

THE UNSTOPPABLE RISE OF REAL-TIME PAYMENTS





Need for Payments Modernization

A decade ago, a day without cash was hard to imagine. Today, the world has entered a new age of "instant" and payments are center stage. The growing ubiquity of smart devices allows customers to pay friends, order food, transfer money, and shop online with a single click. The funds transferred using these payment methods are, however, not immediately processed. Credit and debit card transactions go through a bank settlement process which can take up to 72 hours to clear and settle. Online transactions made through the Automated Clearing House (ACH) system can process same-day and next-day payments, but the transactions are cleared in batches and payees cannot access funds until the settlement process is complete and the payments clear.

Real-time payments address the lag between transaction posting and settlement. RTP networks support instant posting, clearing and settlement of funds on a 24-hour and sevenday (24/7) basis, with immediate finality. This overcomes current bottlenecks related to legacy electronic ACH and Real Time Gross Settlement (RTGS) networks and enables rapid movement of monies.

Basic Atributes of Real Time Payments



All real-time payments are available 24/7 throughout the year-Real-Time Payments can be initiated at any point in time and have no cutoff or holidays in thier calendar



Payments once processed are irrevocable and cannot be cancelled

Speed

All real-time payments are processed immediatly.



All real-time payments have a maximum limit that can be processed in an individual transaction.



A global phenomenon, real-time payments are growing by the day. The number of countries with real-time payment rails implementation has quadrupled in five years. Real-time payments are now available in almost 60 markets, covering 65 different territories with more countries slated to modernize their retail payments infrastructure. These markets account for over 89 per cent of global GDP. Over 5,000 institutions globally are connected (either directly or through intermediaries) to real-time payment systems. A recent research study the global RTP market size is estimated to surge to US\$193 billion by 2030 from US\$13.5 billion in 2021, registering an exponential CAGR of 34.9%.¹

This rapid growth is a result of multiple factors. The most significant is the growing push from regulators to modernize payments infrastructure, as part of the larger agenda to improve efficiency of payment, clearing, and settlement and deepen digitalization initiatives to support the wider economy. While strong regulatory direction is one of the key drivers for innovation, real-time payments are also being propelled by private sector initiatives, as seen in Sweden or more recently the USA, where The Clearing House, owned by the largest 25 banks in the country successfully launched a real-time payments system.

The consumerization of payments, the entry of BigTechs and innovations in front-end apps that fluidly embed payments into customers' transacting journeys have raised user expectations around on-demand payments.

Further, multiple regulations around Open Banking such as the Payment Services Directive II (PSD2) in Europe and in other countries, data protection regulation, and know your customer (KYC) guidelines have provided impetus for existing and new market participants to adopt faster payments.

The COVID-19 pandemic compressed digitalization adoption cycles and reinforced the need for modern payment rails and expediency in payments. Whether disbursing emergency economic stimulus payments to their citizens with efficiency and speed or enabling businesses better manage cash flows, the tangible upside is accelerating decisioning cycles by countries to advance payments modernization.

Growing Global Footprint

Japan: 1973 Iceland: 2001 Republic of korea: 2001 UAE: 2001 Ghana: 2002

Brazil: 2002 Chile: 2002 Taiwan: 2002 Mexico: 2004 South Africa: 2006

Israel: 2007 United Kingdom: 2008 China: 2010 India: 2010 Nigeria: 2011

Poland: 2012 Sweden: 2012 Norway: 2013 Turkev: 2013 Denmark: 2014 Spain: 2016

Italy: 2014 Singapore: 2014 Bahrain: 2015 Bangladesh: 2015

Switzerland: 2017 Thailand: 2016 Finland: 2017 United States: Germany: 2017 2017 Australia: 2018 Latvia: 2017 Kenya: 2017 France: 2018

Malaysia: 2018 Belgium: 2019 Colombia: 2019 Netherlands: 2019 Hungary: 2020 Canada: 2022



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Increasing customer demand customer demand for quick payments is driving the need for improving the existing payment rails with real time settlement.

