

PROJECT i2i CASE STUDY

Driving Financial Inclusion in the Philippines

Project i2i is an Enterprise Ethereum payment network built with Unionbank of the Philippines to integrate rural banks into the domestic financial system, enabling more accessible and efficient domestic transactions for local citizens.

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35M Filipinos live on less than \$2 a day, and 35M adult Filipinos are unbanked. This is clearly a huge opportunity for financial inclusion, a chance to make a difference in a very meaningful way.”

*—Justo Aboitiz Ortiz
Chairman of Unionbank
of the Philippines*



Island-to-Island | Institution-to-Institution | Individual-to-Individual

The Philippines is a rapidly emerging economy with a population of over 100 million. However, two thirds of its population lives on less than \$2 a day and remains unbanked. This means 70 million Filipinos have severely limited access to both the domestic and global financial ecosystems. This is a significant problem when up to 10% of the Philippines' GDP is made up of international remittances sent from overseas workers to family members across the country. Unionbank of the Philippines, one of the largest banking institutions in the country, sought to tackle this challenge by partnering with ConsenSys Solutions, Microsoft Azure, Kaleido, Amazon AWS, ConsenSys Diligence and seven rural Philippine banks to create an inter-rural bank payment platform.

PROBLEM STATEMENT

A staggering 70% of Filipinos remain unbanked. As such, Unionbank of the Philippines aimed to facilitate their financial inclusion with Project i2i. Being that 56% of Filipinos reside in rural communities with scarce access to financial services, Unionbank sought to partner with the 476 rural banks already invested in these areas and established in their relationships with the community. But how can Unionbank work with these rural banks to financially include unbanked Filipinos when the rural banks themselves are disconnected from electronic banking services and domestic money transfer networks?

ENTERPRISE ETHEREUM SOLUTION

In a pilot-project partnership with seven rural banks, Unionbank worked with ConsenSys Solutions to build a decentralized, cost-efficient, approximate real-time inter-rural bank payment platform to connect rural banks to each other and to national commercial banks, using Enterprise Ethereum. This effectively brings said rural banks into the domestic financial system and increases access to the communities in which they operate.

GOALS ACHIEVED

The i2i platform is scheduled to launch in 2019 with 130 rural bank partners, aiming to service millions of previously unbanked Filipinos. Project i2i has received clearance and support from the central bank of the Philippines (Bangko Sentral ng Pilipinas) to operate as the country's first Ethereum-based payment network for domestic remittances. UnionBank and ConsenSys are now working toward expanding the platform to include international remittance systems.



THE PROBLEM OF FINANCIAL INCLUSION

Without access to financial services, individual consumers and business owners in rural areas of the Philippines are unable to make use of regulated bank accounts, speedy domestic and international payment networks, lucrative investment mechanisms, trustworthy credit options, and more. With financial inclusion, these people become empowered to better manage their assets and contribute to the national economy. Together, Unionbank and ConsenSys Solutions recognized the potential of Project i2i not only to help alleviate poverty in the Philippines, but also to make a tangible difference in the quality of people's lives.

The challenge of facilitating financial inclusion was to encourage the financially excluded, traditionally located in rural areas, to engage with financial systems. The key to this engagement was determined to be a partnership with the existing 476 rural banks located amid small rural communities across the country. These rural banks are a critical piece of infrastructure, already embedded and invested in the well-being and development of the communities they serve. Their function and established presence within these remote village communities make them uniquely positioned to reach a large portion of the 56% of Filipinos living in these areas.

The problem of partnering with these rural banks was that they themselves were unbanked. They were disconnected from each other, from national commercial banks, and from domestic payment networks. The goal of Project i2i thus evolved to include the following:

- *To overcome the challenges of connectivity and the lack of basic technological resources across rural areas*
- *To build the infrastructure that would effectively bring the rural banks into the domestic financial system, together with the customers they serve*

