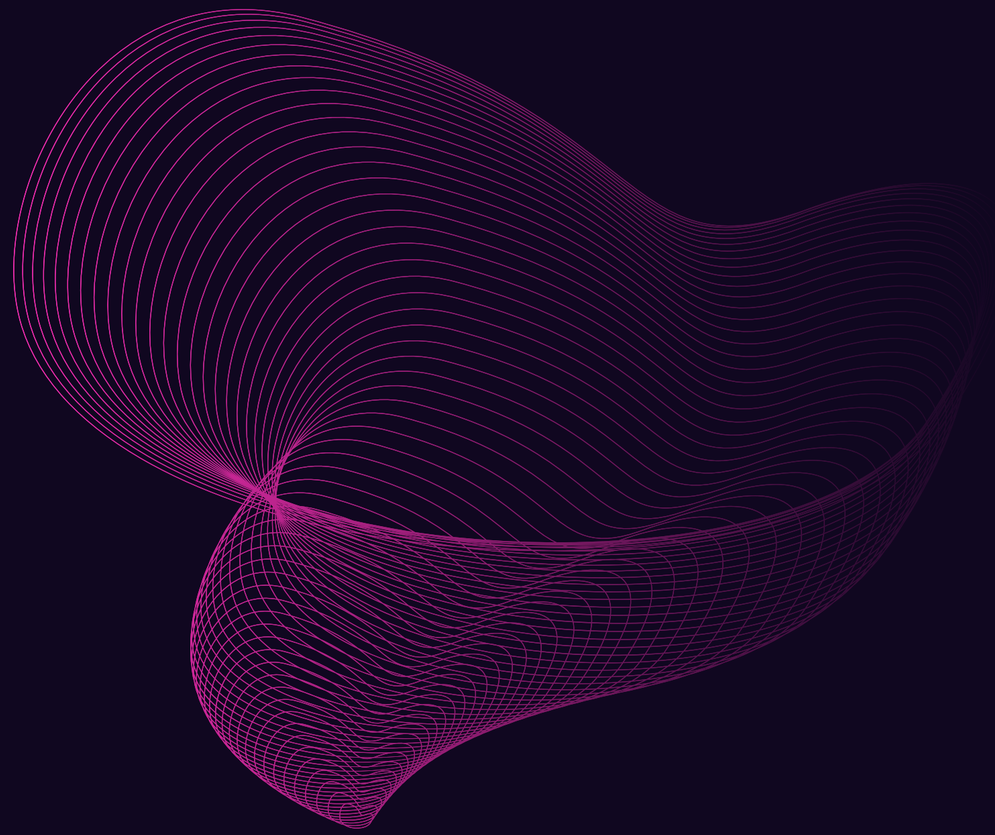
Rethinking Cross-Border Transactions: Issues and Solutions

DIGITAL CURRENCIES AND CROSS BORDER PAYMENTS



Introduction

Digital currencies are reshaping the financial landscape, especially in cross-border payments. Conventional financial systems depend on a network of correspondent banks and intermediaries, leading to inefficiencies such as high transaction fees, slow processing times, and restricted access for individuals in underserved areas.

The motivation for choosing this topic arises from the increasing acknowledgement that blockchain-based digital currencies possess the capacity to transform international money transfers by providing faster, more affordable, and inclusive solutions.

Some examples of traditional finance methods

Interbank Financial Institution

Used for international money transfers.

Remittance Services (Western Union, MoneyGram, PayPal, Wise)

Services used for sending money across borders.

Correspondent Banking

Banks work with international partners to process payments.

Foreign Exchange (Forex) and Currency Restrictions

Governments and central banks regulate currency flows.

Traditional Finance and Its Inefficiencies

The current cross-border payment infrastructure relies significantly on centralised financial institutions and the SWIFT messaging system. Although these systems have enhanced global trade and remittances, they exhibit several significant inefficiencies:

01

Transaction fees, including foreign exchange spreads, intermediary charges, and compliance costs, make international transfers expensive, especially for smaller transactions.