Growing Regulatory push

Global regulatory initiatives are significantly driving innovation with the development of new, faster payment schemes

Improving market infrastructure The use of ISO standards is

recognized as key element to enable real-time exchange of structured information

Source Deloitte and MasterCard



The Real Value of RTP Systems

Globally, the rapid growth of RTP networks is indicative of the myriad benefits to ecosystem participants in terms of a system that improves the speed and the efficiency of person-to-person, person-to-business, government-to-person, and business-to-business transactions. By enabling immediate transfers and access to funds, real-time payments can unlock a range of economic and social benefits that positively influence consumers, merchants, businesses, and governments.

Consumers

Customers are increasingly demanding more transparency, lower fees, and instantaneity when it comes to payments. All types of payment orders are eligible for real-time processing. The Immediate transfer of payment tends to give fast payments a cash-type characteristic, thereby increasing consumer usage small value retail payments. For consumers, the inherent instantaneity results in fewer late fees, less need for short-term, high-cost products such as overdraft or payday loans. For low-income customer segments, dependent on government stimulus funds, the ability to receive government assistance, and other financial aid, is a significant benefit.

Merchants

RTP networks are a key catalyst for the growth of digital commerce. With eCommerce and contactless payments growth hugely bolstered by the pandemic, real-time payment services optimize cost of payments processing. As RTP networks bypass expensive card rails, merchants pay a lower interchange fee per transaction. These savings can potentially be transferred to customers via better incentives and reward structures. In emerging markets, Additionally, merchants can better manage cashflows as they receive monies within seconds of instantly fulfilling customer orders.



Corporates

Small businesses and large corporates see a real value proposition to execute business payments via real-time payment systems. These transactions into simpler process, greater transparency, and a reduction in the cost of cash and check processing. Faster payments will help corporate treasurers optimize cheque and card processing costs, digitalize pretty cash, and better manage payables and receivables.

In general, by using RTP, organizations will be able to collect and disburse payments faster than a traditional payment rails. For example, organizations can collect outstanding invoice payments faster and have immediate liquidity for strategic investment, to pay down debt, or to even have enough cash at hand for the next acquisition.

RTP also allows corporates to make timely pay-outs to employees in the form of spot cash incentives or deposit earned wages to gig workers and blue-collar workers, significantly boosting employee satisfaction.



Source: FSS



Financial Institutions

The increased focus on faster payments represents an opportunity for financial institutions to embrace digital transformation and build out the roadmap for real-time interoperable, open payment, business models. Emerging real-time rails require financial institutions to invest in a Gateway that can connect to real-time schemes and other digital payments while being ready for new standards like ISO 20022 to support the creation of data-rich services. Many large banks in the near-term face the challenge of integrating real-time payments and transactions into their outdated legacy systems. Financial institutions that, however, recognize the benefit of improving their back-end systems and act swiftly will see long-term gains from a financial and reputation point of view.

Payment Regulators

Instant real-time payment rails enable countries architect a modern digital real-time payment infrastructure to exploit massive growth opportunities, arising from an on-demand, always-on 24/7 connected economy. By democratizing access to payment rails, and creating a levelplaying field for FinTechs, banks and financial institutions, real-time payments can have a multiplier impact on the adoption of digital payments by customers especially in under banked societies where bank branches may not exist.





Key Design Principles of a RTP Exchange

The rollout of an RTP system is a massive undertaking. New real-time payment systems must meet a range of requirements and live up to the expectations of multiple stakeholders from regulators to banks through to end-customers. Globally real-time payment solutions are owned, designed, or operated in different ways across jurisdictions, due to the inherent complexities of financial systems, varying consumer needs and public policy objectives. Due to the strategic importance of instant payments, several key considerations may arise. FSS identifies several best practice principles for the implementation of real-time payments.

Support for Payment Types and Channels

When functioning as a central hub, real time payment rails need to provide coverage for an extensive range of payments originating from the internet, smart devices or at the point-of-sale, across a range of payment segments - P2P, B2B, P2B, B2P or G2P. Further, as new payment types, channels, authentication modes and device types emerge the platform needs to support introduction of new payment types and integrate with new payments and channels without back-breaking customization.





