Project IZZI™

Building the
next-generation
global payment
infrastructure

March 2025

Project IZZI

Executive summary

Vision: The *Project IZZI* vision is the global adoption of next-generation payment infrastructure that:

- Delivers safe, efficient, real-time, seamless, 24x7, account-to-account payments domestically, across borders, and across currencies.
- Leverages the time-tested strengths of international banking while promoting competition among bank and nonbank payment service providers.
- Meets the G20 call for faster, cheaper, more transparent, and more inclusive cross-border payment services, including remittances.
- Provides the payment foundation for a unified, global network of interoperable financial ecosystems that can continually expand and innovate.
- Promotes financial inclusion by creating payment services and connected accounts that can be offered to the unserved and the underserved at low-to-no cost.

Solution: The *Project IZZI* solution is patented interbank payment infrastructure with the following core elements and processes:

- Tokenized central bank money.
- Tokenized commercial bank money.
- Tokenized correspondent banking.
- Real-time single-currency payments, domestically and across borders.
- Real-time cross-currency payments at real-time foreign exchange rates.
- Real-time enforcement of all applicable system-wide and customized KYC/AML/CFT requirements.

Benefits: The *IZZI* interbank payment infrastructure will yield significant benefits from multiple perspectives:

- ***Public interest benefits*** include the support of macroeconomic stability, financial system stability, transparency, accessibility, ubiquity, and financial inclusion.

- ***Regulatory benefits*** include a ready-to-approve design under existing supervisory, oversight, and regulatory regimes for monetary policy implementation, payment system operations, international cooperation, and privacy and anonymity requirements.

- ***Benefits for bank and nonbank payment service providers (PSPs)*** include improved competitiveness, lower costs, and the ability to meet the needs of the evolving financial system by introducing new and improved services that are impractical within the limitations of today's interbank payment infrastructure.

Next steps: Payment system operators and bank and nonbank PSPs from around the world are invited to join *Project IZZI* and to participate in the development and testing of a prototype for potential adoption as the next-generation version of their current systems.

Today's payment problem

Today's payment infrastructure is inadequate for the increasingly interconnected digital world. From a payer and payee perspective, single-currency payments can be slow, expensive, complex, opaque, uncertain, and inaccessible, especially when the payer and payee are in different countries or time zones. Cross-currency payments can be even more problematic, since they also depend on underlying foreign exchange (FX) pricing, trading, and settlement practices that increase even further the time, cost, opacity, and risks of the end-to-end payment process, and disproportionately so for remittances and other low-value payments made by individuals, small and medium enterprises (SMEs), and the unbanked.

Today's payments are also inadequate from a PSP[1] perspective. Banks around the world are struggling to strengthen their payment profits, flows, competitiveness, and relevance in the rapidly evolving financial system. At the same time, nonbank PSPs find the attractiveness of their current and prospective services limited by the significant time and cost it often takes for their customers to fund their payments and to de-fund their receipts. Furthermore, specialized PSPs such as digital asset issuers, delivery-versus-payment (DVP) and payment-versus-payment (PVP) settlement systems, and central counterparties find it impractical to offer new or improved services such as 24x7 real-time issuance, real-time trade settlement, intraday collateralized borrowing and lending, and atomic multi-currency margin collection and disbursement.

The digital world demands the ability to pay anyone, anywhere, anytime, instantly, and in any currency. It demands payments that are simple, seamless, cheap, transparent, ubiquitous, accessible, and safe, and the latter is best achieved through proven, well-regulated, and well-protected market structures. It also demands a next-generation payment foundation that can support and enable real-time interoperability across a worldwide network of interconnected financial ecosystems that will continue to expand and innovate.
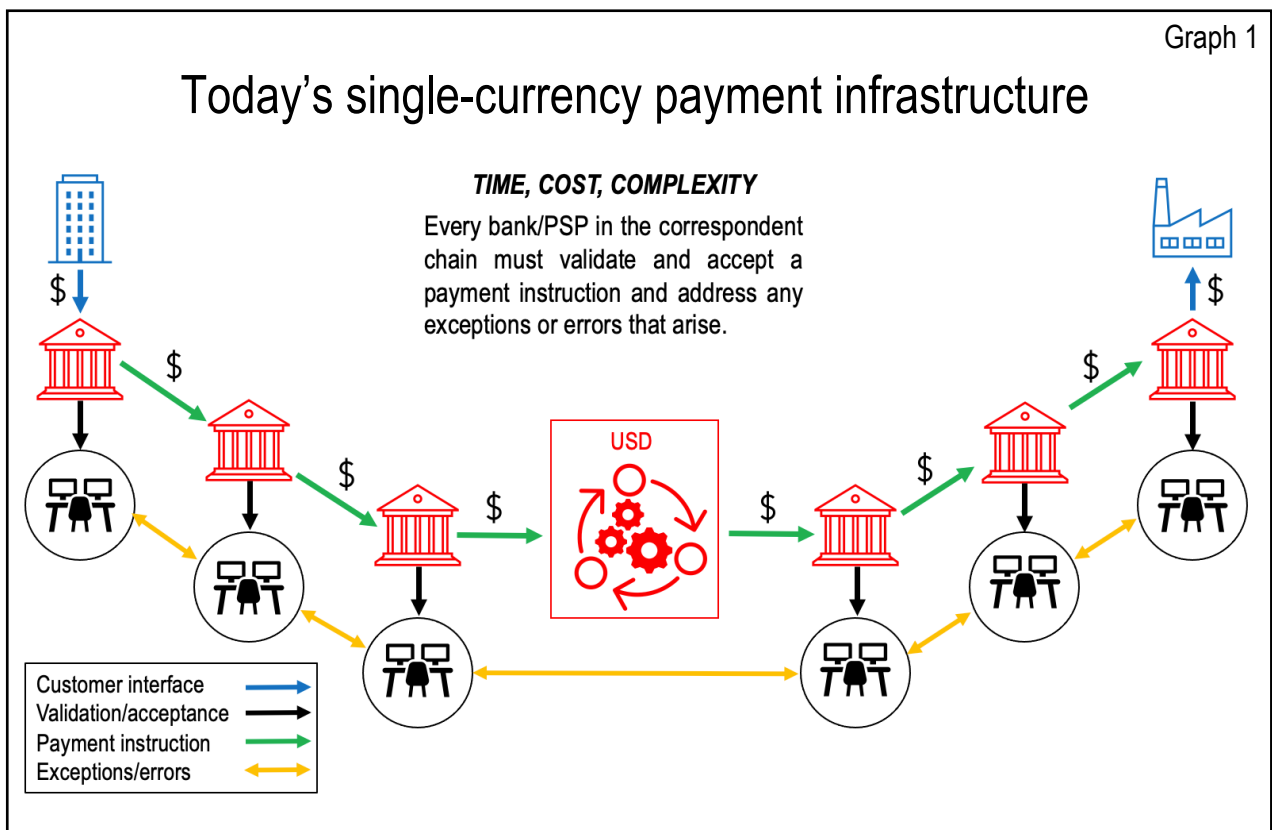
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[1] The term "payment service provider" ("PSP") is used broadly in this paper to include any entity that provides an explicit or embedded payment service. This includes banks and bank-run payment networks; credit and debit card networks; retail, corporate, and wholesale nonbank PSPs; cross-border and cross-currency remittance providers; traditional and digital securities issuers; custodians and fund managers; stablecoin, token, and other digital asset issuers; DVP and PVP settlement systems; central counterparties; and other novel payment arrangements.
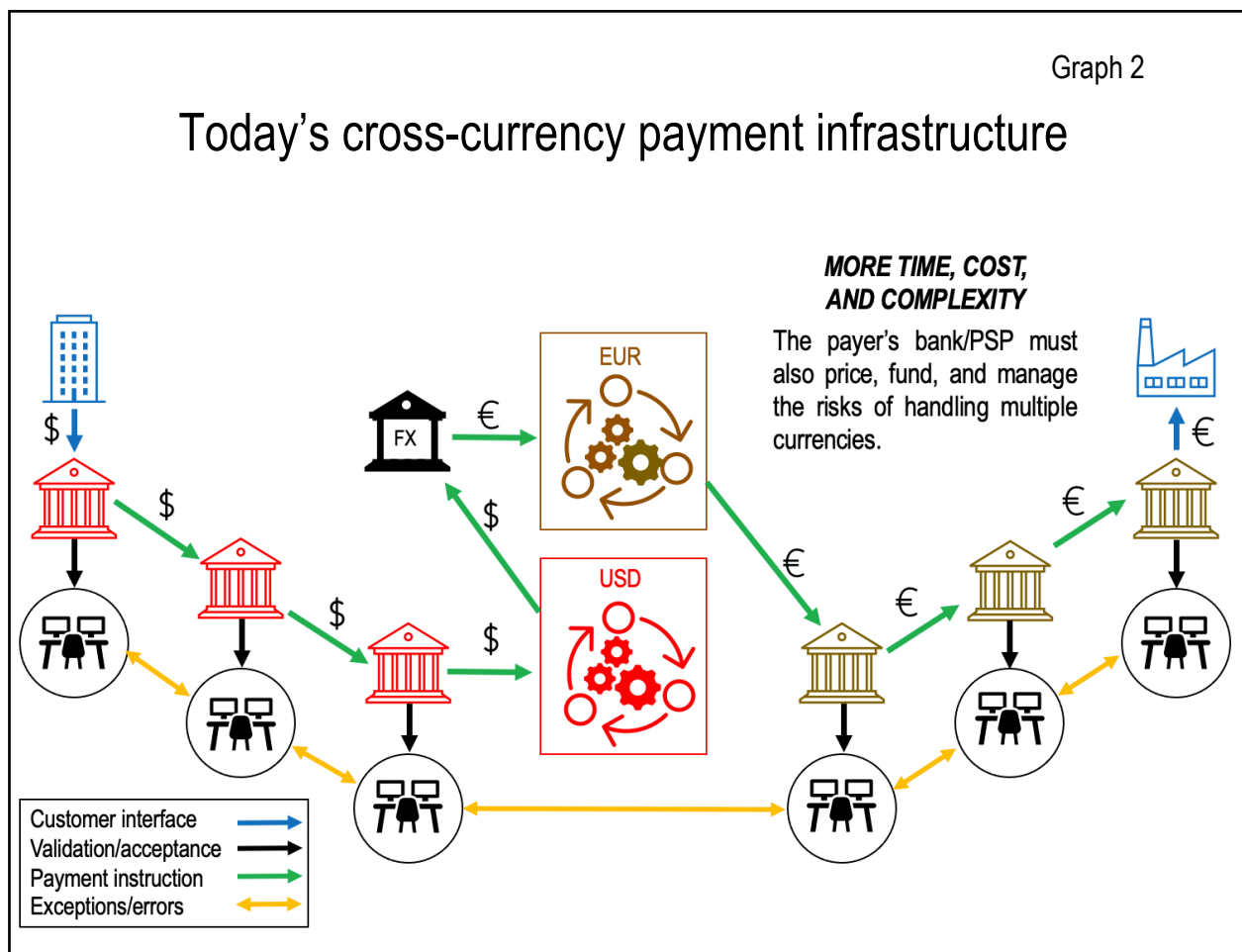
The cause of the problem

