

## How Real Time Payment Technologies are Shaping Payment Ecosystem in Emerging Markets

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### ABSTRACT

Real Time Payment (RTP) systems are revolutionizing the financial landscape of emerging markets. By enabling instant, secure, and cost effective money transfers, RTPs are driving economic growth, promoting financial inclusion, and empowering individuals and businesses. This paper explores the evolution, key features, and impact of RTPs, highlighting their potential to bridge the digital divide, support small businesses, and facilitate government initiatives. While RTPs offer significant benefits, challenges such as technological barriers, security concerns, and regulatory hurdles must be addressed to ensure their sustainable growth. By understanding these opportunities and risks, policymakers, financial institutions, and technology providers can work together to harness the transformative power of RTPs and create a more inclusive and prosperous future.

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### Introduction

As the world becomes increasingly digital, the financial industry is also transforming at a significant pace. New disruptions, FinTech innovations, and evolving payment and consumer experiences are emerging rapidly. One of the most notable transformations is occurring in real-time payment technology. Real-time payments refer to the instant transfer of money from one bank account to another, and they are perhaps the closest digital equivalent to physically handing over cash between entities. For a long time, traditional digital money transfer methods, such as bank transfers and credit card networks, have dominated the global digital payments landscape. However, these methods come with certain barriers that have challenged the ecosystem. One key challenge is the delay in settlement and availability. Depending on the system used, there is typically a 1-5 day delay before funds become available. Additionally, limited banking availability poses another limitation, as weekends and public holidays often disrupt the money movement process. High transaction fees and complexity further contribute to the barriers. Moreover, these systems are often too complex for a large section of society in emerging markets, which has kept many people outside the digital payment ecosystem. As a result, cash remains a much easier and more accessible form of payment in these regions. This paper explores the evolution of real time payments, its impact on consumers in digital payments, and how it is reshaping the payment ecosystem.

### Real Time Payment Technologies

Real-Time Payments (RTP) refer to the instant transfer of money from one bank account to another. These systems allow various participants such as individuals, businesses, and financial institutions to transact in real-time. RTPs have been gaining significant global traction in recent years, particularly in emerging markets.

Below are some key features of RTP that are driving its adoption:

- 1. Instant Settlement:** One of the primary benefits of RTP is its instant settlement. This feature greatly impacts money movement and management, especially for small businesses and individuals who rely on smaller cash balances. RTP eliminates the uncertainty of when funds will be available, offering additional value by removing the opportunity cost of cash in transit.
- 2. Any Time Availability:** In addition to instant settlement, RTP systems facilitate transactions at any time, year-round, and 24/7. This eliminates the need for planning or delays typically seen in traditional payment methods. Just as with instant settlement, this feature adds value by allowing money to be put to work even on weekends or public holidays periods during which traditional bank transfers might face delays.
- 3. Ease of Use:** RTP combines instant transfer with around the clock availability, enabling consumers to mimic cash transactions easily. This replication of the convenience of cash, along with the added benefits of digital payments, is a significant factor contributing to the success of RTPs.
- 4. Interoperability:** RTP systems are often designed to be interoperable, allowing various stakeholders to easily connect to the ecosystem. This interoperability enables the creation of innovative payment platforms and solutions on top of RTP systems, thus facilitating better consumer experiences and fostering new use cases.
- 5. Cost Effectiveness:** RTP systems are typically designed with low transaction costs, which benefit consumers. Governments are also incentivized to promote such cost effective solutions, recognizing the significant benefits they can bring to their economies.

### Major RTP Systems in Emerging Markets

Some of the key RTP systems in emerging markets include the Unified Payments Interface (UPI) in India, PIX in Brazil, and PromptPay in Thailand. These systems are supported by central

government financial institutions to promote faster, more secure digital payments, significantly impacting the payment ecosystem and commerce in these markets.

