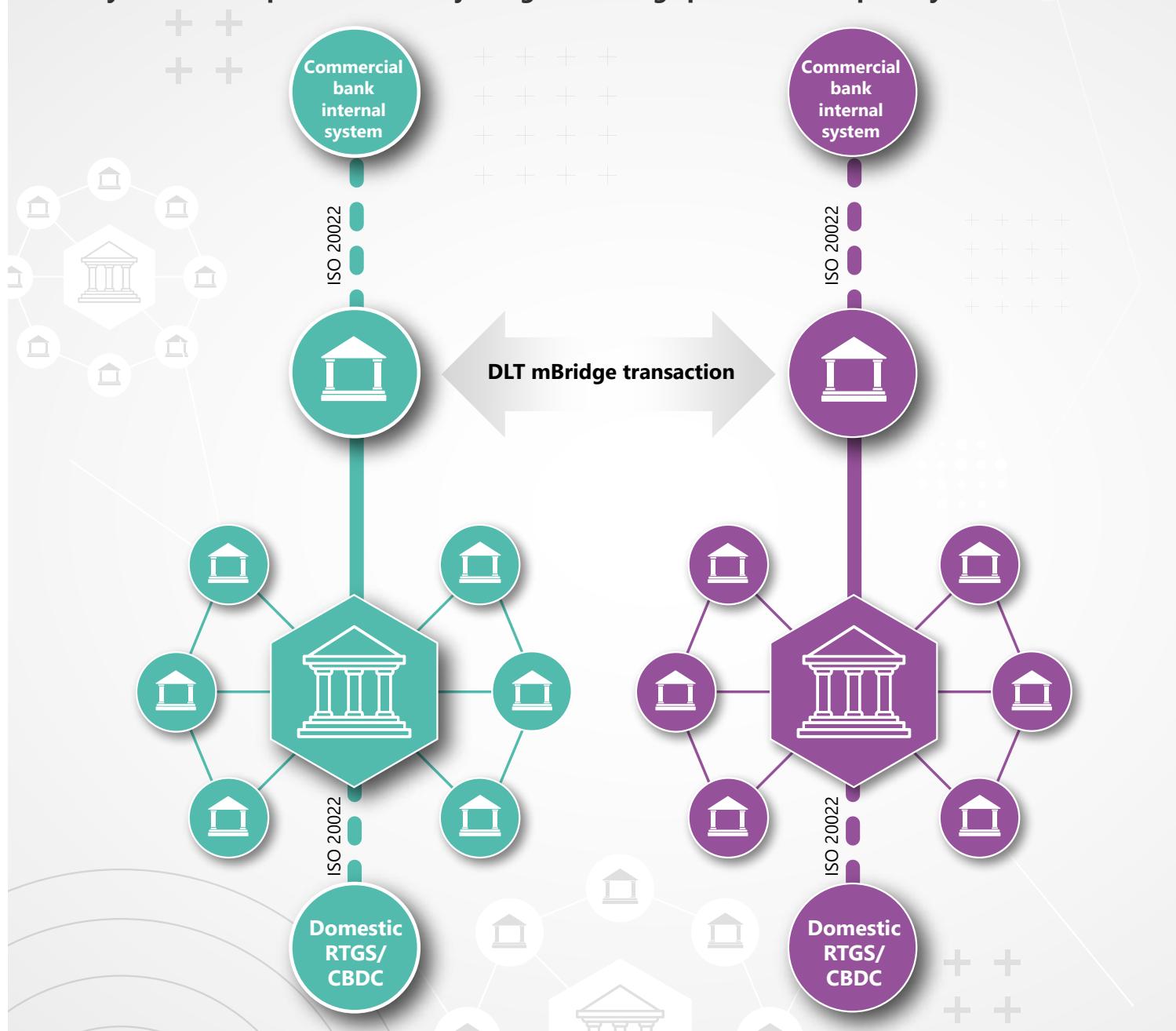
## Project mBridge

### How does the Project mBridge platform connect to external systems?

Interoperability with participants' own systems is supported by **APIs based on the global ISO 20022 messaging standard** for financial information, to allow participants to easily connect and integrate into ISO 20022-compatible payment systems.

For commercial banks, cross-border payments and FX transactions are conducted through the interaction between their core banking systems and their mBridge backend.

For central banks, CBDC issuance and redemption operations are supported by the integration of mBridge into domestic payment systems, such as RTGS and CBDC, through each central bank's mBridge backend. API connectivity to domestic payment systems means that **a domestic CBDC system is not a precondition for joining the mBridge platform if adopted by central banks.**



#### Did you know?

Project mBridge's interoperability could lead to significant network effects as can be gleaned from the open banking and finance field. For example, with the help of API standardisation and interoperability, the number of open-banking API transactions in the United Kingdom (under the CMA and PSD2 regulation) has grown by around 1400% from around 81 million a month in July 2019 to over 1.2 billion in August 2023, according to [Open Banking Limited](#).

