



Spotlight on payments technology

Interlinkage of Real-time Payments systems

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Introduction

Real-time Payments (RTP) are at the heart of the rapidly evolving global payments ecosystem. Major economies either already have RTP systems in place or other economies have outlined plans to launch soon.

In this era of diminishing cross-border barriers, customers are looking for domestic as well as international RTP. Thus, the development of interlinkages between global RTP systems has become key to delivering instant and accessible cross-border payment services. This trend of interlinkage RTP systems is garnering significant attention, driven by increasing consumer demand, supportive regulatory initiatives, and enabling technological advancements. Interlinkage of RTP rails offers significant benefits, such as reduction in cost for all participants, faster payment processing, better visibility, higher STP rates, and increased transparency in payments.

Policymakers and industry bodies across the globe are rising to the task and collaborating to connect payments systems across countries. In October 2020, the G20 endorsed a five-year roadmap by the Financial Stability Board (FSB), in coordination with the Committee on Payments and Market Infrastructure and other bodies to address cross-border payments challenges. The Bank for International Settlements (BIS) Innovation Hub's Project Nexus is another initiative that aims to interlink instant payment systems using a standardised, multilateral approach on a distributed network. Similarly, India's Unified Payments Interface (UPI) is expanding globally, with NPCI International Payments Limited (NIPL) signing bilateral agreements with multiple countries to enable varied use cases for cross-border payments.

In this newsletter, we explore the concept of interlinkage of RTP systems and its benefits. We have focused on select case studies to understand the specific objectives, challenges, and learnings from these interlinkage initiatives.

Note: The various transaction flows and models depicted in the document are per our best understanding of the use cases; the specific nuances may vary.

Rise of Real-time Payments

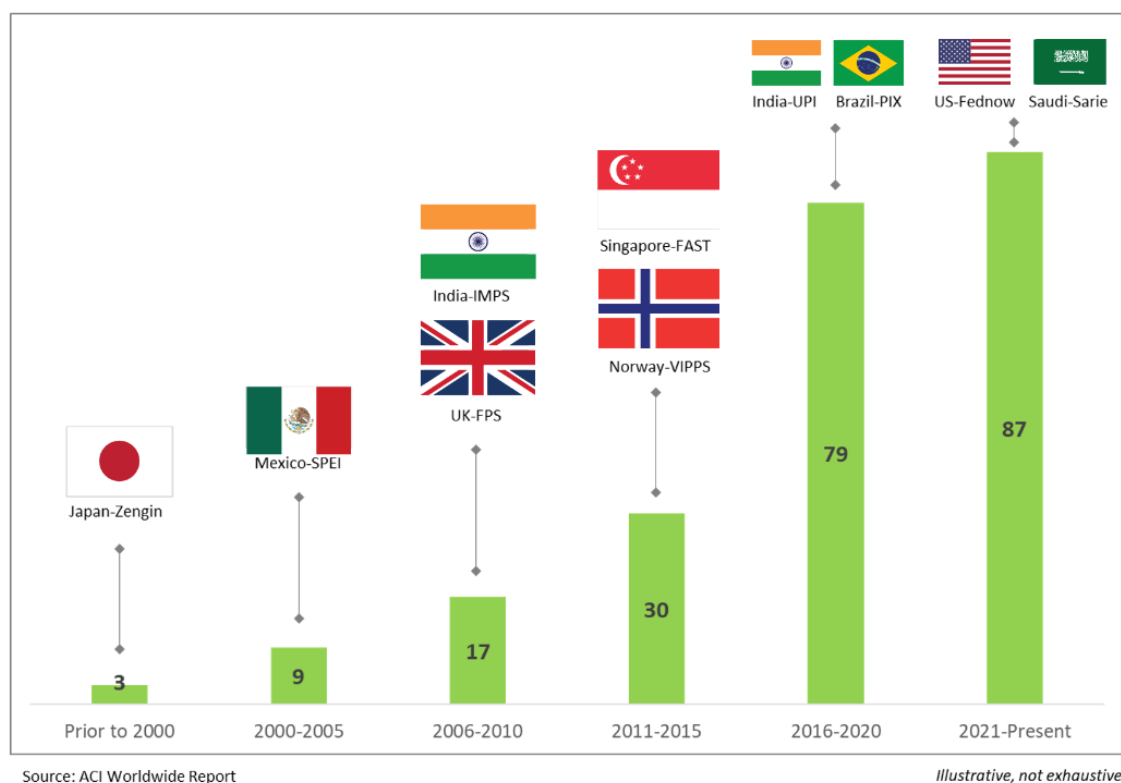
What are Real-time Payments systems?