### Key Enablers of RTP

RTP systems are gaining momentum due to several key enablers. Some of the most important ones are:

- **Financial Ecosystem:** A major factor behind the success of RTPs is the strong collaboration between FinTech companies and traditional banking institutions. In thriving RTP ecosystems, these players work together to foster innovation. API-driven designs allow interoperability, enabling various systems to operate efficiently.
- **Consumer Friendly Features:** RTP systems offer features that make payments simple for consumers, such as QR code scanning or using online credentials (e.g., phone numbers, digital IDs) to complete transactions. The user experience is often enhanced by FinTech and digital-native players, making it much more user-friendly compared to traditional banking systems.
- **Smartphones and Technology Infrastructure:** Smartphones have been a major enabler in the shift toward digital payments. Mobile and digital wallets have become much easier to use with the proliferation of smartphones. In addition, advancements in cloud computing, faster internet connectivity, and API-driven architectures have provided the technological infrastructure necessary for RTPs to thrive.
- **Security and Trust:** With the integration of smartphones and two-factor authentication (such as biometric verification and OTPs), the security and trust in RTP systems have significantly improved. This reduced the risk of fraud, even for less tech-savvy users, and has helped more consumers move online and trust digital payments, accelerating the shift from cash to RTPs.
- **Government and Regulatory Support:** As the world rapidly digitize, governments have recognized the importance of digital payments as a tool to boost commerce, especially for small businesses that traditionally lacked access to digital payment methods. With regulatory support and encouragement, RTPs have been rapidly adopted in many countries.

### Economic Impacts of RTP in Emerging Markets

RTPs (Real Time Payments) make transactions seamless, promoting more frequent use for both personal and business purposes. By providing a frictionless experience, RTPs enable exponential growth in transaction volumes.

RTPs contribute to economic growth in emerging markets in several key ways:

1. **Higher Economic Activity, Trade, and GDP Growth:** Payments are the backbone of trade and economic activity. A fast, secure, and efficient system for the exchange of value has a multiplier effect, driving economic growth in a market. As consumers and stakeholders increasingly trust the system and can transfer value quickly, this fosters value creation both in the short and long term. The faster payment process also increases liquidity across the ecosystem, enabling quicker reinvestment and spurring growth. Consumers are incentivized to spend more, as digital payments lower the barrier to spending. This was a primary driver of the higher acceptance of card networks in advanced markets, and RTP is now overcoming the barriers that previously existed in emerging markets. This increase in economic velocity contributes to higher GDP growth.

2. **Digitizing Cash and the Informal Economy:** While cash is less popular in advanced economies, it remains the preferred payment method in many emerging markets. RTP is positioned to be the key tool for transitioning cash into digital payments in these economies, enabling widespread digitization and improving efficiency.
3. **Enabling MSMEs (Micro, Small, and Medium Enterprises):** One of the biggest beneficiaries of RTPs is MSMEs, which often operate on a smaller scale with limited resources. Traditional payment systems were not designed to cater to their needs, and many MSMEs still rely on cash or have not fully embraced digital payments. However, RTPs, in combination with FinTech players, are now focused on meeting the unique needs of MSMEs, bringing new economic vigor to this sector. In emerging markets, MSMEs are a crucial part of the economy, and with RTPs becoming increasingly popular among them, this sector stands to benefit significantly.
4. **Bringing More Inclusion to Previously Unbanked Consumers:** As RTPs emerge, many governments in emerging markets are offering incentives to integrate previously unbanked consumers and merchants into the formal economy. These incentives often include zero balance accounts and accounts with no maintenance fees. As more small businesses adopt RTPs as a payment channel, a virtuous cycle is created where other small businesses realize the benefits of digital payments, accessible via smartphones, and begin participating in the ecosystem.
5. **Business and Government Payments:** In addition to benefiting consumers, RTPs enable faster and more efficient B2B, B2C, and P2G (Person-to-Government) transactions, adding significant value to the ecosystem. RTPs support use cases such as tax refunds, social benefits disbursements, and direct benefit transfers. This streamlines administrative processes and ensures the easy and accountable distribution of funds.
6. **Regional and Cross Border Integration:** RTP systems that are integrated across borders help enhance trade and remittances in emerging markets, improving trade flows. While cross border RTP adoption is still in its early stages, the COVID-19 pandemic accelerated the adoption of cross border e-commerce. RTPs that can support these cross border transactions will play a significant role in this process.