Today's payment problem can be traced to seven fundamental frictions identified by the G20 that are entrenched in the current payment infrastructure:

- Long transaction chains
- Funding costs
- Weak competition
- Fragmented and truncated data formats

- Complex processing of compliance checks
- Limited operating hours
- Legacy technology platform

These frictions reflect the combination of out-of-date, complex, costly, and risk-filled processes and systems for settling interbank account-to-account (A2A) payments (i.e., the transfer of funds from one bank/PSP account to another). For example, Graph 1 shows the processes that can be required when a corporation in one city/country wishes to pay US dollars to a supplier in another city/country. Today's infrastructure requires every bank/PSP and payment system in the correspondent chain between payer and payee to scan and approve each payment instruction (PI) against its credit and liquidity requirements and its criteria for know-your-customer, anti-money-laundering, and countering-the-financing-of-terrorism (KYC/AML/CFT) purposes. Each intermediary must also dedicate back-office resources to track unsettled in-flight payments and to handle any exceptions or errors that it or any other intermediary in the chain might identify.

Graph 1

Today's single-currency payment infrastructure

TIME, COST, COMPLEXITY
Every bank/PSP in the correspondent chain must validate and accept a payment instruction and address any exceptions or errors that arise.

USD

Customer interface →
Validation/acceptance →
Payment instruction →
Exceptions/errors ←→

Cross-currency payments can encounter even more frictions. For example, Graph 2 shows the additional intermediaries and processes that can be required when a large corporation in one city/country wishes to use US dollars to pay euro to a supplier located in another city/country. Today's infrastructure for a cross-currency payment requires two separate single-currency payments and the associated time, cost, resources, and uncertainty of settling each. It also requires the payer's bank/PSP to price, to fund, and to manage the risks of converting the payer's currency into the payee's currency, whether it does so directly or through another bank, PSP, or FX service provider.

Graph 2

Today's cross-currency payment infrastructure

MORE TIME, COST, AND COMPLEXITY

The payer's bank/PSP must also price, fund, and manage the risks of handling multiple currencies.

Customer interface
Validation/acceptance
Payment instruction
Exceptions/errors

As confirmed by the Committee on Payments and Market Infrastructures through industry outreach and shown in Graph 3, the seven fundamental frictions identified by the G20 lead directly to the high cost, low speed, limited transparency, and inaccessibility that challenge many of today's payments.

Graph 3

Challenges and frictions in cross-border payments
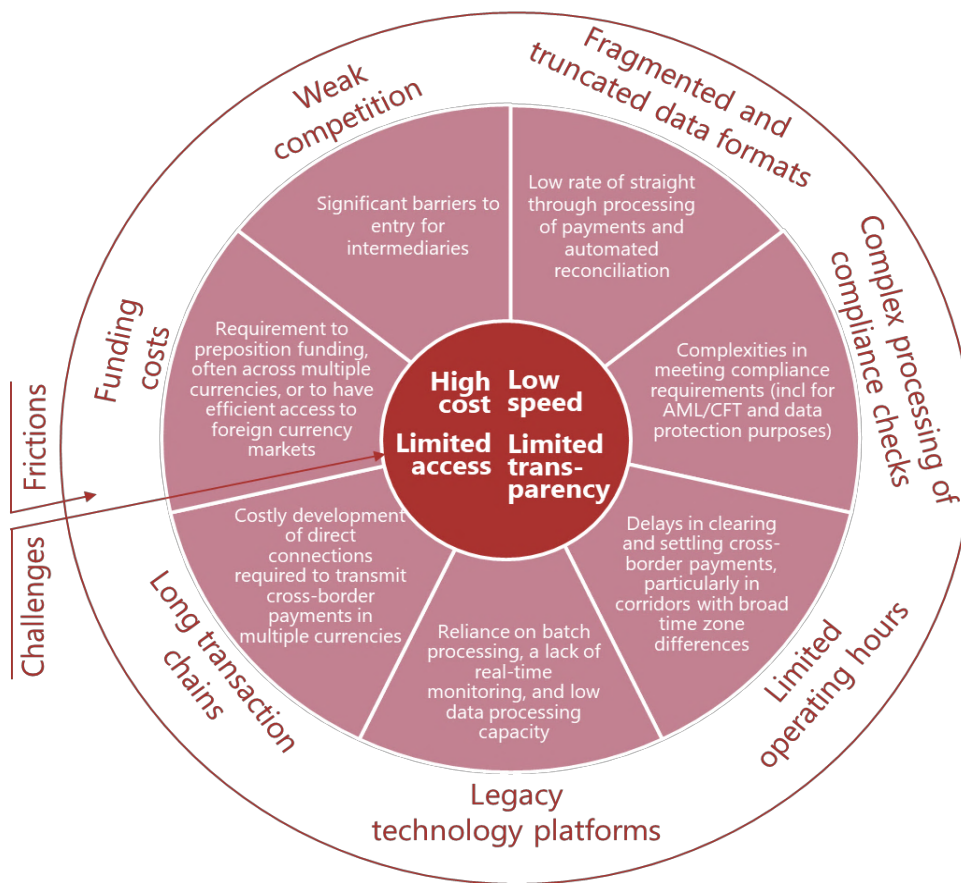
Source: CPMI, *Enhancing cross-border payments: building blocks of a global roadmap, Stage 2 report to the G20,* July 2020.

To be sure, various past and ongoing initiatives aim to improve domestic, cross-border, and cross-currency payments. These efforts include establishing new "fast" or "instant" single-currency payment systems, linking existing interbank payment systems that operate in different jurisdictions, and introducing services that pre-validate, pre-authorize, or track PIs across the often-lengthy correspondent chain that can connect a payer to a payee.