Transaction Types

To build out a robust ecosystem, real-time payment systems should support multiple payment types.

Push/Send Payments: The payer initiates a credit transfer request and monies are deducted from the account.

Request to Pay/Collect Payments/ Pull Payments: The payee initiates a request for payment from the payer. Payees will define the expiry time of the collect request (up to 45 days in India). n case, the customer has not defined the expiry time, the Central scheme default time is applicable (30 minutes in India).

Mandates: Mandates allow customers to authorise third parties to initiate payments from their bank accounts. Once a mandate has been created and authorised by the payer customer, the relevant third party, via its sponsoring institution, can request a payment initiation message to be sent to the payer customer's financial institution. The business rules for the mandate service assure that the payment initiation messages will be acted upon by the financial institution holding the payer customer's bank account. Mandates could be one-time or recurring and payers have the flexibility to amend, pause, resume and cancel mandates.

Source: FSS



Source: FSS



Member Participation

The presence of more participants makes the RTP system more valuable to constituent ecosystem members. However, inclusion of non-banks and technology companies such as mobile network operators and mobile money operators will provide RTP networks with a wider user base and boost adoption.

Payment schemes offer several pathways to participation to improve reach and penetration. Financial institutions that use the payment system infrastructure have a direct account linked with the central bank's settlement system (where settlement generally takes place). A directly connected participant needs to meet the technical requirements of maintaining an NPP Payment Access Gateway (PAG) in a real-time environment for transmission and exchange of messages with the RTP scheme.

Direct participants can sponsor other financial institutions and manage transaction authorization and settlement on their behalf. Indirect participants are financial institutions that use the payment system infrastructure via a sponsoring primary participant and leverage the primary participant's account with the central bank for settlement. Under this arrangement, sponsor banks will assume complete responsibility for the settlement of all transactions initiated by indirect participants.

Certain schemes such as Unified Payment Interface and The Clearing House in the US, for instance, limit direct participation to licensed banks and authorized deposit-taking institutions, whereas other schemes, Spei Mexico, Singapore based FAST and Pay Now, as an example, allow licensed non-bank PSP (wallet service providers, remittance service providers, telecom operators) to join as direct participants to broaden participation.



Support for Virtual Address Directory

Many schemes support proxy addressing mechanisms such as – mobile number, email Id, or another personal identifier - linked to respective customer accounts to enable real-time payments. The association of a proxy address with a payment identifier solves the problem of sharing sensitive information such as account numbers. Customers can have multiple proxy addresses for a single account, or a single proxy address can be linked to multiple accounts or a single account.

Proxy databases are not limited to consumer payments. Account-masking services enable businesses to use a unique proxy identifier to send and collect payments. This identifier can be linked to one or more bank accounts, allowing businesses and their banks to manage their liquidity more flexibly. The Clearing House, as an examples has developed the Universal Payment Identification Code, which businesses can use to route payments to one or more bank accounts. If a company changes its bank or wants to route payments to a different account, it can do this while continuing to use the same code.

The alias can be mapped centrally or at a bank level. The central scheme may support a secure, robust, and scalable 'address directory" that maps unique recipient identifiers to their bank account information with a look-up time of less than a second. As an example, the payer enters the proxy address of the payee and the payer's bank looks up this number against the central infrastructure and receives the name associated with the proxy and the payment information.

In countries without a centralized proxy database, individual banks may manage their own proxy databases for their customers. In the United States, the Zelle network is a P2P proxy database that allows consumers from participating banks to send and receive payments using their mobile-phone number instead of a bank account number. RTR Canada, likewise, supports payment routing based on account numbers and institution transit numbers. If an alias (such as an email address or a mobile phone number) is used the sending participants will be responsible to resolve them prior to the payment being submitted to the RTR.



Virtual Address

Real live examples include

- Thailand Prompt Pay: Customers can use the national Thai id as a unique identifier for payments.
- **FAST Singapore**: Enables users to send and receive funds instantly by using either their mobile number or Singapore NRIC/FIN, or any other VPA.
- UPI India: Transactions can be performed using Mobile Number& MMID, Aadhaar Number, Account Number & IFS Code and Virtual Address.
- **Paym UK**: Currently a select number of participating banks enable corporates to register for alias-based payments. These banks enable their corporate users to register up to 50 numbers, which essentially help different personnel in multiple branches or business areas to be registered for the service.