High Costs

02

Transfers often take several days to process due to the involvement of multiple banks and regulatory checks

Slow Settlement Times

03

Many individuals in emerging markets lack access to traditional banking services, making cross-border transfers difficult.

Limited Financial Inclusion

04

Intermediaries introduce friction into the system, requiring multiple verifications and reconciliations, leading to increased risks of errors and delays.

Operational Complexity

The Role of Blockchain in Enhancing Efficiency and Accessibility

01

Cryptocurrencies and stablecoins enable direct peer-to-peer transactions, eliminating intermediaries and reducing fees.

Reduced Transaction Costs

02

Transactions on blockchain networks occur in real-time or within minutes, significantly improving the efficiency of international transfers.

Faster Settlements

03

Digital wallets and blockchain-based payment networks provide access to financial services for unbanked and underbanked populations worldwide.

Greater Financial Inclusion

04

Immutable blockchain ledgers reduce the risks of fraud and increase trust in the payment system.

Enhanced Transparency and Security

Why do we need the modernisation of cross-border Payment?

The J.P. Morgan paper, "The Race to Rewire Cross-Border Payments," emphasises the dynamic nature of international payment systems. The increasing volume of cross-border transactions, propelled by financial inclusion and the reorganisation of global supply chains, necessitates immediate modernisation.

Despite advancements in domestic real-time payment systems, cross-border payments continue to face infrastructural and legal challenges. The study highlights how blockchain, along with other emerging technologies, could enhance the efficiency, cost-effectiveness, and transparency of international payments, thereby fostering global trade and economic development.

Stellar [XLM]

Stellar is a blockchain-based protocol designed specifically for facilitating fast, low-cost cross-border payments and digital currency transactions. Launched in 2014 by Jed McCaleb, Stellar operates as an open-source decentralized network optimised for financial inclusion and interoperability between traditional banking systems, cryptocurrencies, and fintech solutions.

Size Market

37%
Expected CAGR of the BaaS market

$7.54 bn
Total Market Cap

30.71 bn
total circulating supply

Key Functions of Stellar

Multi-Currency Transactions & Anchors

- Anchors act as trusted intermediaries (banks, payment processors, or financial institutions) that issue fiat-backed digital tokens on Stellar.
- Users deposit traditional fiat currency (USD, EUR, etc.) with an anchor, which then issues a 1:1 pegged digital representation of the currency on the Stellar blockchain.

Decentralized Exchange (DEX) and Path Payments

- Stellar has a built-in decentralized exchange (DEX) that allows users to trade digital assets without intermediaries.
- Path Payments: If a user wants to send money across borders, Stellar automatically finds the most efficient conversion path using available liquidity pools.

Smart Contracts and Compliance

- The protocol integrates Know Your Customer (KYC) and Anti-Money Laundering (AML) features, making it more compliant with regulatory frameworks than purely decentralized blockchains like Bitcoin.

Working of Stellar

01

Decentralized Control

No single entity has complete control over the network.

02

Low Latency

Transactions are confirmed in seconds rather than minutes or hours

03

Flexible Trust

Network participants can choose which validators they trust.

04

Asymptotic Security

Resistant to malicious actors attempting to disrupt consensus.

Comparison with Traditional Finance

Comparison	Stellar	Traditional Finance
Feature	Stellar (Blockchain-Based Solution)	Traditional Finance (SWIFT, Banks, etc.)
Transaction Speed	3-5 seconds per transaction	1-5 days (due to intermediaries)
Transaction Fees	< $0.01 per transaction	High fees ($10-$50 per transfer)
Transparency	Fully transparent ledger	Opaque banking processes
Security	Decentralized cryptographic security	Bank-controlled security mechanisms
Access & Inclusion	Open to anyone with internet	Limited to those with bank access

Gaps and Challenges

Adoption and Competition in the Blockchain Space

Limited Institutional Adoption: While Stellar has partnered with some financial institutions and fintech companies, it has struggled to secure widespread adoption by major banks compared to competitors like Ripple (XRP) and SWIFT.