Other initiatives envision new payment infrastructure that can also support real-time interoperability across a world-wide network of increasingly interconnected and digitized financial ecosystems. The most forward-looking visions include those of the Finternet[2], a unified ledger[3], cross-border payment and contracting platforms[4], and regulated liability networks[5]. Underlying such visions is the establishment of one or more programmable ledgers that can settle payments in both tokenized central bank money and tokenized commercial bank money and that can interoperate with other programmable ledgers – or separate partitions on a common ledger – that support different use cases, markets, and financial ecosystems in the evolving digital world.

However, the payment processes underlying all these initiatives and visions are not currently designed to remove all seven fundamental frictions identified by the G20. For example, each bank/PSP in the correspondent chain would still need to process and approve each PI, including by scanning each PI for KYC/AML/CFT purposes, whether the bank/PSP is acting as originator, beneficiary, or intermediary. Each would still need to monitor and manage unsettled in-flight payments, to address any exceptions or errors, and to reconcile payments across the correspondent chain. For cross-currency payments, the payer bank/PSP would still need to price, to fund, and to manage the risks of converting the payer's currency into the payee's currency. In addition, many of these initiatives can raise significant governance, oversight, or other public policy concerns that can delay or present a major barrier to jurisdictional approval.[6]

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[2] Carstens, A and N Nilekani (2024): "Finternet: the financial system for the future", BIS Working Papers, no 1178, April.

[3] BIS (2023): "Blueprint for the future monetary system: improving the old, enabling the new", Annual Economic Report 2023, Chapter III, June, pp 85–118.

[4] Adrian, T and Mancini-Griffoli, T (2023): "The rise of payment and contracting platforms", IMF Fintech Note 2023/005.

[5] McLaughlin, T (2021): "The regulated internet of value", Citi Treasury and Trade Solutions.

[6] CPMI (2024): Linking fast payment systems across borders: governance and oversight, Final report to the G20.

The *IZZI* solution

The *IZZI* solution is patented[7] interbank payment infrastructure that is both ready-to-approve and specifically designed to remove all seven fundamental frictions at their source and thereby enable the international banking system to achieve the following objectives:

- Meet the G20 call for faster, cheaper, more transparent, and more inclusive cross-border payment services, including remittances.
- Provide the payment foundation for a unified, global network of interoperable financial ecosystems that can continually expand and innovate.
- Promote financial inclusion by creating simple-to-use payment services and accounts that can be offered at low-to-no cost to the unserved and the underserved.

Overview of the IZZI interbank payment infrastructure

The *IZZI* interbank payment infrastructure incorporates the following core elements (see the Technical Appendix for a more detailed explanation of how the *IZZI* interbank payment infrastructure works):

Tokenized central bank money (T-CeBM). Digital representations of claims on central bank money in a funding account at the central bank of issue (i.e., T-CeBM) by authorised bank/PSP holders are recorded as balances on a programmable ledger, either the currency's partition on a common ledger or an independent single-currency ledger located in the currency's jurisdiction. When a bank/PSP transfers funds from its individual central bank account to the funding account at the central bank, T-CeBM of the same amount is instantly created by crediting the bank/PSP's ledger balance equivalently.

Tokenized commercial bank money (T-CoBM). Digital representations of commercial deposits in each currency at deposit-taking domestic and foreign bank and nonbank PSPs (i.e., T-CoBM) are also recorded as balances on that currency's partition/ledger. Each bank/PSP holder of T-CeBM can establish customer sub-balances on the partition/ledger that represent its customers' deposits at the bank/PSP. The bank/PSP can then create T-CoBM that is fully matched – but not collateralized[8] – by T-CeBM by debiting its proprietary sub-balance and crediting a customer's sub-balance. If one or more of its customers is a respondent bank/PSP, the respondent can then, in turn, establish customer sub-balances on the partition/ledger to create T-CoBM that represents its own customers'

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[7] U.S. Patent No. 11,354,662.

[8] Of note, if a central bank decides in the future to issue central bank digital currency (CBDC) and to distribute CBDC to end-users via authorized banks/PSPs, it could do so on the same partition/ledger by legally structuring the associated end-user sub-balances as either a direct liability of the central bank or fully collateralized by T-CeBM.

deposits...and so on. In this way, T-CoBM can be created and distributed through existing correspondent relationships, including across borders.

Tokenized correspondent banking. Each currency's partition/ledger records the correspondent relationships between all banks and PSPs in that currency and can identify the correspondent chain that connects each payer to each payee in the currency, no matter how long or how many borders the chain might cross. Furthermore, the process for creating T-CeBM and T-CoBM ensures that every T-CoBM sub-balance on the partition/ledger is always fully matched by at least an equivalent amount of both T-CeBM on the partition/ledger and central bank money in the central bank funding account.

Real-time single-currency payments, domestically and across borders. A message from the payer's bank/PSP triggers a programmable process that verifies both sufficient balance availability to cover the payment and permissibility of the payment against all applicable KYC/AML/CFT rules and restrictions. If and only if verified, the programmable operation atomically debits/credits the payer's, the payee's, and their connecting correspondents' respective ledger balances in T-CeBM and T-CoBM accordingly, and without the need for any intermediary to process or approve a PI, to track unsettled in-flight payments, or to handle potential exceptions and errors.

Real-time cross-currency payments at real-time FX rates. A message from the payer's bank/PSP triggers a programmable, composable process that integrates the cross-currency payment with a market-priced FX trade into one transaction. Conditioned upon verification of balance availability and payment permissibility, the respective balances of the payer, the payee, the FX trader, and their connecting correspondents on the two single-currency partitions/ledgers (and on a third currency partition/ledger if a vehicle currency/trader is used) are atomically updated without the need for PI processing by any intermediary bank/PSP, and without the need for the payer's bank/PSP to price, to fund, or to manage the risks of converting the payer's currency into the payee's currency.

Real-time enforcement of all applicable KYC/AML/CFT requirements. A minimum identity standard (i.e., a set of identity fields) for all payers and payees is established for each currency. Each bank/PSP must make available in real time the required identity information for each currency for which their customers wish to send or receive payments. When a payment is initiated, a programmable process identifies all banks/PSPs in the correspondent chain that connects the payer to the payee (and to the FX trader(s) for a cross-currency payment), accesses the payer's and payee's identity information, and centrally screens and conditions settlement upon verification of the end-to-end permissibility of each payment against all applicable system-wide and bank/PSP-customized rules and restrictions across the correspondent chain. Each bank/PSP remains solely responsible for determining and updating its customized rules and restrictions.

How IZZI removes the seven fundamental frictions

The *IZZI* interbank payment infrastructure combines these core elements and novel payment processes to remove all seven fundamental frictions as follows:

Friction	The *IZZI* infrastructure solution
Long transaction chains	Programmability lets one PI replace redundant PI processing by each party in the correspondent chain.
Funding costs	Composability integrates each cross-currency payment with an FX trade in real time to eliminate the payer bank's/PSP's cost and risk of pricing, funding, and converting the payer's currency into the payee's currency.
Weak competition	Direct access for all authorized banks and nonbank PSPs, including direct access across borders, promotes competition.
Fragmented and truncated data formats	Final, immutable, auditable, and atomic on-ledger settlement provides straight-through processing and automatic reconciliation across all parties.
Complex processing of compliance checks	The programmable payment process provides real-time, on-ledger enforcement of all applicable system-wide and bank/PSP-customized rules and restrictions on behalf of every party in the correspondent chain between payer and payee.
Limited operating hours	Interoperable ledgers permit seamless, real-time payments across borders, across currencies, and across time zones 24x7 with real-time finality, even when correspondents are closed.
Legacy technology platforms	Banks/PSPs can use simple APIs to access and to integrate their existing internal systems (including batch platforms) with the *IZZI* infrastructure to achieve real-time gross execution and settlement of payments.

Key benefits

The *IZZI* interbank payment infrastructure will yield significant benefits from a public interest perspective, from a regulatory perspective, and from the perspectives of both individual banks and nonbank PSPs.

Public interest benefits

Macroeconomic stability	By enhancing the central role of banks as deposit-taking payment service providers, the *IZZI* infrastructure strengthens their fundamental role in supporting macroeconomic growth as intermediaries between savers and borrowers.
Financial system stability	The *IZZI* infrastructure leverages the central role of banks and correspondent banking in payments with the time-tested protection of the banking safety net (i.e., supervision, regulation, oversight, deposit insurance, and access to intraday and overnight credit from the central bank of issue) and avoids creating the potential for "digital runs" on the overall banking system.
Financial system structure	The *IZZI* infrastructure preserves the two-tier banking system regarding access to central bank money while simultaneously promoting price and service competition among all bank and nonbank PSPs in each currency, including across borders.
Transparency	The *IZZI* infrastructure enables cheap and fully transparent end-to-end payment costs, including competitive and transparent real-time FX rates for cross-currency payments, no matter how long the correspondent chain between a payer and payee may be.
Accessibility and ubiquity	Since a single-currency system can be established for any individual currency and a cross-currency system can be established for any group of currencies that have established their own single-currency systems, the *IZZI* infrastructure can support any permitted cross-border and cross-currency payment corridor.
Financial inclusion	*IZZI* creates simple-to-use and cheap-to-run payment services and connected accounts that can banks/PSPs can offer at low-to-no cost the unserved and the underserved, as called for by the CPMI-World Bank *Payment aspects of financial inclusion* guidance.