### Financial Inclusion and Social Impact

As RTPs penetrate all sectors of the economy in emerging markets, their social impact is significant. One key impact, as noted earlier, is better access to financial services for all sections of society. Many RTP systems operate via mobile phones, making them accessible even in regions with limited banking infrastructure. Systems like UPI (India) enable digital transactions through simple mobile authentication, often linked to wallets or non-banking platforms, thereby reducing entry barriers. Additionally, RTPs lower the cost of transactions, enabling broader participation in the financial system. With negligible or no transaction fees, they are viable for microtransactions, such as paying for groceries or utility bills.

By simplifying access to financial services, RTPs empower historically excluded groups such as women and marginalized communities. They facilitate welfare disbursements directly to beneficiaries, ensuring that marginalized populations receive their full entitlements without leakages. For instance, UPI was extensively used in India to distribute pandemic financial aid to millions of vulnerable households.

RTPs also encourage savings habits and financial planning among users. Many RTP systems are integrated with savings tools, enabling users to set aside money directly from their transactions. Engaging with RTP systems often introduces users to formal financial systems, fostering greater financial literacy over time.

RTPs further enable digital economies and help reduce the digital divide. They act as an on-ramp to the broader digital economy for underprivileged populations. Individuals with access to RTP systems can shop online and engage with digital services, thereby expanding economic opportunities. RTP systems with international interoperability also facilitate efficient remittances for migrant workers, contributing to global financial inclusion.

RTPs catalyze broader social impacts by enabling participation in the formal economy and reducing poverty. Digitizing cash transactions brings more economic activities into the formal sector, improving tax compliance and public resource allocation. Financial inclusion driven by RTPs also leads to better access to credit, savings, and investment opportunities, helping to break the cycle of poverty for many. Furthermore, they streamline fundraising and donation mechanisms for nonprofits and social impact organizations.

### Technological and Infrastructure Developments

Real Time Payment (RTP) systems rely on robust technological and infrastructural developments to function effectively and scale adoption. A significant enabler is the expansion of mobile networks, which allows RTPs to reach rural and underserved areas. Systems like Kenya's M-Pesa thrive due to widespread mobile penetration, enabling even basic phones to facilitate transactions. Additionally, QR code systems provide a low cost, user friendly interface for small vendors and consumers, as seen in India's UPI, which uses interoperable QR codes to make digital payments accessible without expensive POS systems.

To support high transaction volumes, RTPs leverage scalable real time gateways and payment APIs to ensure seamless interoperability across banks, wallets, and fintech platforms. Technologies like cloud computing and blockchain are increasingly being integrated to enhance scalability, security, and cross-border capabilities. This infrastructure not only accelerates the adoption of RTPs but also pushes telecom operators and service providers to expand their reach, improving the broader ecosystem.

However, rapid adoption of RTPs brings challenges, particularly around cybersecurity and fraud prevention. The speed and volume of RTP transactions make them attractive targets for hackers, with risks such as phishing and account takeovers. To mitigate these risks, RTP platforms employ end to end encryption, multi factor authentication (MFA), and AI-driven fraud detection. For instance, Brazil's PIX limits nighttime transaction amounts to curb fraud, while India's UPI uses two factor authentication for added security. Education campaigns also play a critical role in teaching users to recognize and avoid scams.

Governments and regulators are pivotal in driving RTP adoption through policy frameworks and public-private partnerships (PPPs). By setting standards for interoperability, transaction limits, and security, regulatory bodies ensure a uniform and fair ecosystem. For example, India's NPCI governs UPI, providing a consistent framework across banks and apps. Similarly, Brazil's Central Bank collaborated with private players to develop PIX, ensuring inclusivity and market-wide adoption.

In addition to governance, governments often incentivize RTP adoption through subsidies and infrastructure investments. India, for instance, offered cashback programs to encourage UPI usage, while Thailand's government linked Prompt Pay to its National e-Payment Plan to drive adoption. Such efforts are complemented by investments in national payment infrastructures and digital identity systems, which simplify onboarding and ensure secure transactions.

