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International Payments via Smart Contracts

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ABSTRACT: The global financial landscape is experiencing significant transformation driven by technological advancements and evolving market dynamics. Moreover, blockchain technology has become a pivotal platform with widespread applications, especially in finance. Cross-border payments have emerged as a key area of interest, with blockchain offering inherent benefits such as enhanced security, transparency, and efficiency compared to traditional banking systems. This paper presents a novel framework leveraging blockchain technology and smart contracts to emulate cross-border payments, ensuring interoperability and compliance with international standards such as ISO20022. Key contributions of this paper include a novel prototype framework for implementing smart contracts and web clients for streamlined transactions and a mechanism to translate ISO20022 standard messages. Our framework can provide a practical solution for secure, efficient, and transparent cross-border transactions, contributing to the ongoing evolution of global finance and the emerging landscape of decentralized finance.

KEYWORDS: Blockchain, Smart Contracts, Cross-Border Payments, International Transactions, Decentralized Finance (DeFi), Cryptocurrency, Ethereum, Financial Technology (FinTech), Payment Automation, Distributed Ledger Technology (DLT), KYC and AML Compliance

I. INTRODUCTION

Cross-border payments face several significant challengesaffecting efficiency, cost, and accessibility. Traditional international transactions are often slow, taking days to completedue to the involvement of multiple intermediaries such ascorrespondent banks. Each intermediary adds time andincreases transaction fees, making cross-border payments expensive. Moreover, the lack of transparency in the processcan lead to uncertainties regarding transaction status and finalsettlement times. Regulatory compliance is another hurdle, astransactions must adhere to the varying financial regulationsof each country involved, which includes fulfilling anti-moneylaundering (AML) and combating the financing of terror-ism (CFT) requirements. Additionally, currency conversionin these transactions introduces further complexity and cost,with fluctuating exchange rates potentially affecting the finalamounts received by beneficiaries.

II. LITERATURE SURVAY

The concept of international payments has evolved significantly with the emergence of blockchain technology and smart contracts. Traditional cross-border payment systems often suffer from delays, high transaction fees, and reliance on intermediaries such as banks and clearinghouses. To address these limitations, researchers have explored blockchain-based solutions where smart contracts automate payment execution, ensuring transparency, security, and reduced operational costs. These systems enable peer-to-peer transactions without the need for third-party validation, thereby increasing efficiency in global financial transactions.

Several studies have proposed frameworks utilizing smart contracts on blockchain platforms like Ethereum to facilitate secure and automated international payments. Researchers have implemented mechanisms where predefined conditions in smart contracts trigger fund transfers once requirements are met, such as verification of goods delivery or compliance checks. These systems often incorporate cryptographic techniques and decentralized ledgers to ensure immutability and prevent fraud. Comparative analyses show that such models significantly reduce transaction time compared to traditional systems like SWIFT.

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Other research works focus on enhancing scalability and interoperability in cross-border payments. Integration of smart contracts with digital currencies, including Bitcoin and central bank digital currencies (CBDCs), has been studied to enable faster settlements and lower currency conversion costs. Additionally, hybrid approaches combining blockchain with existing financial infrastructures have been proposed to ensure smoother adoption. These systems also address compliance requirements such as anti-money laundering (AML) and know-your-customer (KYC) regulations within automated workflows.

Despite the advantages, challenges remain in implementing smart contract-based international payment systems. Issues such as legal recognition, regulatory uncertainty, scalability limitations, and security vulnerabilities in smart contract code are still under active research. Future directions emphasize improving consensus mechanisms, formal verification of smart contracts, and developing standardized frameworks for global adoption. Overall, smart contracts present a promising solution for transforming international payments by making them faster, more secure, and cost-effective.