Scalability and Network Limitations

Transaction Throughput Constraints: While Stellar processes transactions faster than Bitcoin and Ethereum, it faces scalability concerns as transaction volumes increase.

Liquidity and Market Volatility

Like most cryptocurrencies, XLM experiences high price volatility, making it difficult to use as a stable medium for cross-border payments. While Stellar allows tokenization of assets, some issued tokens struggle with liquidity, limiting their usability.

Ecosystem Development and User Experience

While Stellar has a developer-friendly API, it has struggled to attract a large developer community compared to Ethereum and Solana.Wallet integrations and ease of use remain areas for improvement, especially for non-technical users.

Introducing OpenBridge

Leveraging blockchain innovation to build a fast, secure, and scalable cross-border payment network for traditional economies

OpenBridge

OpenBridge is a multi-tier hybrid blockchain-based cross-border payment system designed to provide highly scalable, secure, and privacy-preserving financial transactions. It leverages advanced cryptographic techniques, automated smart contracts, and Layer 2 scaling solutions to offer efficient, low-cost, and globally accessible cross-border payments. OpenBridge achieves an optimal balance between scalability, security, and privacy while incorporating a moderate decentralization model that ensures efficiency without compromising trust and regulatory compliance.

Why OpenBridge?

As we have seen so far, traditional cross-border payment systems and existing blockchain protocols suffer from several limitations such as limited scalability, privacy challenges, security risks, high costs, and regulatory and compliance constraints. **OpenBridge is designed to overcome these challenges through:**

01 Hybrid Blockchain Consortium Model

02 Multi-Currency Smart Contract Layer

03 Privacy through Zero-Knowledge Proofs (ZKPs)

04 Proof-of-Authority (PoA) Consensus Mechanism

05 Interoperability with Existing Financial Infrastructure

Hybrid Blockchain Consortium Model

The Multi-Tier Hybrid Blockchain Architecture of OpenBridge is designed to balance scalability, security, privacy, and regulatory compliance by integrating two layers:

Layer 1: Settlement and Governance Layer (Permissioned Blockchain)

- This layer operates under a **Proof-of-Authority (PoA)** consensus, where regulated financial institutions (central banks, commercial banks, and regulated entities) act as validator nodes.
- The layer ensures final transaction settlement, and compliance with AML/KYC regulations.
- Notably, it implements **Zero-Knowledge Proofs (ZKPs)** for privacy, allowing transactions to be verified without exposing sensitive user details.
- Provides an auditability framework that allows regulators to verify transactions without compromising user confidentiality.

Hybrid Blockchain Consortium Model

Layer 2: High-Speed Scalability Layer (Optimistic & ZK-Rollups)

- This layer uses **Optimistic Rollups** for standard transactions, where we batch multiple transactions off-chain before finalizing them on Layer 1.
- It also integrates **Zero-Knowledge Rollups** (ZK Rollups) for privacy-focused transactions, ensuring confidential yet verifiable cross-border payments.
- It also reduces congestion on Layer 1 by processing transactions off-chain, lowering costs and improving throughput.