### Challenges and Limitations

#### Technology and Connectivity Barriers

One of the primary challenges for RTP adoption is the digital divide in emerging markets, where limited internet access, low smartphone penetration, and lack of digital literacy hinder usage. Rural areas often lack reliable mobile networks, leaving a significant portion of the population unable to access digital payment platforms. For example, while systems like M-Pesa in Kenya work on basic mobile networks, many RTP platforms require smartphones or internet connectivity, posing a barrier in regions with poor infrastructure. Additionally, low levels of digital literacy make it difficult for users to navigate payment apps, reducing confidence and adoption.

#### Trust and Security Concerns

Building trust among users who are accustomed to cash transactions remains a significant hurdle for RTP systems. Many users in emerging markets are wary of digital transactions, fearing scams, data theft, or losing money due to technical glitches. High-profile cyberattacks and fraud cases can further erode confidence. For instance, phishing scams on platforms like UPI in India highlight the need for robust fraud prevention measures. To overcome these concerns, RTP platforms must prioritize user-friendly interfaces, transparent policies, and education campaigns to instill confidence and teach users how to recognize and avoid fraudulent activities.

#### Operational and Regulatory Constraints

RTP systems face operational challenges, particularly in ensuring system scalability and reliability under high transaction volumes. With millions of transactions processed daily, system overloads can result in delays or failures, undermining trust in the platform. Regulatory compliance adds another layer of complexity, as RTP providers must adhere to strict anti-money laundering (AML), combating financing of terrorism (CFT), and Know Your Customer (KYC) requirements. For example, platforms like PIX in Brazil and PromptPay in Thailand have faced challenges integrating with local regulations while maintaining seamless user experiences.

#### Interoperability Challenges

Ensuring interoperability among banks, fintechs, and payment service providers is crucial for RTP adoption, but it is not always straightforward. Disparate systems and competing interests can lead to fragmentation, limiting the reach and effectiveness of RTP platforms. For instance, smaller banks or regional players may lack the resources to integrate with national RTP systems, excluding some users and reducing overall efficiency.

#### Addressing Connectivity and Scalability Issues

Governments and private sectors are working to mitigate these challenges through investments in mobile networks, subsidized smartphones, and digital literacy programs. Some RTP platforms, like M-Pesa, have succeeded by leveraging basic mobile technologies rather than relying solely on internet-enabled devices. Similarly, innovations like offline payment capabilities and lightweight apps are being developed to ensure accessibility in low-connectivity areas.

## Regulatory and Security Solutions

To address trust and security concerns, RTP platforms are implementing advanced encryption, real-time fraud detection, and multi-factor authentication. Regulatory bodies also play a key role in establishing standards and monitoring compliance, ensuring a balance between innovation and security. Public-private partnerships can facilitate these efforts, enabling RTP providers to scale operations while meeting regulatory requirements.

## UPI in India

Unified Payments Interface (UPI) has revolutionized India's payment ecosystem since its launch in 2016, emerging as a benchmark for real-time payment (RTP) systems globally. Developed by the National Payments Corporation of India (NPCI), UPI offers a seamless, interoperable platform that allows users to make instant transfers across banks and fintech applications using simple identifiers like mobile numbers or QR codes. UPI processes around 8 billion monthly transactions, reflecting its widespread adoption and ability to handle high transaction volumes efficiently.

One of UPI's most significant achievements is its impact on small merchants and micro enterprises. The system's low cost and accessibility have empowered small businesses, including street vendors, to accept digital payments through QR codes and UPI-linked apps without investing in expensive POS machines. This transformation has enabled millions of merchants to join the digital economy, increasing their sales and financial transparency. Initiatives like UPI Lite and offline payments have further expanded reach, allowing transactions even in areas with poor internet connectivity.