Regulatory benefits

Monetary policy implementation	The *IZZI* infrastructure preserves each central bank's ongoing control of its currency and the effectiveness of its tools for monetary policy implementation. • Each central bank retains control over access to T-CeBM. • Each central bank can control directly the outstanding amounts of intraday and overnight T-CeBM and, indirectly, T-CoBM (since the latter cannot exceed the former), including by imposing limits or other conditions on funding account balances. • Each central bank can influence the attractiveness and velocity T-CoBM by adjusting the interest rate it pays, if any, on central bank balances in the funding account.
Domestic regulatory authority	The *IZZI* infrastructure supports each jurisdiction's ongoing regulatory authority. • Each single-currency system is designed to fit neatly within, and will be subject to, the existing regulatory, supervisory, and oversight frameworks for payment systems in the currency's jurisdiction. • Each single-currency system will observe the CPMI-IOSCO *Principles for financial market infrastructures*. • Access to each single-currency payment system by a separate cross-currency payment system must be approved by the central bank and any other relevant authority in the single-currency's jurisdiction.
International oversight	Each *IZZI* cross-currency payment system will be overseen by all relevant authorities. • Each cross-currency system that is established in any one jurisdiction will be subject to the cooperative oversight of, and as determined by, the central banks of all included currencies. • Each cross-currency system will observe the CPMI-IOSCO *Principles for financial market infrastructures*.
Privacy and anonymity requirements	Payments settled via the *IZZI* infrastructure will be subject to all applicable regulations and policies. • The programmable payment process enforces compliance on behalf of all parties in the impacted correspondent chains with each jurisdiction's privacy, KYC/AML/CFT, and all other applicable regulations and policies. • Each bank/PSP will only have access to the same data that it has today.

Benefits for banks

Improved competitiveness	Banks can retain and grow their deposit base, payment flows, and overall competitiveness with new and improved services. • Banks can offer their customers real-time, final, certain, and cheap A2A payments to and from anyone, anywhere, in any currency, 24x7. • Banks can offer payments fit for the digital world to any domestic or cross-border customer, including individuals, merchants, SMEs, large commercial firms, wholesale financial firms, and government entities.
Lower costs	Banks can use the *IZZI* infrastructure to lower the cost and to improve the profitability of their single-currency and cross-currency payments business. • Transactions are executed end-to-end at a minimal charge. • No need for any bank in the correspondent chain between the payer's bank/PSP and the payee's bank/PSP to approve a PI. • No need for any bank to scan a PI for AML/CFT purposes, whether as originator, beneficiary, or intermediary. • No need for intermediaries to handle exceptions and errors or to track and reconcile in-flight payments across the correspondent chain. • Any bank can offer cross-currency payments without the need to fund, to trade, or to manage the risks of handling multiple currencies. • Internal bank systems, including batch platforms, integrate easily via simple APIs.
Regulatory confidence	Banks can establish and use the *IZZI* infrastructure with regulatory confidence. • The *IZZI* infrastructure is ready-to-approve within existing regulatory, supervisory, and oversight frameworks for domestic and cross-border payment systems. • *IZZI* will observe the *Principles for financial market infrastructures.* • Banks can plan to use *IZZI* to improve and expand their payment services -- including to meet the G20 payment targets and the evolving needs of the digital financial system -- notwithstanding uncertainties in the regulatory environment.

Benefits for other PSPs

Direct access	Any authorized PSP can access the *IZZI* infrastructure directly, including: • Bank-run payment networks • Credit and debit card networks • Retail, corporate, and wholesale nonbank PSPs • Cross-border and cross-currency remittance providers • Traditional and digitized securities issuers and custodians • Stablecoin, token, and other digitized asset issuers • DVP and PVP settlement systems • Central counterparties • Other novel payment arrangements
Improved competitiveness	PSPs can lower the cost and improve their front-end services with enhanced back-end interbank settlement processes, including by: • Providing customers real-time, 24x7, low-cost funding and defunding. • Eliminating the need, cost, and risk of back-end interbank credit exposures to support funding/defunding. • Eliminating uncertainty and delays in a customer's ability to access or to spend its receipts, which can often last 1-3 business days.
New services	PSPs can offer new 24x7 front-end services that are impractical with today's back-end interbank payment infrastructure, such as: • Real-time point-of-sale payments from card issuers to merchants and merchant acquirers. • Real-time trading with immediate DVP/PVP settlement of traditional and digitized securities and FX transactions. • Real-time and defined-time intraday swaps and repos. • Real-time DVP/PVP issuance and redemption of stablecoins, tokens, and other digital assets. • Real-time delivery/release/transfer of physical assets (e.g., imports, collateral, real estate) against payment. • Atomic multi-currency margin collection and disbursement.

Next steps

IZZI, Inc has been established to achieve the *Project IZZI* vision by developing the patented *IZZI* interbank payment infrastructure. Payment system operators and bank and nonbank PSPs from around the world are invited to join *Project IZZI* and to participate in the development and testing of a prototype for potential adoption as the next-generation version of their current systems.

The *IZZI* prototype for both single-currency and cross-currency payments will be built on a common programmable platform with a partition for as many individual currencies that wish to test. It will be developed with state-of-the-art technology, utilizing the beneficial elements of distributed ledger technology to maximize security, resilience, and auditability but without dependence on decentralized governance or decentralized operations.

Upon successful testing, an operational single-currency system can then be established for any individual currency at the jurisdiction's own pace based on jurisdictional readiness and capacity, including potentially as the next-generation version of an existing payment system. As each single-currency *IZZI* system is established, individual banks and nonbank PSPs can access and use the system as direct participants, including across borders. They can create and fund proprietary and customer ledger balances either through their own central bank accounts or through their domestic or foreign correspondents.

In parallel, one or more operational cross-currency systems can be established to coordinate cross-currency payments across one or more pairs of operational single-currency systems.

While each single-currency and cross-currency *IZZI* system can be built and operated independently, any could outsource its back-office switch to a third-party platform provider, if desired and permitted. Whether each *IZZI* system operates independently, on an outsourced switch, or on a common third-party platform that supports other *IZZI* systems, the patented payment process will allow them to function collectively as a unified network of interoperable payment ledgers. Going forward, an ever-expanding and evolving network of financial ecosystems can integrate and interoperate with the growing *IZZI* interbank payment infrastructure, each at their own pace.