Risk Management

According to the Committee on Payments and Market Infrastructure RTP networks should have a comprehensive risk-management framework to mitigate risk at multiple levels -- legal, credit, liquidity, operational, and other risks. Risk-management policies and procedures enable stakeholders to identify, measure, monitor, and manage the range of risks that arise in or are borne by the RTP. Some key ones include:

Transaction Risk

RTP networks need to define transaction rules to mitigate operational and fraud risk. The transaction trail is assessed on various parameters such as location, volume, frequency, payment type (push or pull) number of parties involved.

The limits can prevent scenarios such as multiple credits to a single account or multiple collect requests to a single virtual address. RTP participants also have the flexibility to set their own transaction sending limits for end-users, based on a variety of factors specific to their risk tolerance and product offerings. For example, participants in the RTP network may offer higher transaction limits to corporate users than consumers.



Transaction Risk Preventive Measures

India's UPI, globally the most successful real-time payments network, implements a series of controls to combat transaction risk and fraud. This includes:

- **Application Registration**: The PSP application is certified by the NPCI and the NPCI Utility / Libraries embedded in the application for entering sensitive data such as biometric credentials, PIN and One Time Password (OTP).
- **Customer Registration**: Customer is sent an SMS by the PSP while registering the customer to ascertain the veracity of the customer.
- **Device Binding**: The PSP also does the device fingerprinting through an automated outward encrypted SMS (Mobile number to PSP system) which hard binds the mobile number with the device. This ensures that the transactions originating from the hardbound device are secured at the first step itself.
- **Name Display**: The name of the customer is displayed on the App both in the case of sending monies (who is the sender) and for Collecting money (who is the initiator of the Collect request).
- **Transaction Authorization**: Authorization is split between the PSP and the Issuing Bank. The device fingerprinting of the mobile device serves as the 1st factor and the PIN as the second factor.
- Transaction Authentication: The PIN or the Biometric is the second factor of authentication.
 Unsolicited Pull Requests: Customer is in control of transactions and must enter authentication

details to initiate a debit to his/her bank account.

- **Data Storage in Bank and TPP apps**: The PSP shall integrate NPCI libraries in its PSP application where the app in no way shall be able to capture sensitive customer data like Card Details, PIN,
- Expiry Date, OTP. All these details shall be captured only by NPCI Libraries, and the PSP app shall only facilitate it.
- No PII in mobile app. Customer sensitive data is allowed to be stored only in PSP banks and not by the 3rd party applications and is saved in an encrypted form.
- NPCI also has backup Infrastructure to safeguard its data.

Source: FSS



• Liquidity and Settlement Risk

Liquidity and settlement risks are predominant in RTP networks or account of the instant nature of fund transfers. The receiving institutions credit the customers' account before the payment is final, and they might be exposed to credit risk in instances where the sending institutions fail to settle their obligations during the settlement cycle. Many schemes use a prefunding model to mitigate liquidity and settlement risks. In secured countries, participants are required to deposit collateral with the central banks.

Operational Risk

Operational risks arise from the potential of loss due to deficiencies in system reliability or integrity. Payment systems can be exposed to these risks because of vulnerabilities of system participants. RTP network administrators must proactively monitor operational performance of each participant for scenarios that may adversely affect network performance or the operations of other participants.

KYC and AML

Members need to comply with in-country KYC, AML laws, Combating of Financing of Terrorism (CFT), PEP check, Terrorist List check, Customer Due Diligence (CDD) and Enhanced Due Diligence (EDD) checks as stipulated by many scheme operators for activities of members before registering a customer.