III. THEORETICAL BACKGROUND

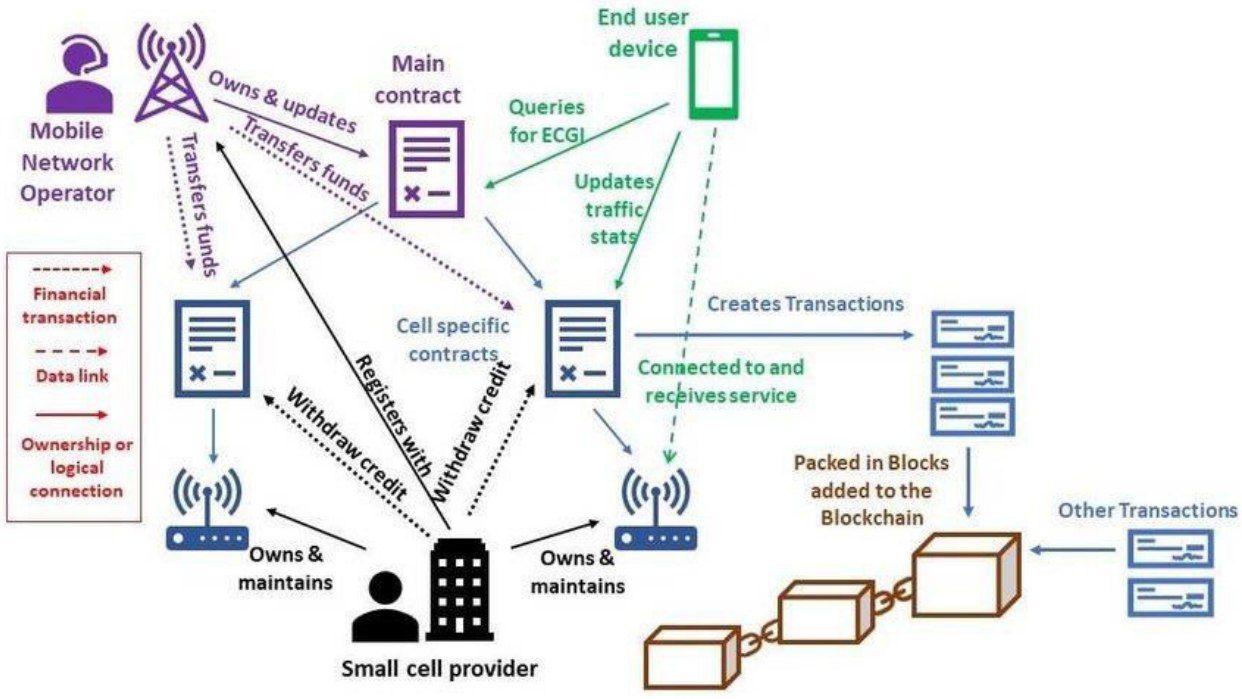
3.1 PROBLEM IDENTIFICATION

- Our implementation of the blockchain-based framework for cross-border payments, leveraging smart contracts and web clients, represents a significant step towards enhancing the efficiency and security of global financial transactions. By replicating and streamlining the CBPR+ process within a decentralized environment, our framework offers a promising solution to the challenges associated with traditional cross-border payment systems.

3.2 PROBLEM SOLVING

- The proposed system introduces **Smart Contract–based International Payments** to automate and secure cross-border transactions using blockchain technology. Smart contracts replace intermediaries by validating, processing, and settling transactions instantly when predefined conditions are met. The system ensures transparency through immutable blockchain records and eliminates hidden fees associated with banks and clearing houses. Currency conversion is handled using decentralized oracles to provide real-time exchange rates. Payments are executed on a trustless, decentralized network, reducing the risk of fraud and delays. By eliminating intermediaries, the platform makes international money transfers faster, cheaper, and more secure, benefiting individuals and businesses globally.

3.3 SYSTEM ARCHITECTURE



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IV. SYSTEM IMPLEMETATION

4.1. MODULE:

1. User Authentication Module
2. KYC & Identity Verification Module
3. Smart Contract Payment Module
4. Currency Conversion & Oracle Module
5. Transaction Initiation Module
6. Blockchain Ledger Module
7. Notification & Status Tracking Module
8. Admin & Compliance Module

4.2 MODULE DESCRIPTION:

1. User Authentication Module
Handles registration, login, wallet creation, and secure access with multi-factor authentication.
2. KYC & Identity Verification Module
Ensures legal compliance by verifying user identity through documents and global KYC APIs.
3. Smart Contract Payment Module
Executes automated payments when conditions are met:

- Transfers funds
- Validates sender balance
- Locks/release payments

4. Currency Conversion & Oracle Module
Fetches real-time exchange rates using decentralized oracles (e.g., Chainlink) to ensure accurate conversions.
5. Transaction Initiation Module
User enters recipient details, amount, and currency; the system creates a smart contract instance to handle the payment.
6. Blockchain Ledger Module
Stores transaction details immutably on the blockchain for transparency and auditing.
7. Notification & Status Tracking Module
Provides real-time updates, confirmations, and failure alerts to users.
8. Admin & Compliance Module
Manages user KYC, monitors transactions, and ensures compliance with international regulations.

V. CONCLUSION

5.1 CONCLUSION

The **International Payments via Smart Contracts** system successfully overcomes the challenges of traditional cross-border banking by offering faster, more secure, and cost-effective global payments. By eliminating intermediaries and leveraging blockchain technology, the system ensures transparency, immutability, and automation. Smart contracts execute payments instantly using real-time exchange rates and cryptographic verification. The platform is scalable, efficient, and suitable for financial institutions, businesses, and individuals seeking secure global transactions.

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