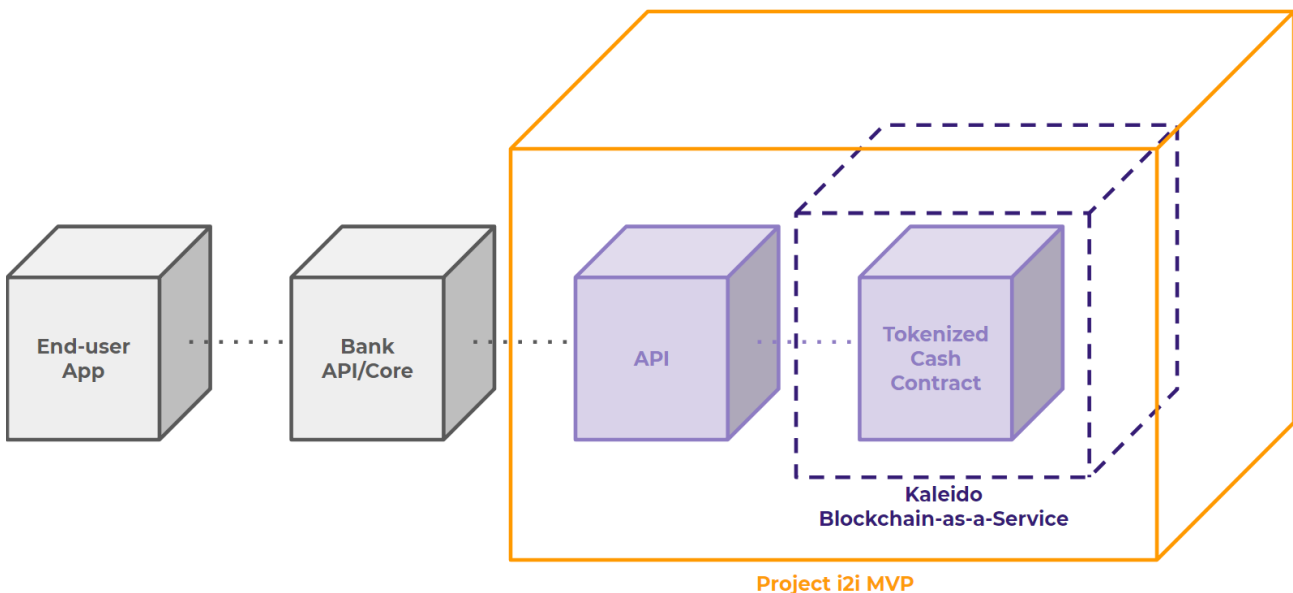
ENTERPRISE ETHEREUM SOLUTION

Unionbank partnered with ConsenSys Solutions to develop an Enterprise Ethereum-based inter-bank platform that would enable secure, instantaneous and cost-efficient domestic remittances, effectively allowing rural banks to easily send and receive money across any bank account in the Philippines.

The Project i2i platform consists of a web API and an Ethereum blockchain back-end. The API allows a bank's API and core banking system to connect to the blockchain back-end. The connection handles key management and allows participants to construct and send signed transactions to the smart contract running on a permissioned Quorum blockchain deployed through ConsenSys' Kaleido platform. Signed transactions instructed through the API triggers three key functions of the smart contract:

1. The pledge of digital tokens corresponding to Philippine Pesos held in an off-chain bank account
2. The redemption of the digital tokens
3. The transfer of tokens among platform users