The Bank for International Settlements (BIS) defines Real-time Payments (RTP) systems¹ as those “in which the transmission of the payment message and the availability of “final” funds to the payee occur in real time or near-real time on as near to a 24/7 basis as possible.” An RTP system is the underlying infrastructure that connects banks and other financial institutions, allowing them to send and receive payments in real time. RTP systems are typically available 24/7/365, including weekends and holidays. These systems are also interchangeably referred to as immediate payments or instant payments systems.

There are three different types of RTP systems across the globe: (1) central bank-backed, RTP systems, such as FedNow in the US, (2) RTP systems launched by private payments operators, such as Unified Payments Interface (UPI) in India, (3) closed loop systems, such as Zelle in the US (allowing real-time transactions within its network).

More than 80 countries have already launched RTP, with Japan’s “Zengin” being the first one (developed in 1973). Over the past two decades, we have seen a proliferation of such systems with the launch of some notable names, such as the “RTP network from The Clearing House” in the US, the “Faster Payments Service” in the UK, Internet Banking Payment Systems in China, and the “Unified Payments Interface - UPI” in India. Most recent examples of RTP include “FedNow” in the US, “PIX” in Brazil, and “Real-Time Rail” in Canada. Figure 1 captures the rise of RTP systems across the globe.

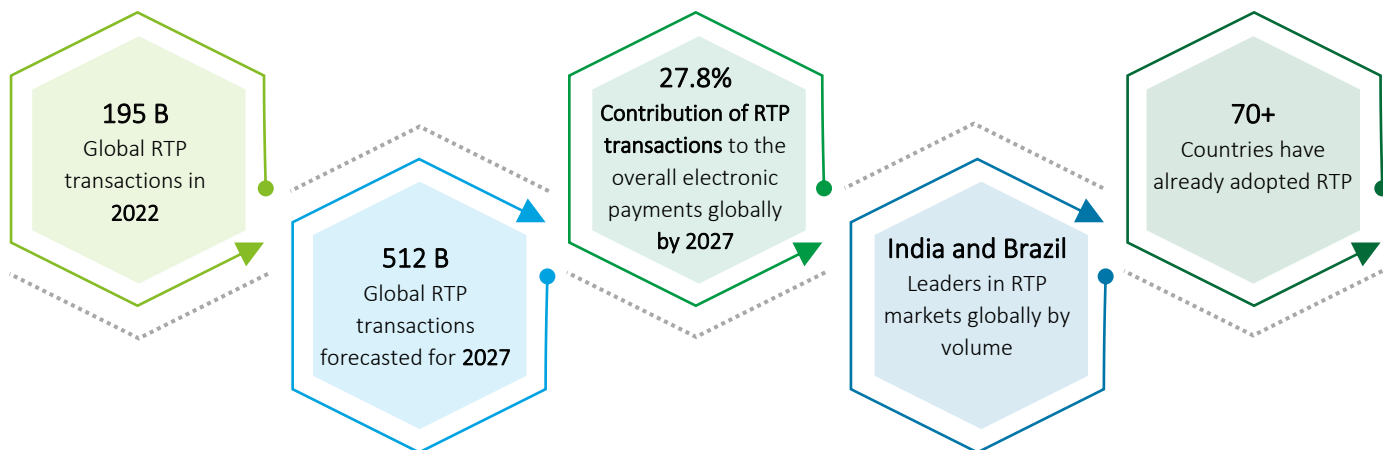
Figure 1: Rise of RTP systems over the years