Multi-Currency Smart Contract Layer

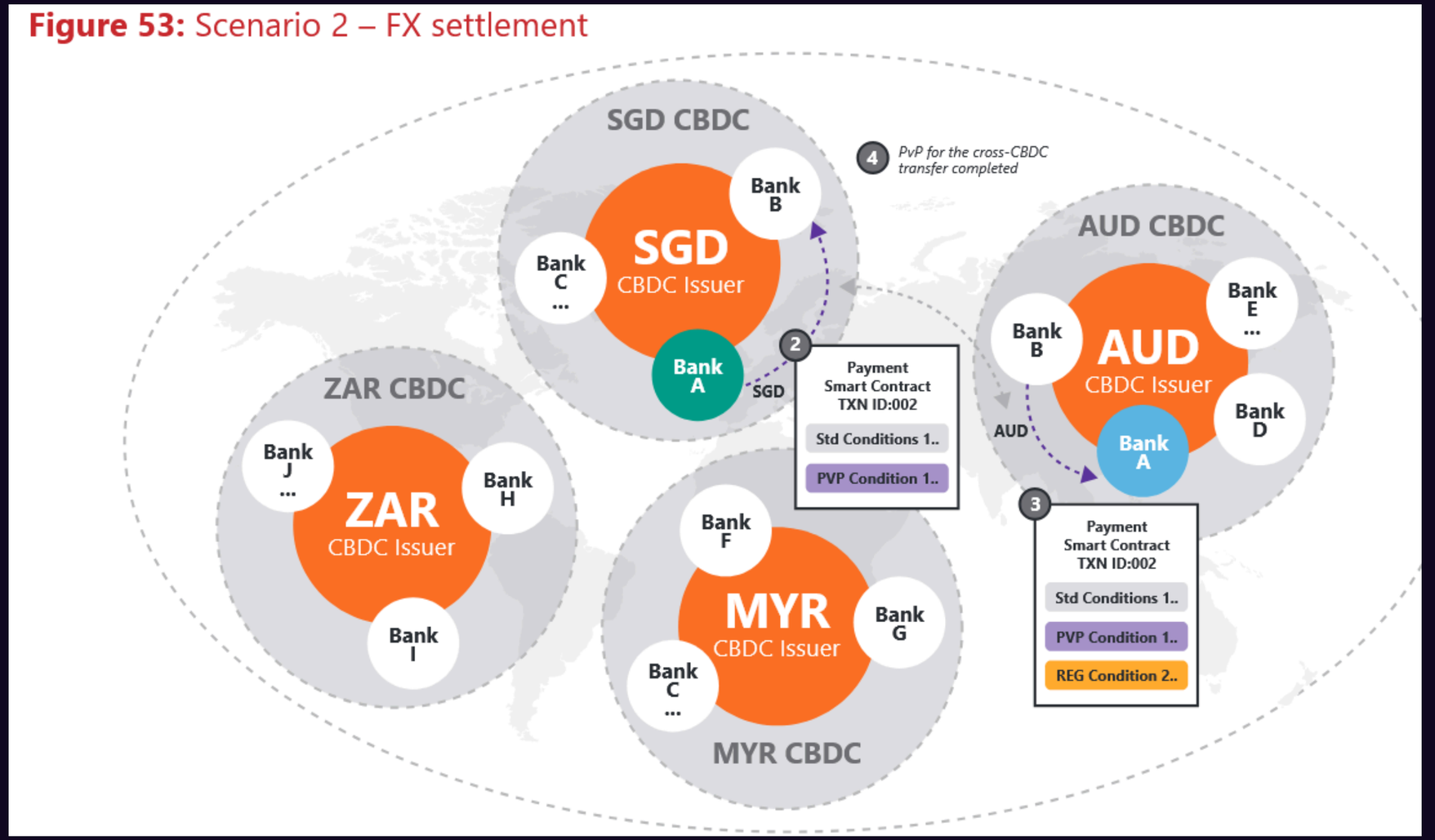
The Multi-Currency Smart Contract Layer in OpenBridge draws inspiration from the ***IMF's Multi-Currency Exchange and Contracting Platform***, which envisions a blockchain-based solution for instant, automated foreign exchange (FX) settlement across multiple currencies facilitated by smart contracts.

Brief overview of the model:

- **Decentralized Liquidity Sourcing:** The system reduces reliance on traditional forex markets by sourcing liquidity from a range of regulated/trusted financial institutions and liquidity pools.
- **Programmable Payment Logic:** This model allows businesses to use conditional payments, ensuring that funds are released only when predefined conditions are met. This feature is particularly beneficial for cross-border trade and B2B settlements as it provides added security and trust in transactions.
- **Layer 1 Deployment:** Layer 1 deployment ensures that transactions comply with financial regulations while still benefiting from the automated FX conversions.