DIAGRAM 1: OVERVIEW OF PROJECT i2i's MVP ARCHITECTURE

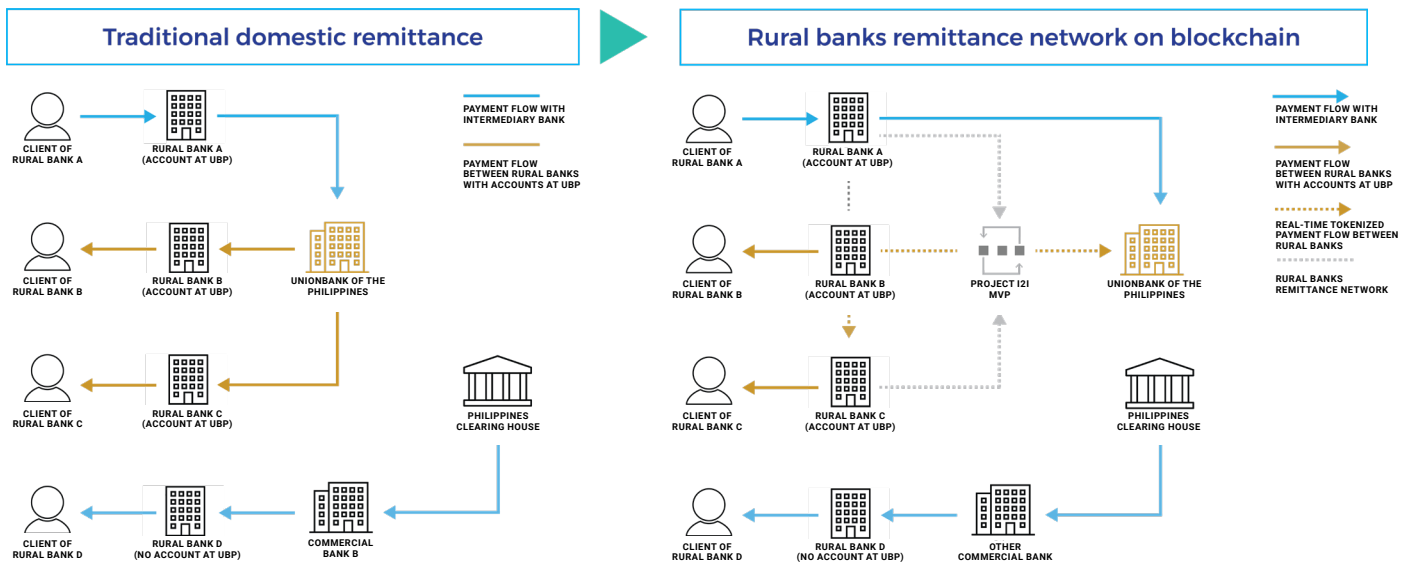


In this way, digital tokens are used to instruct and settle remittances between participating rural banks by consolidation through one platform’s messaging, execution, settlement, and accounting of the transaction.

The resulting solution offers the following financial operation benefits:

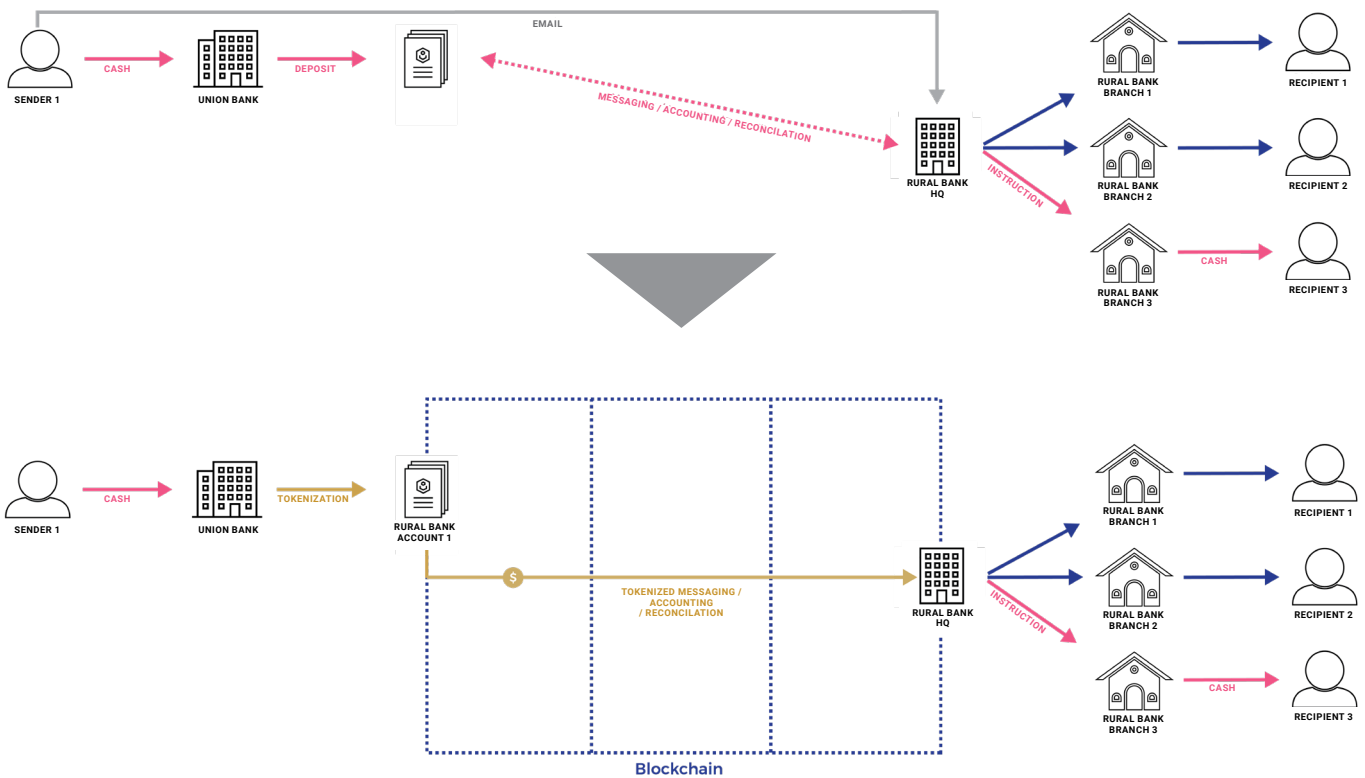
- *Creation of a verified chronological digital ledger of remittances that enables immediate visibility of cash inflows and outflows across each partner bank*
- *Streamline of banking operations - eliminating at least 20 intermediation steps required to complete a domestic transaction - into one seamless process*
- *Faster transaction times and lower costs*
- *Easy operability even in low tech settings*
- *Intuitive user interface*
- *Automated real-time reporting*
- *Automated notification of relevant stakeholders for cash settlement operations*
- *Real-time liquidity management*
- *Automated compliance*