Requests to join *Project IZZI* may be addressed to info@izzi.global.
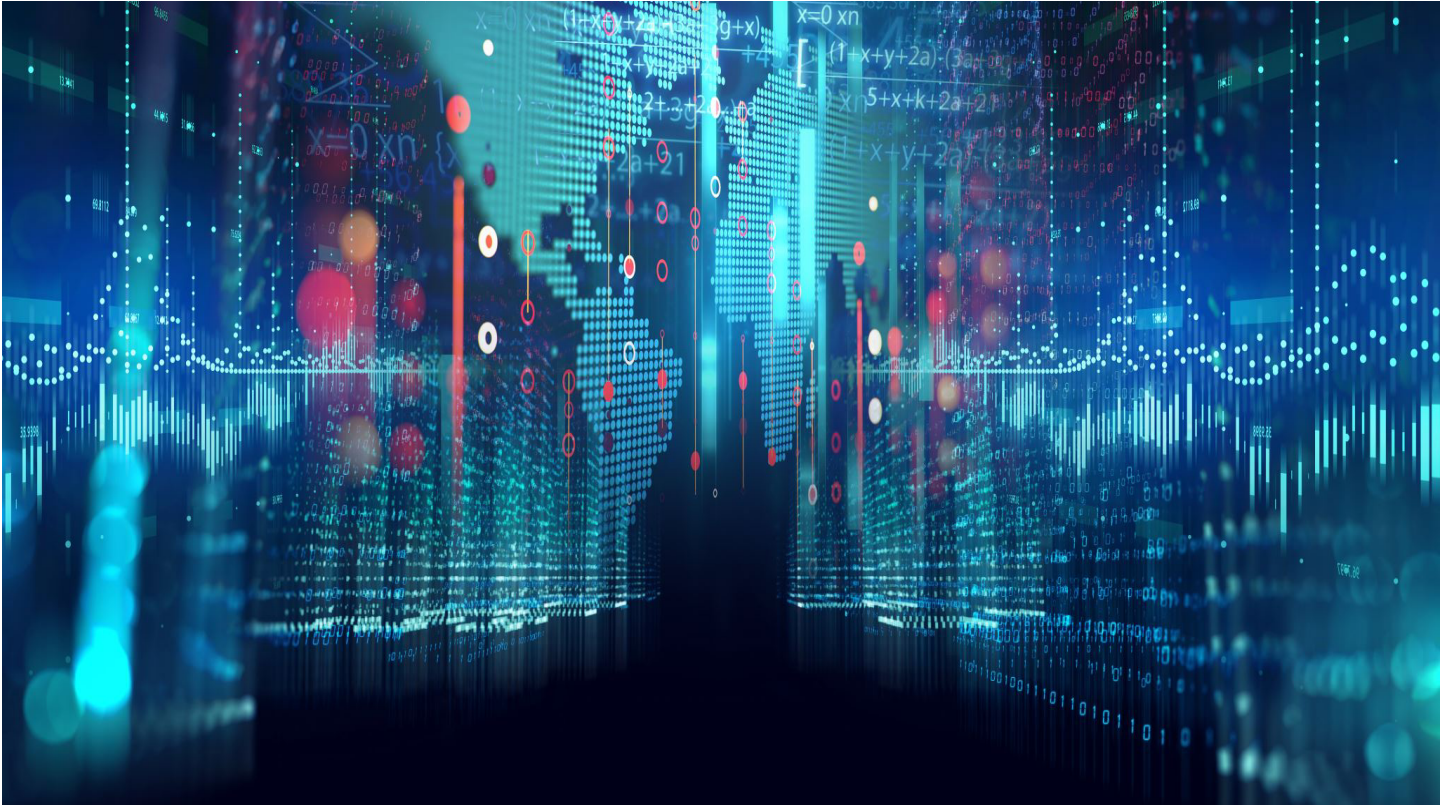
Technical Appendix: How *IZZI* Works

1. Creating tokened central bank money
2. Creating and distributing tokenized commercial bank money
3. Making a single-currency *IZZI* payment
4. Making a cross-currency *IZZI* payment
5. Centralized enforcement of KYC/AML/CFT compliance
6. The global *IZZI* ecosystem

1. Creating tokenized central bank money

A set of Funding Banks (FBs) will establish a Funding Account (FA) at the currency's central bank and appoint the currency's *IZZI* payment system operator as the FA agent. The *IZZI* operator will also establish and be responsible for the currency's programmable ledger, whether it is the currency's partition on a common ledger or an independent single-currency ledger located in the currency's jurisdiction.

Each FB will have a balance on the ledger that records its tokenized claim on central bank money (T-CeBM), which is the digital representation of its right under the rules of the system to receive central bank money paid out of the FA. When a FB transfers funds from (to) its individual central bank account to (from) the FA, the FB's T-CeBM ledger balance will increase (decrease) equivalently.

Graph A-1

Creating tokenized central bank money
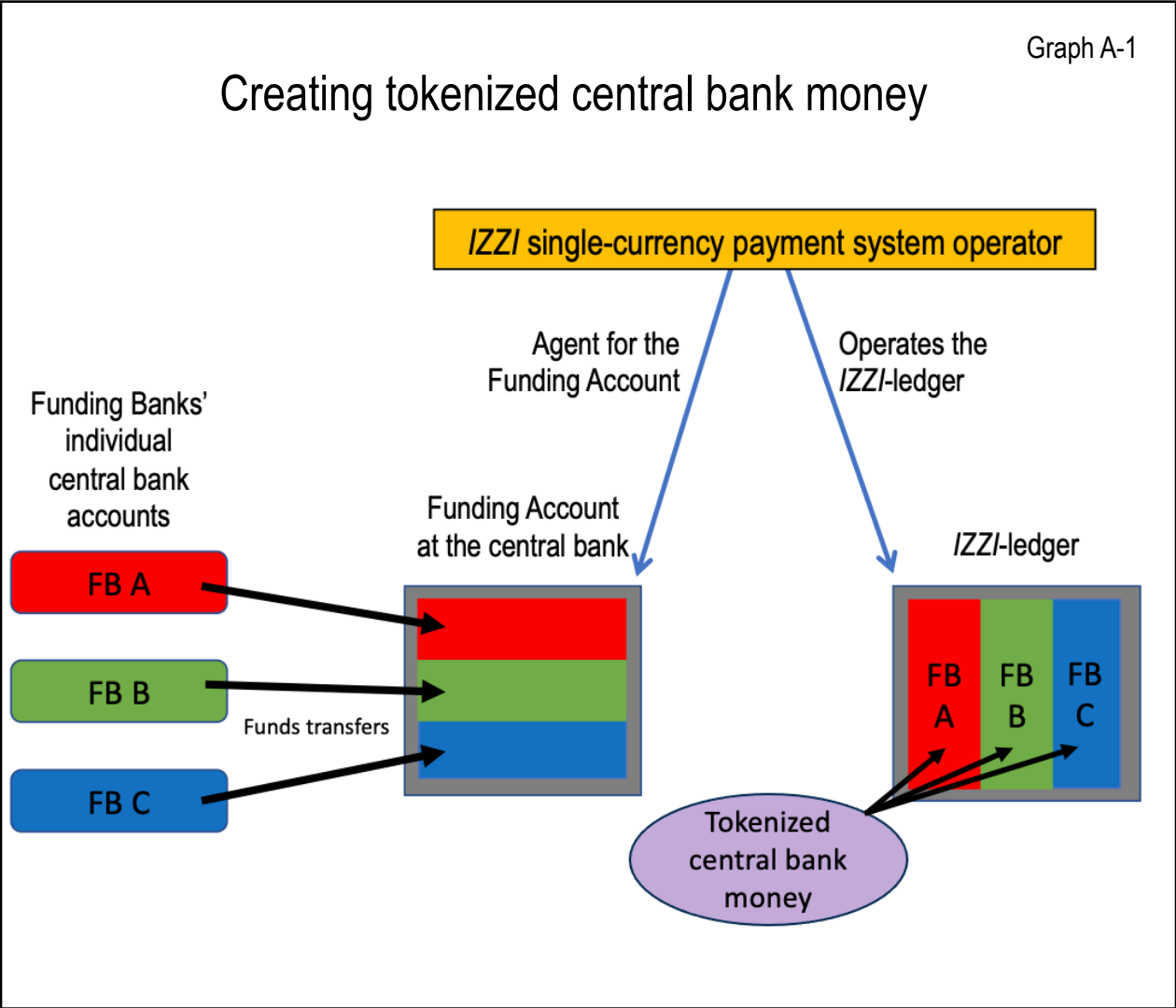
2. Creating and distributing tokenized commercial bank money

Each FB can establish a sub-balance on the ledger for any domestic or cross-border customer. A FB customer's sub-balance records its tokenized commercial bank money (T-CoBM), which is a digital representation of the customer's demand deposit at the FB that is matched fully but not collateralized* by the FB's T-CeBM. A customer can be any type of End User (EU), (e.g., an individual, merchant, commercial firm, financial firm, or government entity), including a respondent Non-Funding Bank (NFB) or nonbank PSP.