Multi-Currency Smart Contract Layer

Figure 53: Scenario 2 – FX settlement



Source: BIS' Project Dunbar Report

Privacy through Zero-Knowledge Proofs (ZKPs)

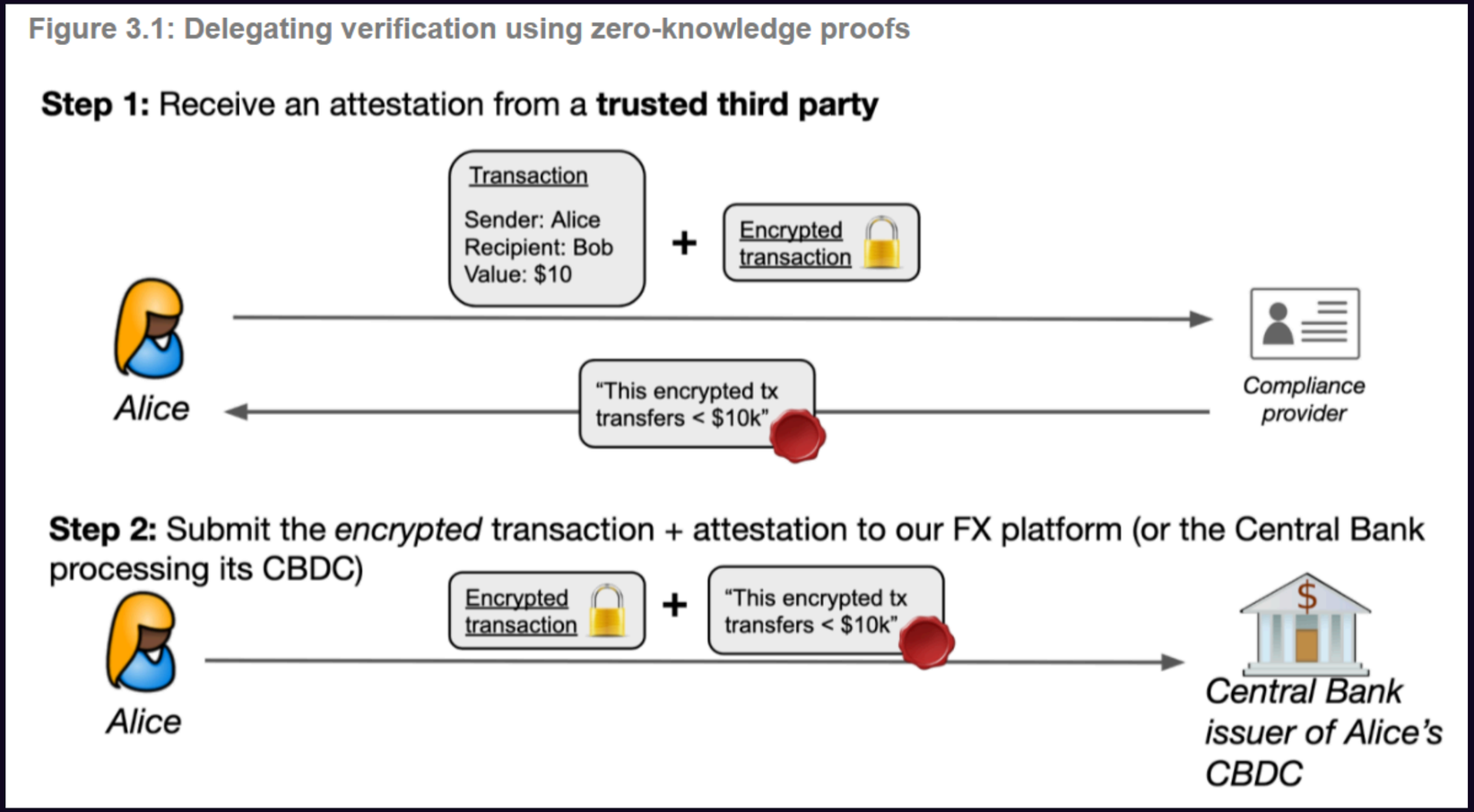
OpenBridge ensures privacy without sacrificing compliance by integrating **Zero-Knowledge Proofs (ZKPs)** at multiple levels. Zero-Knowledge Proofs (ZKPs) are essentially cryptographic techniques that allow one party (the prover) to prove to another party (the verifier) that a statement is true without revealing any underlying data. This ensures that transactions are verifiable but private.