DIAGRAM 2: STREAMLINED FINANCIAL PROCESSES



Taking into consideration the customers' perspective -- field research demonstrated that rural communities valued the social interactions of banking activities. The Project i2i solution was thus designed to integrate with rather than to disrupt this "high-touch" customer experience. Unionbank led the development of a customized highly-intuitive user interface that would encourage rural bank staff to adopt the technology and incorporate usage of the platform through customer-facing interactions.

DIAGRAM 3: IMPROVED CUSTOMER EXPERIENCE



The i2i platform effectively simplifies banking operations by removing several manual steps in the transaction and reconciliation process. Inter-rural bank transactions may now occur with near-real-time efficiency for customers.

In summary, the Project i2i platform facilitates financial transactions in remote areas of the Philippines by providing rural banks with the infrastructure to access the domestic financial system. It encourages rural bankers to adopt new technologies with its intuitive user interface. It empowers rural banks to improve customer experience while maintaining their traditional high-touch service. Finally, it enables millions of Filipinos to enjoy the benefits of financial inclusion.



SUSTAINABLE RESULTS AND POSSIBILITIES FOR A RAPIDLY EMERGING ECONOMY

After a successful 6 month pilot period, Project i2i is scheduled to launch in 2019 with clearance and support from the Central Bank of the Philippines (Bangko Sentral ng Pilipinas, BSP) to operate as the country's first Ethereum-based payment network for domestic remittances. 130 Rural banks have registered to join the inter-bank partnership, and Unionbank and ConsenSys Solutions aim to onboard the remaining 346 rural banks onto the platform by the end of 2019.

Thus far, the BSP has shown strong appreciation for Project i2i's use of blockchain to drive financial inclusion at the institutional level. The BSP has recognized the project's many transformative benefits such as increased accessibility, heightened number of transactions, and enhanced visibility for regulators. The BSP is encouraging the commercial launch of the i2i platform and is helping to drive adoption by mandating rural banks to open their infrastructures to enable integration.

The success of the i2i pilot has led to further adoption of blockchain technology, specifically Enterprise Ethereum, in the financial sector of the Philippines. Unionbank and ConsenSys Solutions are presently exploring the next phase of Project i2i, which will include integration with Project Ubin, another financial services project of ConsenSys Solutions with the Monetary Authority of Singapore (MAS), to enable cross-border remittances by Q4 2019.