UPI has also been a key driver of financial inclusion in India. By leveraging widespread mobile penetration and integrating with digital identity infrastructure like Aadhaar, UPI has made it easier for unbanked and underbanked populations to access formal financial services. Government programs, such as direct benefit transfers (DBTs), are disbursed seamlessly via UPI, ensuring transparency and reducing leakages. Women and rural populations, in particular, have benefited from this ecosystem, gaining access to digital payment tools and financial independence.

The government's proactive support, coupled with innovations from private players, has sustained UPI's success. Policies like zero transaction fees for UPI payments have incentivized adoption among both merchants and consumers. Additionally, partnerships with global giants like Google Pay and WhatsApp have amplified UPI's reach, even extending its use to cross border remittances. UPI not only serves as a model for other RTP systems globally but also continues to bridge socio-economic gaps, fostering inclusive growth across India.

## Future Outlook

The long term economic impact of widespread Real Time Payment (RTP) adoption in emerging markets is transformative. By enabling faster, more efficient, and inclusive financial transactions, RTPs can accelerate economic activity, promote entrepreneurship, and support small businesses. In emerging economies, where cash transactions dominate, RTPs reduce inefficiencies, improve transparency, and help governments monitor economic activity more effectively, boosting tax compliance and revenue. Over time, widespread RTP adoption can lead to a more formalized economy, increased financial inclusion, and greater resilience in the face of economic shocks, particularly for underserved populations and small enterprises.

Looking ahead, RTP systems are poised to integrate with blockchain, digital currencies, and artificial intelligence (AI) to unlock new functionalities and reach. Blockchain could enable secure, transparent cross-border RTPs, eliminating intermediaries and reducing costs, especially for remittances a significant financial lifeline in many emerging markets. Similarly, central bank digital currencies (CBDCs) could seamlessly integrate with RTP infrastructures, enabling real time settlement of digital currency transactions while maintaining regulatory oversight. AI-powered systems, meanwhile, could enhance fraud detection, automate dispute resolution, and provide personalized financial insights to users, further increasing trust and adoption of RTP platforms.

Despite their promise, RTP systems face ongoing challenges. Regulatory compliance remains a key issue, as RTP providers must navigate complex and evolving rules around anti-money laundering (AML), combating the financing of terrorism (CFT), and data protection. Achieving interoperability across borders and ensuring equitable access to RTP platforms are other critical hurdles. Fraud and cybersecurity threats, particularly in the context of rising transaction volumes, pose persistent risks. To address these challenges, governments and private players must collaborate on robust regulatory frameworks, invest in advanced fraud prevention technologies, and prioritize inclusive design to ensure that RTP systems are accessible to rural and marginalized populations.

Ensuring equitable access to RTP systems requires targeted solutions, such as investments in mobile infrastructure, public awareness campaigns, and user-friendly payment interfaces. Offline payment capabilities and multilingual support are essential for bringing unconnected and digitally underserved populations into the RTP ecosystem. As these challenges are addressed, RTP systems are likely to play an even more central role in shaping the financial landscapes of emerging markets, fostering economic growth and empowering millions with efficient, secure, and inclusive payment solutions.

## Conclusion

Real Time Payment (RTP) systems have revolutionized the way individuals and businesses conduct financial transactions in emerging markets. By enabling instant, secure, and cost effective money transfers, RTPs have accelerated economic growth, enhanced financial inclusion, and improved efficiency. The success stories of systems like UPI in India and PIX in Brazil demonstrate the transformative power of RTPs in bridging the digital divide, empowering small businesses, and facilitating government initiatives [1-7].

To maximize the benefits of RTPs, policymakers, technology providers, and financial institutions should collaborate to create an enabling environment. This includes establishing robust regulatory frameworks, investing in infrastructure, promoting financial inclusion initiatives, fostering public private partnerships, and prioritizing cybersecurity and fraud prevention.

Real Time Payment technologies have the potential to reshape the financial landscape of emerging markets, fostering economic growth, social inclusion, and greater prosperity. By embracing innovation, addressing challenges, and leveraging the power of technology, we can unlock the full potential of RTPs and create a more connected, equitable, and prosperous future for all.

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