• Real-Time Fraud Controls

The adoption of "real-time payments" stokes fears of "faster fraud." RTP systems allow users to make payments within seconds. However, with payment times reducing and payment touch points increasing due to an open payment architecture, RTP payments have become vulnerable to additional security threats. An optimum balance needs to be arrived at with adequate security procedures in place. At the same time, the user experience needs to convenient and easy. Artificial intelligence/machine learning based real-time fraud engines can help banks mitigate fraud. Similarly, opportunities for banks to provide consumers with real-time payment capabilities will be heavily influenced by the bank's ability to help its detect, prevent, and manage fraud. RTP schemes need to prepare early as fraud rates are highest when institutions initially roll out real-time



payments. Over time, however, as payment data is collected to help identify normal behaviors and effectiveness of existing controls, these rates go down.

Centralized Data on Frauds

As a shared system the ecosystem could benefit from a central framework for collection of data on frauds. The data can be used analytically for differentiating fraudulent and legitimate transactions, strengthening oversight and supervision, and for providing guidelines to entities for minimizing risks of similar fraud.





Compelling Overlay Services

Real-world use cases leveraging RTP rails are emerging apace. When the World Wide Web went live 1991, nobody could have imagined the explosion of digital applications consumers use today. Real-time networks are no different. Overlay services augment reach and ubiquity of instant payments services by building on existing basic infrastructure. The ability to build multiple 'overlay' services utilizing various customer channels, such as mobile apps and online portals, on top of the real-time payment's infrastructure represents a significant opportunity to improve the lives of consumers and bring additional benefits to businesses and financial institutions. Here are some other examples that demonstrate the value real-time payments bring.

Singapore, Malaysia, and Thailand are linking their national real-time payment systems to allow cross-border real-time payments through FAST, InstaPay, and DuitNow to enable affordable instant cross-border transfers.

India's Unified Payment Interface enables PSPs expose APIs to third party providers for integration of real-time payments into third party apps, enabling a range of use cases such as Direct Debits Transit Payments and Toll payments. To widen adoption among India's large, underserved base of low-income, feature phone users, UPI recently introduced e-RUPI, a prepaid voucher that can be sent via SMS and redeemed by the beneficiary at the specified merchant. Such efforts are being bolstered by Central Bank initiatives such as UPI123Pay, an option to enable UPI payments over Missed Calls, Interactive Voice Response, and Proximity Sound-based Payments.

Payment systems like PromptPay Thailand, Faster Payments Service in the UK and UPI India support Request to Pay and are transforming payment acceptance for small merchants by enabling them accepting payments digitally with zero investments in payments infrastructure.

Due to the popularity of QR Codes, RTPs schemes in the Asian region have enabled invoking payments through this channel. India and Indonesia, with a large base of informal enterprises, have linked Instant payments with QR codes.



This creates a portable and safe way for MSMEs to both pay and be paid, does not require a smartphone for them to use it, and is an easy and cost-effective digital payments solution that can help them grow their businesses and establish a credit history.

Sandbox to Foster Innovation

The key factors for realizing the opportunities offered by RTP are agility, innovation, and a customer-centric approach for launching new products and services. Many RTP operators extend a sandbox environment to FinTechs to foster competition and monitor new age digital products and business models in a controlled environment, enabling firms to bring innovations to the market more quickly and readily.

- Payments Canada offers an API Developer Portal, which allows developers the ability to builled new apps.
- NPP Australia has introduced a new "NPP API Framework to help developers seeking to create applications leverage RTP and to test app capabilities.
- National Payment Corporation of India, the governing body of UPI, regularly conducts hackathons to encourage greater competition and drive real-time payments uptake.

Settlement Cycles

The settlement model has an important role and forms a core intermediating function in RTP, ensuring a swift, safe, and seamless flow of funds from one payment participant to another. A sound settlement model ensures mitigation of risks and the management of liquidity. Payment schemes operating may opt to settle transactions on a real-time model or a net deferred model. This means depending on the model, the participants within the RTP system will settle every transaction in real-time or will offset net positions at a preconfigured timeline. SPEI, of the Banco de Mexico clears low-value transactions every 20 seconds during working hours. Some countries have chosen to implement "multiple batch" systems with clearing cycles that are designed in the same manner as traditional systems. The transactions are settled once or many times in a day at a pre-defined periodicity. For example, countries like



India, Philippines or Thailand have adopted a deferred settlement model. Within countries who operate on a deferred settlement model, Japan's Zengin settles payments once every day, Singapore's FAST system settles transactions twice a day and India's UPI runs four settlement cycles daily. Other countries such as Australia's NPP support near real-time settlement cycle 24*7*365 days through a separate Fast Settlement System.