For the Philippines - a country where overseas remittances make up to 10% of GDP - an Ethereum-based international payment network would make incredibly significant strides in increasing accessibility and efficiency, while also decreasing costs of cross-border remittances for millions of Filipinos.

The connectivity achieved by Project i2i will be a foundation for many more valuable services that can be built on top of its newly established networks. The domestic remittance platform will be the first step in the adoption of new blockchain-based products that will be accessible to a much wider percentage of the Philippine population.

In working toward financial inclusion, the i2i platform is helping to foster national economic progress and catalyze inclusive prosperity in the Philippines. This triumph is already encouraging many other industries to consider the revolutionary impact of Enterprise Ethereum blockchain technology.

EVOLUTION OF PROJECT i2i

In its current state, Project i2i is at phase one of an evolutionary approach toward the use of tokens on public Ethereum.

PHASE 1 : CLOSED-LOOP BANK TOKENS

Tokens issued by a commercial bank for payment among clients.

OBJECTIVE

- Introduce cash tokenization.
- Achieve operational and cost-efficiency in bank to client and client to client transactions.

PHASE 2 : INTER-BANK SETTLEMENT UTILITY

Decentralized utility for interbank payments and settlement.

OBJECTIVE

- Extend tokenized cash to commercial bank transactions.
- Validate viability and scalability for commercial banks and other financial institutions.

PHASE 3 : CENTRAL BANK ISSUES CRYPTO-PESO

General purpose tokens issued by central bank.

OBJECTIVE

- Make tokenized cash available for crypto-finance cases.

TECHNICAL MILESTONES

The establishment of Project i2i has not only resulted in the tremendous social impact of financial inclusion in the Philippines; it has also produced significant milestones for Enterprise Ethereum blockchain development.

- *Successful integration of the Kaleido private Ethereum chain with the i2i platform*
- *Management of concurrent requests for a single Ethereum account across a pool of API servers*
- *Implementation of a testing framework to experiment with Ethereum transaction lifecycle events*
- *Abstraction of smart contracts from application code through a reusable abstraction layer*
- *Transaction signatures utilizing the Microsoft Azure Key Vault*
- *Optimization of transaction throughput of a single account from 25 to 250 transactions per minute*
- *Integration of smart contracts tests into a continuous integration pipeline*
- *Establishment of a fully dockerized environment including a test chain*
- *Use of Google's distroless docker container to reduce attack surface of API servers*
- *Use of Kubernetes secrets to store sensitive application configuration data*

TECHNOLOGY PARTNERSHIPS

KALEIDO

ABOUT KALEIDO

Kaleido, a ConsenSys Spoke, is an all-in-one Blockchain-as-a-Service platform that radically simplifies the creation and operation of private blockchain networks. Bypassing the cost and complexity of starting from scratch, Unionbank used Kaleido to accelerate the development and power the on-going operation of its inter rural-bank platform.

For more information, visit www.kaleido.io



ABOUT AMAZON WEB SERVICES

Amazon Web Services (AWS) is a secure cloud services platform, offering compute power, database storage, content delivery, and other functionality to help businesses scale and grow. The Project i2i platform, powered by Kaleido, continues to run using the blockchain and distributed ledger solutions of AWS.

For more information, visit www.aws.amazon.com



ABOUT CONSENSYS DILIGENCE

ConsenSys Diligence offers smart contract audits and Ethereum blockchain security. Diligence performed a launch assessment analyzing the platform's code and overall readiness, and also ensured the technical excellence, security compliance, and ethical operation of the smart contracts at the core of the Project i2i platform.

For more information, visit www.consensys.net/diligence/



ABOUT MICROSOFT AZURE

Microsoft Azure is an open, flexible, enterprise-grade cloud computing platform. For Project i2i, Microsoft Azure facilitated Unionbank's blockchain trials and provided private key management services through customization of the Azure Key Vault. This technology enabled easy retrieval and integration of private keys across domestic transactions.

For more information, visit www.azure.microsoft.com

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Blockchain technology will revolutionize financial services, and more so in a context like the Philippines where financial inclusion is such a challenge.”

—Arvie de Vera
Head of Fintech at UnionBank