*Numbers in the chart are cumulative

A new wave of growth is emerging in the realm of RTP with the rise in customer adoption. This is primarily on the back of the launch of newer use cases by RTP systems. In addition, RTP systems have seen a significant uptick with transaction volumes growing by ~63 percent in 2022 alone. Figure 2 captures key statistics indicating global RTP trends.

Figure 2: Global RTP trends²



Source: ACI Worldwide Report : It's Prime Time for Real-Time 2023

Interlinkage of Real-time Payments systems

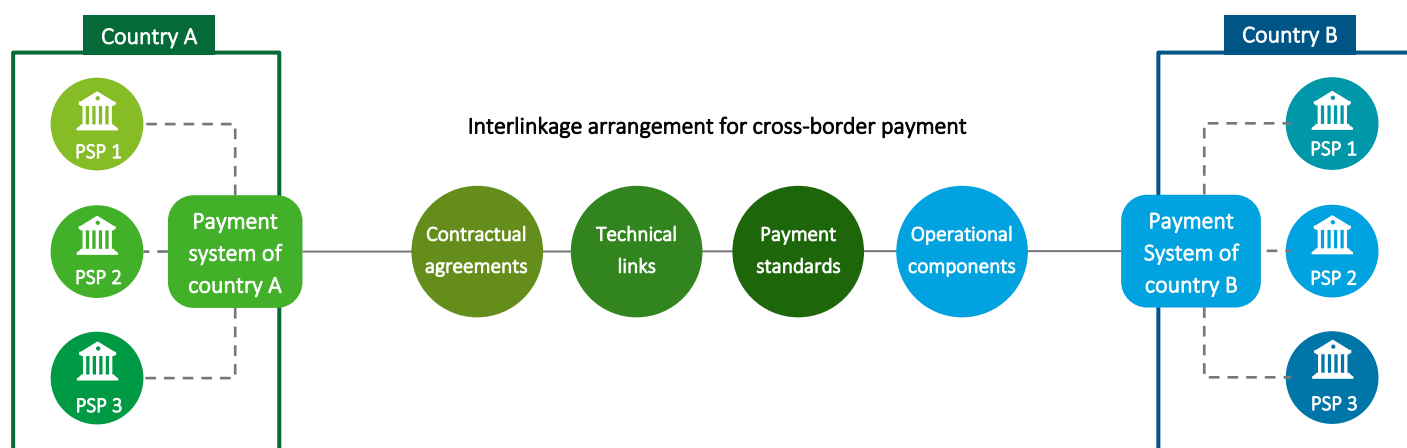
What is the interlinkage of Real-time Payments systems?

RTP systems³ typically function within national borders, facilitating instant payments exclusively within each country. The integration of RTP systems between different countries can facilitate real-time cross-border payments. Some global FinTech providers have attempted this interconnectivity. However, the service is often limited to linkages established by the FinTech player, with a limited number of participating banks and connections for specific use cases, such as remittances. The lack of direct connection between the national payment infrastructures of the participating countries, which is open for all participating institutions and supports multiple use cases, hinders complete interoperability in these solutions.