Settlement Models Overview

Interparticipant settlement takes place through bilateral or multilateral netting of positions at designated times of the day. This model might create credit risks when participants do not have enough funds to fulfil their net settlement obligations. Due to this, participants are required to maintain float in the current accounts they hold with the central bank, locking their liquidity. Real-time Settlement Credit risk is mitigated because of continuous interparticipant settlement. In this model, participants must ensure sufficient liquidity continuously. However, these requirements are relatively low, as FPSs usually process retail payments. In this model, participants need to maintain liquidity pools to handle instant settlement outside normal business hours and on holidays.

Liquidity and Settlement Risk

The management of settlement risk is critical for the smooth functioning of the the RTP network. Deferred settlement models generate credit exposure between the PSPs participating in the payment system, while the receiving PSP must advance final funds to its end customer to ensure payments are processed with required speed. For an RTP with deferred settlement, the credit risk borne by PSPs can be managed through limits (to the aggregate net positions of PSPs), frequent settlement cycles, loss-sharing agreements, collateralization, prefunding arrangements, or an agreement with one or more liquidity providers.

Liquidity risk management is a further consideration for schemes that have adopted deferred settlement models, particularly for networks that conduct settlement cycles outside normal business hours. Further, real-time settlement with limited liquidity during off hours may increase the probability that retail payments will remain unsettled or even be rejected, even though a bank is solvent, if it does not have sufficient off-hours liquidity to complete settlements.



There are various ways of organizing the interactions between real-time payments systems and the RTGS systems to support interparticipant settlement. According to the Bank of International Standards, Central Banks have primarily adopted four models:

In the first model, a Central Bank could opt to make no change in settlement systems for various reasons. In some cases, the size of the fast payment system may be very small and, thus, the financial risks associated with deferred settlement are not significant enough to warrant changes.

In the second model, the Central Bank offers limited functionalities in the RTGS system to support the settlement of fast payments beyond normal business hours. One option in this respect would be the provision of limited settlement facilities in RTGS accounts or other accounts during nights and/or weekends. Another option would be the provision of an account to a RTP system operator (or possibly a set of accounts to participants in the system) in which liquidity in central bank money could be blocked overnight and during weekends in order to guarantee settlement. This allows the fast payment system (with either deferred or real-time settlements) to operate independently when the RTGS system is closed by mirroring the liquidity available in the RTGS accounts or other accounts.

In the third model, many RTGS and other settlement systems have extended their operating hours in the past few decades. In some cases, RTGS systems have been adapted to offer limited functionalities for longer periods of time (e.g., facilitate night-time settlement in central bank money for other systems with pre-reserved liquidity).

In the fourth model, to support the management of risks in fast payment systems, the Central Bank could extend operating arrangements for settlement services it provides, such as extending the operating times of the RTGS system or establish a special settlement service available 24/7, along with arrangements for liquidity provision so that the smooth functioning of the system is assured.