Brief overview of ZKPs

- Instead of broadcasting transaction details to all validators in the permissioned blockchain, ZKPs allow users to prove a transaction's validity without exposing personally identifiable data.
- The system reveals only the minimal necessary data, such as proving a transaction is under legal thresholds without exposing exact financial details.
- Regulators are granted selective cryptographic access, allowing them to verify specific transaction details without exposing full user data. Such *"access control mechanisms"* ensures auditability and compliance with AML/KYC regulations while preserving financial privacy and preventing mass surveillance.

Privacy through Zero-Knowledge Proofs (ZKPs)

Figure 3.1: Delegating verification using zero-knowledge proofs



Source: IMF's paper titled *"A Multi-Currency Exchange and Contracting Platform"*

Proof-of-Authority (PoA) Consensus Model

OpenBridge employs Proof-of-Authority (PoA) consensus, specifically **inspired by Hyperledger Besu's IBFT 2.0**, to ensure fast, secure, and regulatory-compliant cross-border transactions.

In this model:

- Only regulated financial institutions can act as validator nodes after undergoing strict compliance checks and thus preventing bad actors from participating in the network.
- Transactions achieve immediate finality, as approvals are conducted by trusted validators rather than relying on competitive mining (PoW) or staking mechanisms (PoS).
- This mechanism also allows integration with Zero-Knowledge Proofs (ZKPs), which ensures that transactions remain private but verifiable without exposing sensitive financial detail.

Interoperability with Existing Financial Infrastructure

OpenBridge adopts interoperability frameworks **inspired from BIS's m-Bridge project,** which enables seamless cross-border transactions between multiple central banks using a shared digital settlement platform. Moreover, it aligns with *ISO 20022 messaging standards*, allowing compatibility with traditional banking infrastructure, SWIFT networks, and digital asset ecosystems (CBDCs, stablecoins, etc.)

How OpenBridge Enables Cross-Border Payments

Alice lives in Brazil and wants to send $100 to Bob in Nigeria. With OpenBridge, she can complete this transaction in seconds.

Step-by-Step Transaction

Flow:

- Step 1: Deposit & Conversion (Alice) 🌍
- Step 2: Instant Transfer via Layer 2 ⚡
- Step 3: Secure Settlement on Layer 1 🔒
- Step 4: Privacy Protection (ZKPs) 🛡️
- Step 5: Automated Currency Exchange via Smart Contracts 🔄
- Step 6: Instant Access for Bob 💰

01

Alice deposits BRL → 💰USDC conversion

02

Alice sends $100 → ✅Instant Layer 2 transaction

03

Layer 1 validators confirm transaction 🔎

04

ZKPs ensure privacy 🔐

05

Smart contract converts USDC → NGN 🔄

06

Bob receives NGN instantly 🎉

Phased Rollout Plan: Expanding OpenBridge Globally

🌍 Target Markets:

- Brazil → Nigeria (High remittance volume, large unbanked population).
- USA → Mexico (Strong demand for cheaper cross-border payments).

Goal:

🟡 Process 1M+ transactions per month within the first year.

🟡 Establish banking & fintech partnerships in pilot regions.

“OpenBridge is more than a technology—it’s a movement to make cross-border payments truly seamless, for everyone, everywhere.”

Scaling OpenBridge to New Markets

Phase 1: Pilot (0–12 Months)

- Markets: Brazil, Nigeria, Mexico, USA
- Focus: Testing infrastructure, compliance, and transaction flow.