The BIS defines the interlinkage (Figure 3) as:

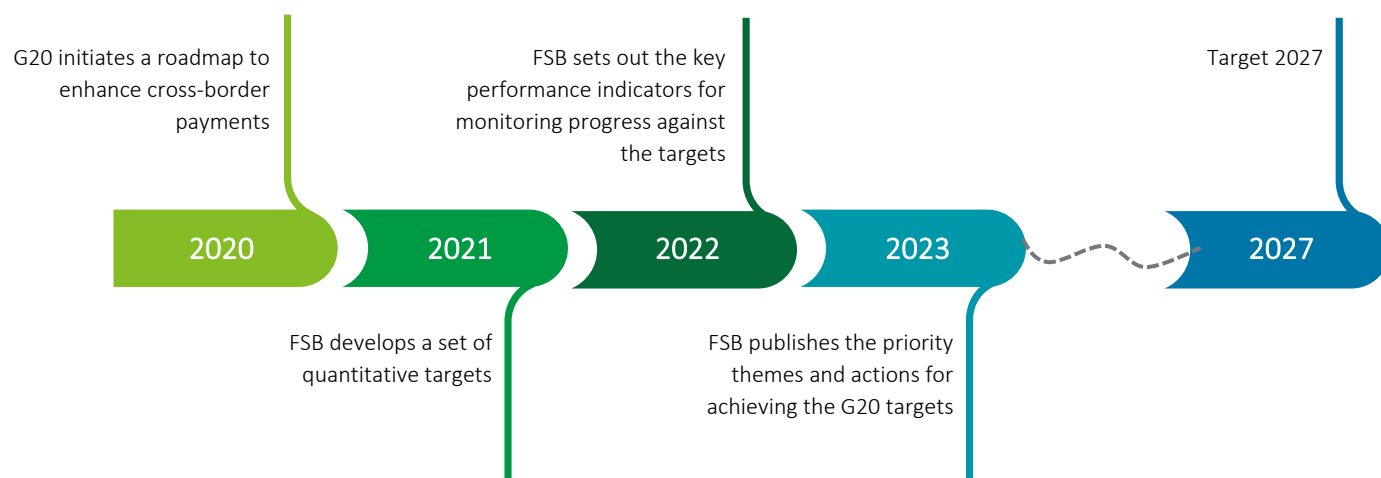
“The interlinking arrangements for cross-border payments is a set of contractual agreements, technical links and standards, and operational components between payment systems of different jurisdictions, allowing their respective participating Payment Service Providers (PSPs) to transact with one another as if they were in the same system.”

Figure 3: Interlinkage Arrangement for Cross-Border Payments as defined by BIS



In 2020, G20 (Group of 20 - an intergovernmental forum comprising 19 sovereign countries, the European Union, and the African Union) initiated a roadmap to enhance cross-border payments to make cross-border transactions more efficient, cost-effective, transparent, and secure. In 2021, the Financial Stability Board (FSB) developed a set of quantitative targets that address the four challenges (cost, speed, access, and transparency) and plans to address them by 2027⁴. In 2022, the FSB set out the key performance indicators for monitoring progress against the targets, and in 2023, the FSB published the priority themes and actions for achieving the G20 targets⁵, including the following:

- Payment system interoperability and extension
- Legal, regulatory, and supervisory frameworks
- Cross-border data exchange and message standards

Figure 4: Initiatives by the G20 to enhance cross-border payments

What led to the need for interlinkage of Real-time Payments systems?

The interlinkage of RTP systems emerged as a necessity in response to the evolving demands of modern digital economies and the ever-increasing cross-border trade. Traditional cross-border payment systems have had inherent challenges around long turn-around time for payments clearing and settlement, loss/truncation of information during cross-border payment processing and lack of real-time transaction status visibility, as outlined below:

- **Instantaneous transactions:** Consumers require immediate access to funds, especially for use cases, such as e-commerce and peer-to-peer transfers. Real-time cross-border payment systems can facilitate instant transactions, allowing faster settlement.
- **Cost efficiency:** Interlinked RTP systems often operate with fewer intermediaries and simplified processes, leading to cost savings. This efficiency can translate into lower transaction fees for users, benefiting both businesses and consumers.
- **Enhanced customer experience:** Interlinking RTP systems can improve the overall customer experience by providing seamless and efficient transactions and real-time transaction status visibility.
- **Globalisation and 24/7 economy:** Global markets and the 24/7 economy render traditional banking hours impractical. RTP across time zones can facilitate international trade and collaboration without delays.
- **Risk mitigation:** RTP reduces the risk associated with delayed or uncertain transactions. The instant settlement of funds can minimise exposure to various risks, including credit risk and fraud.
- **Financial inclusion:** RTP systems can contribute to financial inclusion by providing individuals with limited access to traditional banking services, the opportunity to participate in the digital economy.