Scenario 1 "Business as usual"	Scenario 2 "Moderate support"	Scenario 3 "24/7 RTGS or special settlement services"	Scenario 4 "Central bank as RTP operator"
Settlement is only possible during the RTGS system opening times. Deferred settlement, cycles will likely be restricted to business hours during weekdays; payments might be rejected if binding net debit limits are reached, as participants will not be able to access additional liquidity. In fast payment systems with real-time settlement, this scenario would require settlement in off- hours of the RTGS system	Limited functionality is available to support the settlement of fast payments beyond normal business hours.	Real-time settlement in central bank money is possible on a 24/7 basis. Additional liquidity can be provided. It supports both deferred and real- time fast payment systems. This does not necessarily entail the development of a new system but requires a significant adaptation of the RTGS system or a specialised settlement system.	Real-time settlement is possible on a 24/7 basis. Additional liquidity can be provided at all times. Can support both deferred and real-time fast payment systems. Requires a significant adaptation of the RTGS system and the development (or significant adaptation) of a separate clearing infrastructure. Building a new system is a possibility
In Italy, the Jiffy fast payment service was implemented by market providers without requiring changes in retail clearing and settlement systems or in the RTGS system. Jiffy connects all participating PSPs and supports instant message-switching among participants for the registration of credit/debit positions	Sweden Riksbank created a special fiduciary account in RIX for Bankgirot (a clearing house), which operates the fast payment system BiR. RIX is the central bank's RTGS system. Bankgirot registers the transfers it receives via RIX in the appropriate participant's settlement account in BiR. A positive balance on the	The actions taken by the Reserve Bank of Australia in relation to the proposed NPP provide an example. The Reserve Bank of Australia played a catalyst role in establishing the broad direction of the industry's efforts. It also undertook to build the NPP's settlement component, the Fast Settlement Service, to	An example of this approach is Mexico, where the central bank implemented changes in SPEI, the RTGS system owned, regulated and operated by the central bank, so that it could be used as a fast payment system for end users. This approach was chosen to promote the use of electronic payment systems, in the light of end-user needs for a



Scenario 1 "Business as usual"	Scenario 2 "Moderate support"	Scenario 3 "24/7 RTGS or special settlement services"	Scenario 4 "Central bank as RTP operator"
originated by instant payment transactions. This allows PSPs to provide fast crediting and debiting of the end users' current accounts. Each fast payment is then processed as an ordinary credit transfer (SEPA credit transfer, SCT) in the first available time slot. The netting phase, operated in batches, and the settlement phase are operated by any of the infrastructures and payment systems in the SEPA area that support the processing of credit transfers executed according to European standards.	fiduciary account provides liquidity in BiR, even outside the RIX operating hours. The sum of funds on all settlement accounts in BiR is always equal to, and backed by, the funds in central bank money in Bankgirot's fiduciary account, which eliminates credit risk. This setup required some changes in the central bank's system and in the agreement that all participants in RIX have to sign	allow transactions to be settled individually on a 24/7 basis, in near-real time.	fast interbank payment system. An additional consideration was that SPEI had excess processing capacity that could be leveraged for the fast payment implementation. The Bank of Mexico further implemented a mechanism to provide liquidity to SPEI participants on a 24/7 basis.

Source: BIS



Comparison of Selected Real-time Payment Solutions					
Country	RTP System	Year	Payment Overlay s	Settlement Modell	
India	UPI (Unified Payments Interface)	2016 (UPI)	Bill payments, POS Forex Payments, Account Alias services, R2P, Mandate Setting & Recurring Payments	System: Deferred Cycles: 4 cycles per day	
Singapore	FAST & PayNow	2014 & 2017	Recurring Payments, Bill payment, QR Payments, Account Alias, Cross- border payments (Malaysia and Thailand), Grants, Pension and Insurance Payments	System: Deferred Cycles: 2 per day among FAST, BCS and MEPS	
Philippines	InstaPay	2018	QR Code Payments, Account Alias, Government Payments.	System: Deferred Cycles: Once per day at EOD	
Malaysia	RPP - Retail Payments Platform DuitNow	2019	POS Payments, Account alias, R2P, Cross-border and QR Code payments,		
Thailand	PromptPay	2017	QR payments, Account Alias service (phone number, Thai ID or company registration), Corporate payments, Cross-border Payments, Government payments	System: Deferred Cycles: Once per day via BAHNET	
South Korea	HOFINET / EBS	2001	Bill Payments, Insurance Premiums and Newspaper Fees.	System: Real-time Cycles: Multiple / Continuous	



Comparison of Selected Real-time Payment Solutions					
Country	RTP System	Year	Payment Overlay s	Settlement Modell	
China	IBPS - Internet Banking Payment System	2010	POS, Bill payment, QR code, Corporate Payments.	System: Deferred Cycles: Once per day	
Japan	Zengin	1973	Remittances, Government Payments, Insurance, Tax, etc.	System: Deferred Cycles: Once per day	