Phase 2: Emerging Market Expansion (12–24 Months)

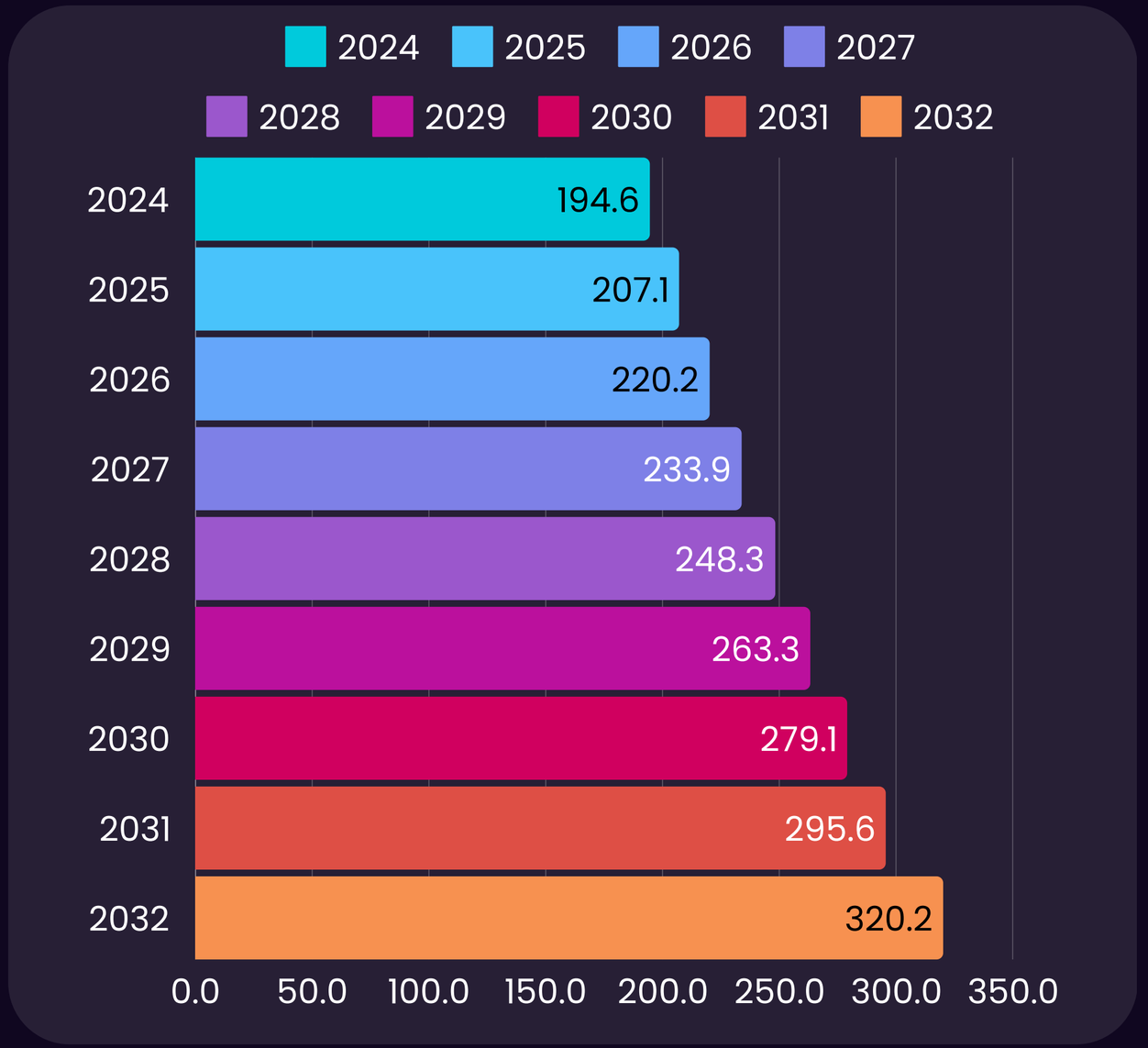
- Markets: India, UAE, Philippines, Kenya
- Focus: Expanding financial inclusion in high-demand regions.

Phase 3: Global Adoption (24+ Months)

- Markets: EU, Africa, Middle East
- Focus: CBDC Integration and corporate B2B payments.

Tapping into a Booming Market with OpenBridge

The cross-border payments market, currently valued at $194.6 trillion in 2024, is expected to grow to $320 trillion by 2032, driven by digital innovation, regulatory advancements, and rising consumer demand for faster, cost-efficient transactions. Thus, OpenBridge is well-positioned to tap into this growth.



Source: FXC Intelligence Report