A NFB/PSP respondent can then, in turn, establish customer sub-balances on the currency's partition/ledger to create T-CoBM that represents its customers' deposits at the NFB/PSP, and so on. In this way, T-CoBM can be created and distributed through existing correspondent relationships, including across borders, with each entity on the hierarchical ledger linked through a unique chain to a specific FB (see Graph A-2).
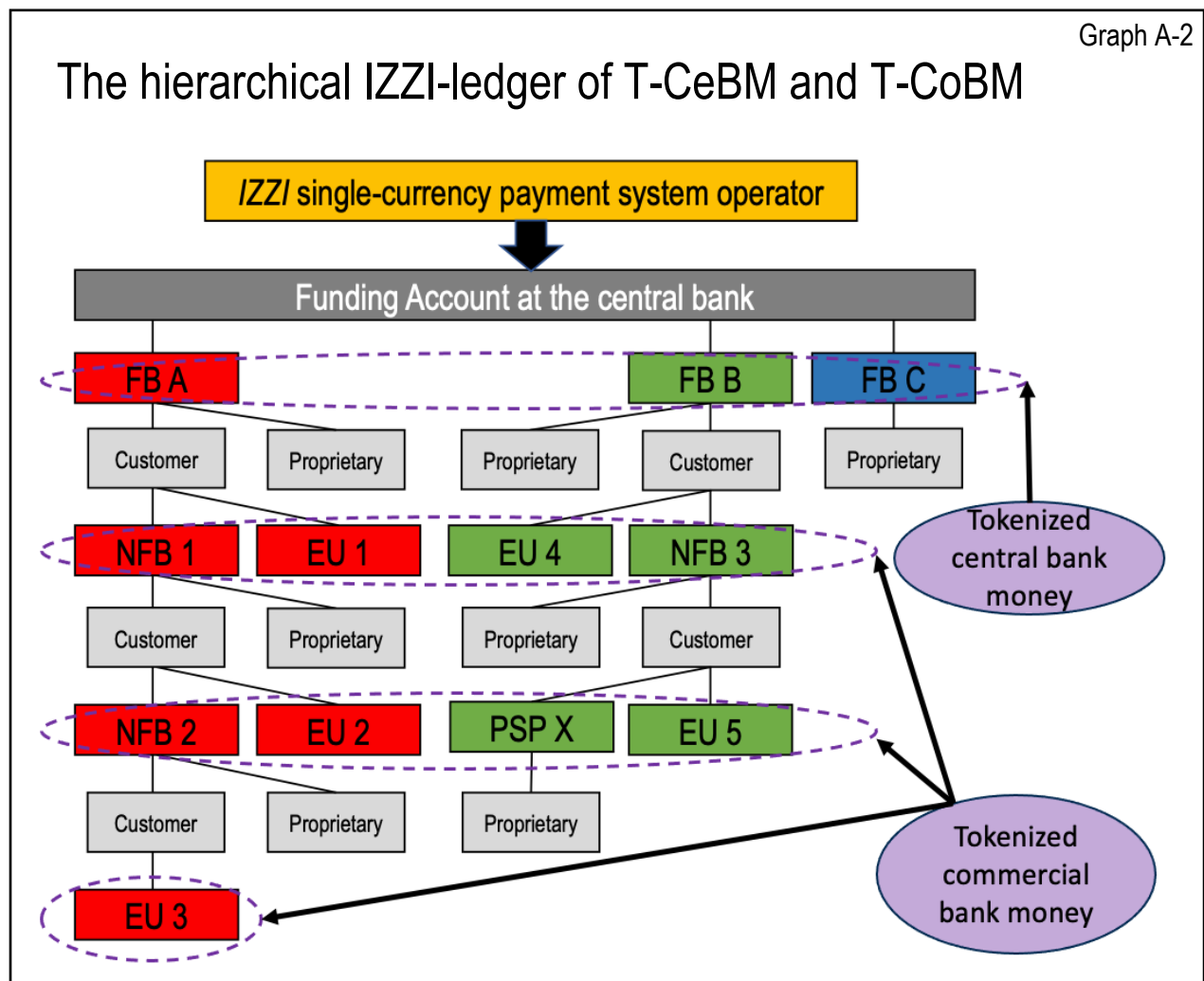
Graph A-2

The hierarchical IZZI-ledger of T-CeBM and T-CoBM

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* Of note, if a central bank decides in the future to issue central bank digital currency (CBDC) and to distribute CBDC to end-users via authorized banks/PSPs, it could do so on the same partition/ledger by legally structuring the associated end-user sub-balances as either a direct liability of the central bank or fully collateralized by T-CeBM.

3. Making a single-currency *IZZI* payment

In contrast to today's payment infrastructure that requires every intermediary in the correspondent chain to validate and to accept a PI, only the payer's bank/PSP will need to validate and to accept a PI, namely the PI it receives from its direct customer via its customer interface (i.e., to check the customer's instruction against any applicable identity, credit, liquidity, fraud, and suspicious activity requirements). Once accepted, the payer's bank/PSP instructs the single-currency *IZZI* payment system operator to make the payment.

Graph A-3 illustrates the process when EU 3 instructs NFB 2 that it wants to pay EU 5. NFB 2 sends a PI to the *IZZI* single-currency payment system that triggers the following programmable operation. First, the chain that connects the payer to the payee is identified, which is NFB 2 to NFB 1 to FB A to FB B to NFB 3. Then two conditions are checked: (i) the permissibility of the payment against all applicable system-wide and customized rules and restrictions of each party in the chain and (ii) if EU 3 (or NFB 2) has a sufficient balance on the ledger to cover the payment. If both conditions are met, then atomically the balances of NFB 2/EU 3, NFB 1, and FB A are debited, and the balances of FB B and NFB 3/EU 5 are credited.

Graph A-3

Making a single-currency *IZZI*-cash payment
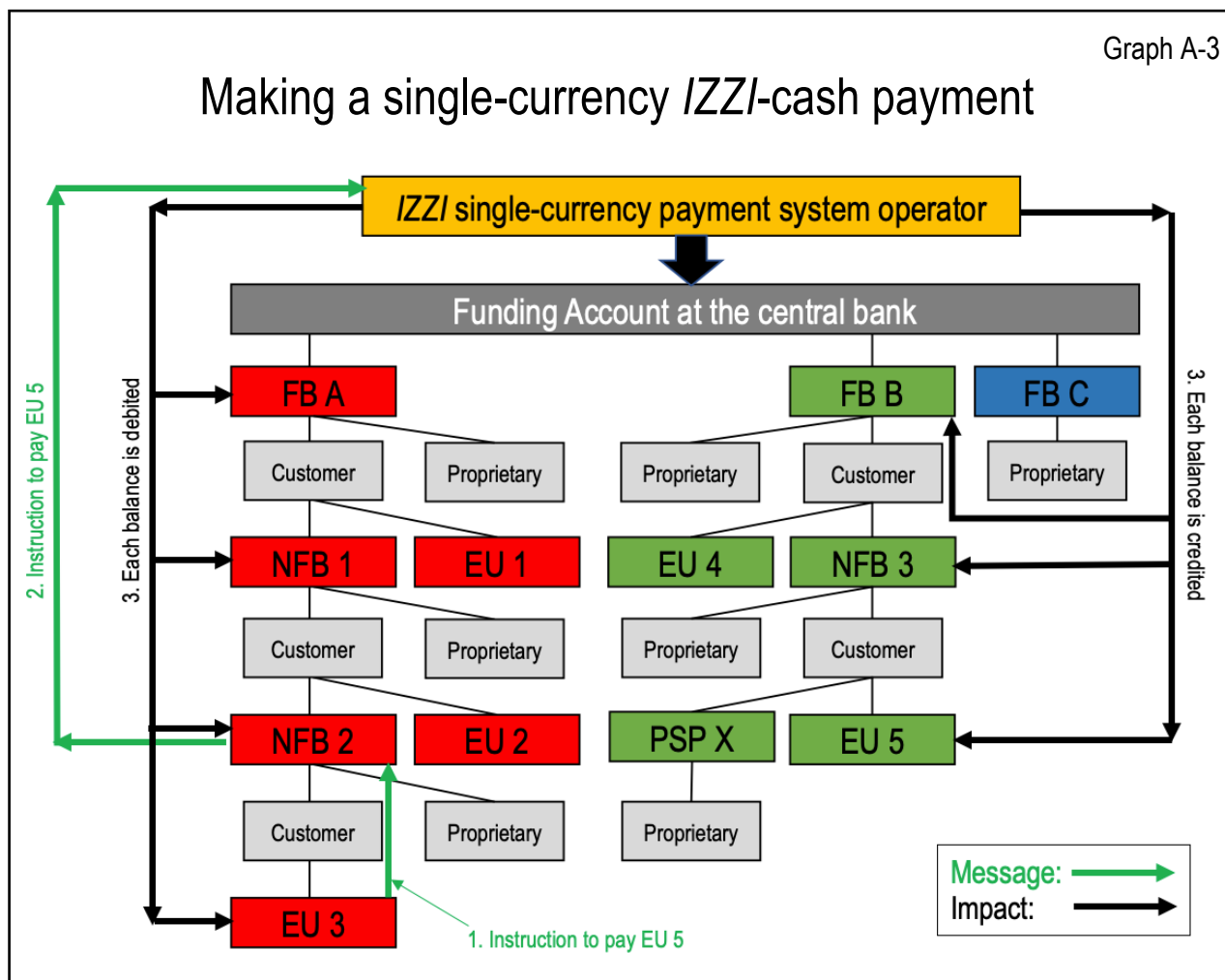
The ledger balance changes are final, immutable, auditable, and made simultaneously available to all parties in the correspondent chain. EU 3 and EU 5 receive confirmation of the payment from NFB 2 and NFB 3, respectively. Of note, no intermediary in the chain will need to process a PI, to track unsettled in-flight payments, to handle potential exceptions and errors, or to reconcile payments across the chain. Any exceptions or errors in the intended payment are identified by the *IZZI* payment system operator and addressed bilaterally, and only with, the payer's bank/PSP.