Source: FSS

Scalability and Reliability of RTP Systems

RTP systems may introduce new sources of operational risk. With real-time payments flowing continuously, the consequences of a few seconds of downtime are even more serious than in traditional systems. For operators seeking to bring real-time payments to their markets, the reliability, and the scalability of the system to support growing transaction workloads is integral to drive adoption among users. The system needs to be operational and available to all members round-the-clock. The RTP scheme should have mechanisms and systems to ensure high levels of end-to-end availability and reliability under both normal and stressed operating conditions. The RTP should define target availability metrics and should also have business continuity and disaster recovery plans to ensure timely recovery and resumption of critical services in the event of an outage or cyber-attack.

Further proactive monitoring of each is essential to maintain a reliable service and ensure the maintains a low rate of transaction declines arising from technical errors. Additionally proper sandboxing of financial institutions is essential to ensure, the health of one bank will not affect the uptime of the whole system.

Many operators require participants to benchmark their infrastructure (hardware & software) to meet the RTP benchmark criteria. For instance, UPI in India mandates participant systems need to process 150 transaction per second (TPS), 5,00,000 transactions per day and 99.9% of uptime of services.



Dispute Resolution and Consumer Protection

When a system processes millions of transactions daily among multiple participants, disputes may arise on account of failed or delayed payments. The RTP system needs to provide a mechanism to participants to send and respond to requests for the return of funds for any reason, including unauthorized or erroneous RTP Payments. In scenarios where adjustments or declines by the payee bank is not acceptable to the sending bank, they can refer the issue for arbitration to the RTP.

In certain RTP schemes, the payment operator may not be a party to any dispute between participants regarding liability for erroneous or unauthorized RTP Payments. Such determination is left to the participants, including through any available dispute resolution and/or judicial process. In such a scenario, the RTP system must be supported by a consumer protection regime that incorporates "guarantees" or "indemnities", to be provided by a PSP to its consumer customers, that address cases of fraud, error, or similar problems.





Various Inter-Bank Dispute and Adjustment Scenarios

Beneficiary Timed Out transaction

- The customer account is credited but the response got timed out
- The customers account is not credited, and the response got timed out
- Post reconciliation it is found that customer account cannot be credited because of closed account, no such a/c
- Chargeback In case of wrong or incorrect customer account
- Chargeback Acceptance / Representment Chargeback acceptance is only confirmation, there will not be any fund movement between sending and receiving institution
- Pre-arbitration, Pre-arbitration Acceptance and Pre-arbitration Rejection
- Arbitration
- Transaction Credit Confirmation (TCC) This option is provided only to make sending bank understand that customer a/c has been credited either online or by initiating manual credit by beneficiary. This will avoid raising chargeback by remitter bank
- **Returns** Payee bank can return the funds to the remitting bank where payee bank is not able to credit their customer's a/c due to wrong a/c no, a/c closed



Way Forward and FSS Instant Payments

A growing number of economies around the world are embracing real-time payments. This has significant implications for accelerating supply chains and connecting industry ecosystems more dynamically and deepening financial inclusion in countries where cash dominates. FSS Instant Payment Hub is designed to support Central Banks in this transition journey. FSS deep experience and proven expertise in managing population-scale payment infrastructure for Central Banks and Tier One Banks means we're well-equipped to support RTP payment operators every step of the way. The underlying modular technology components support low-latency, high-volume transactions and can be deployed in any market, irrespective of the local market topology.

References

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About FSS

FSS (Financial Software and Systems) is a leader in payments technology and transaction processing. FSS offers an integrated portfolio of software products, hosted payment services and software solutions built over 30+ years of experience. FSS, endto-end payments products suite, powers retail delivery channels including ATM, POS, Internet and Mobile as well as critical back-end functions including cards management, reconciliation, settlement, merchant management and device monitoring. Headquartered in India, FSS services leading global banks, financial institutions, processors, central regulators and governments across North America, UK/Europe, Middle East, Africa and APAC.

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