# Legal and governance

The platform developed for Project mBridge is underpinned by **a set of comprehensive legal rulebook documents, including the mBridge Platform terms, jurisdiction- and CBDC-specific terms, external terms and a fit-for-purpose governance structure.**



The **mBridge Platform terms** are a binding contract between the mBridge administrator and each central bank participant, and between each central bank participant and its commercial bank participants. This legal framework governs the access and use of the mBridge platform and its functionalities by all participants. For example, it outlines when and under what circumstances a CBDC transaction is considered settled with contractual finality on the mBridge platform.

**Jurisdiction- and CBDC-specific terms** include (i) Issuance and Redemption terms imposed at a local level by a central bank participant in relation to its own CBDC with its domestic commercial banks, and (ii) a Platform CBDC Instrument articulating the specific rights granted to the holder of the CBDC by the central bank participant.

**External terms** are contractual arrangements that commercial bank participants may decide to enter into and that are outside of the mBridge legal framework.

## Project mBridge

The decentralised governance structure developed as part of the project outlines the roles and responsibilities of the different participants and how the platform developed for Project mBridge is managed and controlled.

The organisational structure supporting the project platform consists of a Steering Committee, and the four Subcommittees: Compliance, Technology, Legal and Policy.<sup>2</sup>

The Steering Committee is in charge of formulating strategies and policies, overseeing the business management, and guiding the design, building and operation of mBridge.



The decentralised governance structure also provides for Subcommittees to provide expert guidance and support to the Steering Committee, with the following responsibilities:

- **Compliance:** establishing a methodology and process for ensuring the adherence of the mBridge platform participants to the rulebook.
- **Technology:** managing software development and maintenance, infrastructure planning, and design, building, testing, deployment and technical specifications of mBridge.
- **Legal:** developing the legal framework of mBridge and coordinating the application of the rulebook documents for coherence, consistency and compliance with each jurisdiction's applicable laws and international standards, such as the Principles for Financial Market Infrastructures (PFMI), and internal policies.
- **Policy:** monitoring and analysing the policy implications of the transactions performed on mBridge, and studying market integrity control mechanisms such as whistleblowing, complaint handling and the related reporting.

<sup>2</sup> The committee structure and composition may change from time to time according to the needs and stage of the project.

# Global Project mBridge participants

Project mBridge is a collaborative effort of the **BIS Innovation Hub**, four founding central banks and over 25 observing members.

Founding members:



HONG KONG MONETARY AUTHORITY  
香港金融管理局



مصرف الإمارات العربية المتحدة المركزي  
CENTRAL BANK OF THE U.A.E.



中国工商银行  
数字货币研究所  
DIGITAL CURRENCY INSTITUTE  
PEOPLE'S BANK OF CHINA



ธนาคารแห่งประเทศไทย  
BANK OF THAILAND

Observing members:<sup>\*</sup>



BANCO CENTRAL  
Chile



BANK INDONESIA  
BANK SENTRAL REPUBLIK INDONESIA



BANK NEGARA MALAYSIA  
CENTRAL BANK OF MALAYSIA



BANK OF ISRAEL  
البنك الصهيوني  
CENTRAL BANK OF EGYPT



BANK OF KOREA



BANQUE DE FRANCE  
EUROSYSTÈME



Central Bank of Bahrain



CENTRAL BANK OF EGYPT



CENTRAL BANK OF JORDAN  
البنك центральный  
CENTRAL BANK



National Bank of Georgia



NATIONAL BANK OF KAZAKHSTAN



FEDERAL RESERVE BANK OF NEW YORK  
ONYC



RESERVE BANK  
OF AUSTRALIA



Saudi Central Bank



SOUTH AFRICAN RESERVE BANK



THE CENTRAL BANK OF HUNGARY



TÜRKİYE CUMHURİYET MERKEZ BANKASI

Observing members have access to the **Project mBridge sandbox**, which is a secure and easily-accessible testing environment simulating mBridge nodes and transactions. No production data or real-value transactions are involved in the sandbox. So far, 11 observing members have participated in the sandbox testing and provided valuable feedback.



<sup>\*</sup> Logos placed in alphabetical order.

# What's next for Project mBridge?

A next envisaged stage in this project is to see if the platform tested can evolve to become a Minimum Viable Product (MVP),<sup>3</sup> which entails:

- Continued work on the technology and functions (eg platform statistics, maker-checker mechanisms, queue management, among others), and on the legal and governance frameworks guided by global CPMI frameworks;
- Investigating technological solutions that can supplement mBridge operations including novel technologies to support FX and liquidity and AML/CFT compliance;
- Acting as a testbed and evaluating potential synergies with other BIS Innovation Hub projects and innovative private sector solutions;
- Welcoming new participants and use cases;
- and more...



<sup>3</sup> As outlined in our 2022 report: [Connecting economies through CBDC \(bis.org\)](https://bis.org)



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