# 4. Making a cross-currency *IZZI* payment

An *IZZI* cross-currency payment system operator will coordinate the pricing and settlement of cross-currency payments across one or more pairs of currencies that have established their own single-currency *IZZI* payment systems. The programmable cross-currency payment process will provide an FX rate for the cross-currency payment that is fully transparent, known in advance, and determined through real-time market competition by authorized FX traders. If the rate is accepted, composability will ensure that the cross-currency payment and the associated FX trade are integrated and atomically settled across the two impacted single-currency *IZZI* partitions/ledgers (and on a third currency partition/ledger if a vehicle currency/trader is used).

The *IZZI* cross-currency payment system operator will act as a trusted intermediary during the integrated cross-currency payment process and will have a limited balance sheet to support the process. It will have a proprietary balance on each single-currency ledger for the cross-currency payments that it facilitates, and it will have the status of a FB vis-à-vis the FA for each of those currencies (i.e., it will be authorized to hold T-CeBM to facilitate the cross-currency settlement process without incurring commercial bank credit risk).

FX Traders (FXTs) will be authorized to trade one currency for another to facilitate cross-currency payments. As a condition for authorization, the FXT must establish either a T-CeBM or T-CoBM balance on the partition/ledger of each currency it wishes to trade. Each FXT must also continuously quote an FX offer rate 24x7 for each currency pair it is authorized to trade. Each FXT can update its offer rate in real time, along with its maximum offer amount, subject to a minimum offer amount set under the rules that it must also continuously maintain as a minimum balance on the partition/ledger. To promote price transparency and market competition, the *IZZI* cross-currency payment system operator can stream an indicative FX rate for each currency pair in real time, 24x7 based on the current offer rates.

Part 1: Graph A-4 illustrates the initial steps in the cross-currency payment process. In the example, EU 3 has US dollars and wishes to pay euro to EU 6. EU 3 requests a locked-in exchange rate from its payer bank/PSP (NFB 2) to determine the all-in cost of the payment. NFB 2 then sends a message to the *IZZI* cross-currency payment system that triggers the following programmable steps. First, in this example, FXT Z is identified as the FXT with the best offer rate. Then each single-currency payment system checks and

confirms the end-to-end permissibility of the cross-currency payment and the FX trade against all applicable system-wide and customized rules and restrictions along the correspondent chains that connect EU 3, EU 6, and FXT Z to one another. If confirmed, the euro *IZZI* payment system atomically debits the euro balance of FXT Z, credits the euro balance of the *IZZI* cross-currency payment system operator, and debits the euro balances of the correspondents in the chain connecting them (i.e., NFB A and FB 1). A message with the locked-in offer rate is then sent to NFB 2/EU 3.

Graph A-4

Making a cross-currency IZZI payment: Part 1
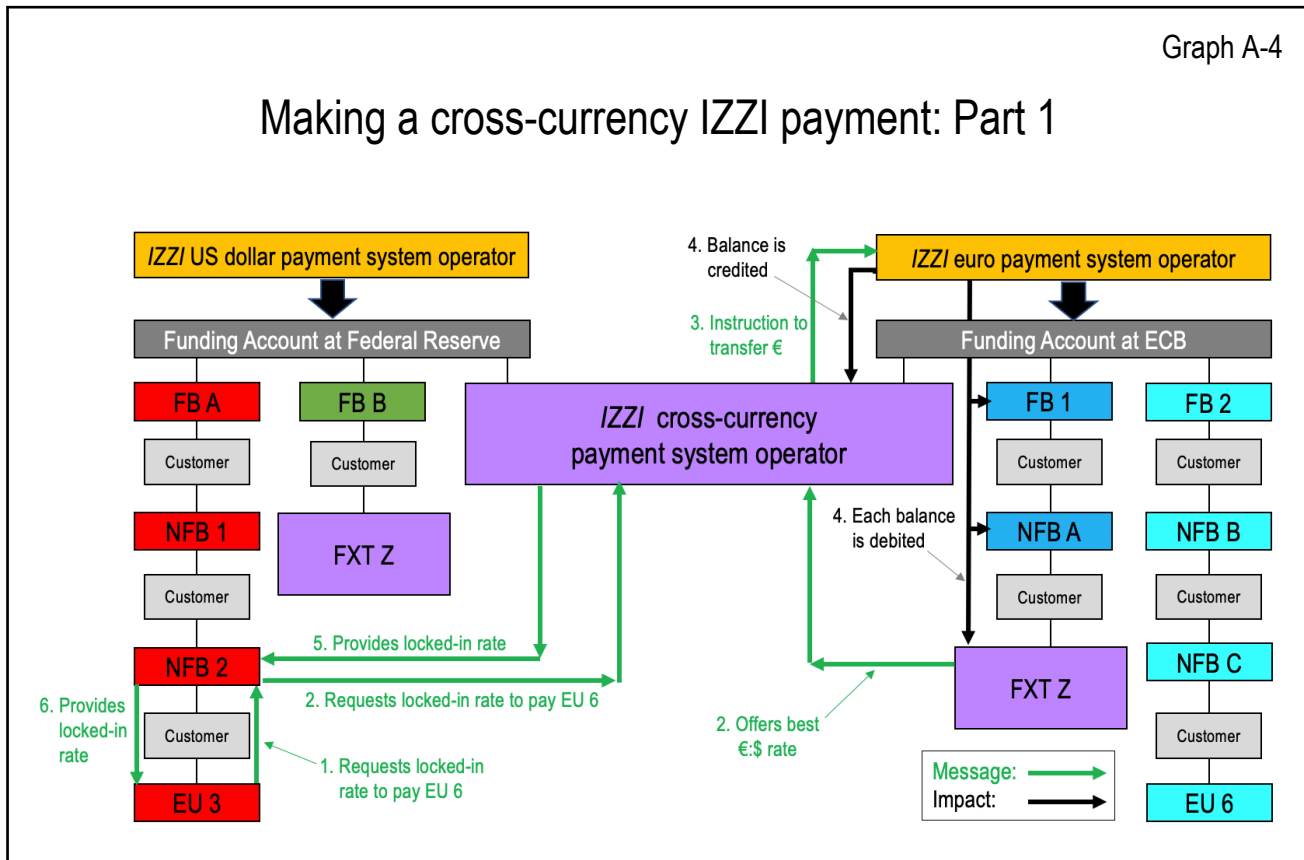
Part 2: Graph A-5 shows that if NFB 2/EU 3 accepts the locked-in offered rate, NFB 2 will send a message that triggers the US dollar *IZZI* payment system to atomically debit the US dollar balances of NFB 2/EU 3, credit the US dollar balance of the *IZZI* cross-currency payment system operator, and debit the US dollar balances of the correspondents in the chain connecting them (i.e., NFB 1 and FB A). If NFB 2/EU 3 do not accept the rate, the euro *IZZI* cross-currency payment system atomically reverses the previous debits/credits to return the offered euro to FXT Z.

Making a cross-currency IZZI payment: Part 2

IZZI US dollar payment system operator

IZZI euro payment system operator

9. Balance is credited

Funding Account at Federal Reserve

Funding Account at ECB

8. Instruction to pay cross-currency operator

9. Each balance is debited

FB A

FB B

Customer

Customer

NFB 1

FXT Z

Customer

NFB 2

Customer

7. Accepts locked-in rate

EU 3

IZZI cross-currency payment system operator

FB 1

FB 2

Customer

Customer

NFB A

NFB B

Customer

Customer

FXT Z

NFB C

Customer

Message:
Impact:

EU 6

Part 3: The successful crediting of the cross-currency operator's US dollar balance serves as authorization and confirmation by NFB 2/EU 3 of both the cross-currency payment and the FX trade. In addition, by receiving and holding both FXT Z's euro and EU 3's US dollars as a trusted intermediary, the *IZZI* cross-currency payment system operator can provide an end-to-end PVP settlement mechanism that ensures the final transfer of the payer's currency to the FX trader will occur if and only if the final transfer of the FX trader's currency to the payee takes place. As shown in Graph A-6, this is accomplished by using the crediting of the cross-currency operator's US dollar balance as a programmable trigger to atomically debit the cross-currency operator's US dollar balance, credit FB B's and FXT Z's US dollar balances, debit the cross-currency operator's euro balance, and credit FB 2's, NFB B's, and NFB C's/EU 6's euro balances.

Graph A-6

Making a cross-currency IZZI payment: Part 3
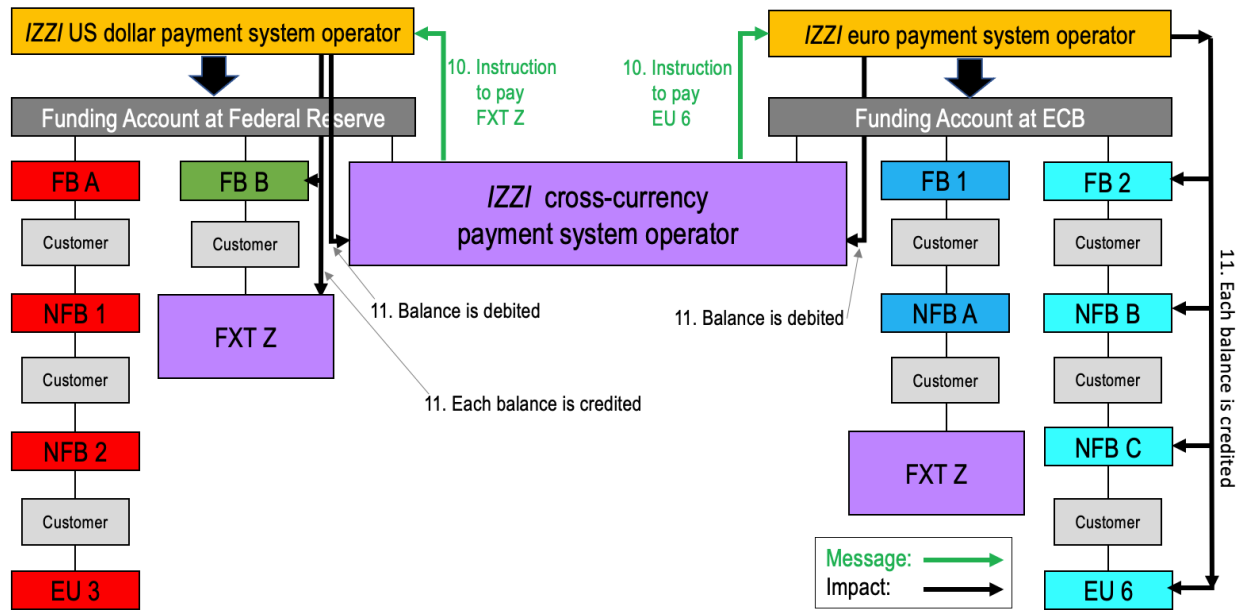
Of note, this cross-currency payment process enables any bank/PSP to offer its customers cross-currency payment services without the need to fund, to trade, or to manage the risks of handling multiple currencies. In this example, the US dollar-based NFB 2 can offer a euro payment service to its US dollar-based customer EU 3 without the need to fund, to trade, or to manage the risks of converting US dollars into euros. It can do so because the *IZZI* cross-currency payment process uses composability to integrate the cross-currency payment and the associated FX trade into a single, simultaneously executed and settled transaction in which FX traders compete to provide both the FX rate and the necessary foreign currency liquidity "on demand". Alternatively, a bank/PSP can choose to participate directly in multiple single-currency *IZZI* payment systems and offer its customers cross-currency payment services between those currencies at in-house exchange rates directly without using the *IZZI* cross-currency payment system.

5. Centralized enforcement of KYC/AML/CFT compliance

The programmable payment process provides real-time, on-ledger enforcement of all applicable system-wide and bank/PSP-customized rules and restrictions on behalf of every party in the correspondent chain between payer and payee.

- Each bank/PSP remains solely responsible for determining and for updating as necessary its customized rules and restrictions.
- Each bank/PSP is also responsible for providing the single-currency operator with its customized payment rules and restrictions and for providing the operator with updates as necessary.

Each single-currency operator will establish and update as necessary a system-wide minimum identity standard (i.e., a set of identity fields) for all payments in its currency.

- The minimum identity standard will be set to enable on-ledger screening against all system-wide and bank/PSP-customized rules and restrictions.
- The minimum identity standard can differ by currency.
- Each bank/PSP must pre-validate and make available in real time the required identity information for each currency for which its customers wish to send or receive payments.

When a single-currency or cross-currency payment is initiated, the programmable operation:

- Identifies all banks/PSPs in the correspondent chain across all relevant currency partitions/ledgers that connects the payer to the payee (and to the FX trader(s) for a cross-currency payment).
- Accesses the payer's and payee's identity information.
- Screens and conditions settlement upon verification of the end-to-end permissibility of the payment against all applicable system-wide and bank/PSP-customized rules and restrictions on each currency's partition/ledger.

Most notably, no bank/PSP in the correspondent chain needs to screen either a single-currency or a cross-currency payment instruction.

6. The global *IZZI* ecosystem

Graph A-7 provides a summary of the functional roles and regulatory features of all the entities that will constitute the global *IZZI* interbank payment ecosystem.

Graph A-7

The *IZZI* interbank payment ecosystem

The *IZZI*-based network of interoperable payment ledgers

Functional roles:

An independent operator runs each *IZZI* cross-currency payment system

An independent operator runs each single-currency *IZZI* payment system

T-CeBM in each currency is matched 100% by central bank money

Create and distribute T-CoBM to end users and to other bank and nonbank PSPs

Create and distribute T-CoBM to end users and to other bank and nonbank PSPs

Provide FX rates and multi-currency funding in real time and manage FX risks

Regulatory features:

Enables cooperative central bank oversight of each cross-currency payment system

Enables domestic regulation of each single-currency payment system

Supports monetary policy implementation and currency control by the central bank of issue

Retains the two-tier banking system and access policies of each central bank

Promotes competition among bank and nonbank PSPs, including across borders

Promotes competitively priced FX rates for low-cost and seamless cross-currency payments

IZZI cross-currency operator

IZZI USD operator — *IZZI* EUR operator — *IZZI* operator for each other currency

Funding account at the Fed — Funding account at the ECB — Funding account at each central bank of issue

USD Funding Banks — EUR Funding Banks — Funding Banks for each currency

USD Non-Funding Banks — USD nonbank PSPs — EUR Non-Funding Banks — EUR nonbank PSPs — Non-Funding Banks for each currency — Nonbank PSPs for each currency

FX Traders — FX Traders

End Users
Individuals, merchants, SMEs, large commercial firms, wholesale financial firms, government entities

Graph A-8 illustrates how the *IZZI* infrastructure can serve as the payment foundation for a unified, global network of interoperable financial ecosystems that can continually expand and innovate.

The *IZZI* payment foundation for interoperable ecosystems

End users

Individuals, merchants, commercial firms, financial firms, government entities, etc

Securities issuers	Stablecoin issuers	Token issuers	CBDC issuers		PVP systems	DVP systems	Trade facilitators	Central counterparties
Receive/confirm real-time payments for newly issued traditional and digitized capital instruments.

Send/confirm real-time payments of principle, interest, dividends, and other money owed to instrument holders. | Receive/confirm real-time payments from buyers of newly minted stablecoins.

Send/confirm real-time payments of principle, interest, and other money owed to stablecoin holders. | Receive/confirm real-time payments from buyers of newly minted tokens.

Send/confirm real-time payments of principle, interest, and other money owed to token holders. | Receive/confirm real-time payments from buyers of newly minted CBDCs.

Send/confirm real-time payments of principle, interest, and other money owed to CBDC holders | Send and receive real-time payments to/from other end users and financial ecosystems | Receive/confirm real-time payments from senders of currencies sold.

Send/confirm real-time payments to recipients of currencies bought. | Receive/confirm real-time payments from secondary market recipients of traditional and digitized assets.

Send/confirm real-time payments to secondary market deliverers of traditional and digitized assets. | Receive/confirm real-time payments to trigger deliveries, collateral release, and other actions.

Send/confirm real-time payments to deliverers, lenders, and performers of other actions. | Receive/confirm real-time receipts of margin and other payments from CCP participants.

Send/confirm real-time disbursement of margin and other payments to CCP participants. |

IZZI payment infrastructure

- **Single-currency payment systems**
- **Cross-currency payment systems**

PROJECT IZZI™

Contact:

info@izzi.global

IZZI, Inc