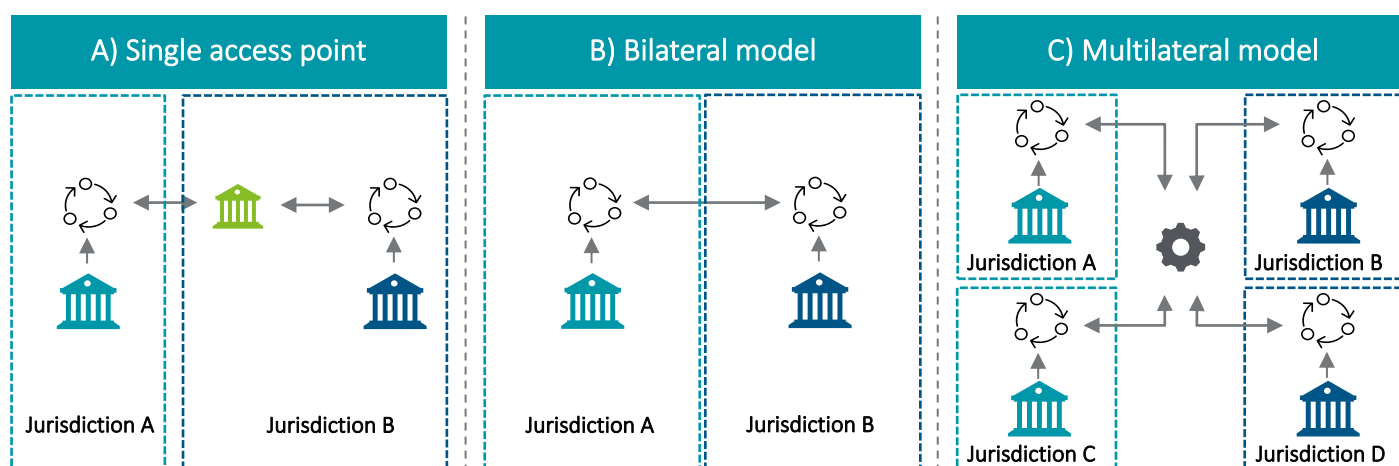
In April 2021, the RTP systems of Singapore (PayNow) and Thailand (PromptPay) were interlinked, marking one of the first direct connections between two domestic RTP systems globally. This interlinkage was done to mitigate challenges around high fees/high FX (Foreign Exchange) charges and extend the payment processing time between the two countries.

In the first year of its launch, the interlinkage resulted in 2,00,000 transactions worth US\$44 million⁶.

What are the different types of interlinkage arrangements?

RTP systems can be interlinked directly or can be dependent on an intermediary who facilitates the connection between the two systems⁷. Figure 5 describes the three models based on this form of link, i.e., the 'Single access point', 'Bilateral model', and the 'Multilateral model'. (Note: Multilateral model includes both the 'Hub and Spoke' and 'Common Platform' models, as defined by BIS.)

Figure 5: Types of interlinkage arrangements based on form of linkage



A) Single access point

i. Definition

A domestic payment system is linked to a single gateway entity (payment service provider) that directly participates in a foreign payment system, providing access to all participants in the foreign system.

ii. Settlement process

This arrangement follows a correspondent banking model for accounting, clearing, and settling inter-system positions between interlinked systems. This process is usually done through nostro/vostro accounts that linked systems hold with each other.

iii. Key characteristics

This model bears a resemblance to correspondent banking arrangements but differs by ensuring access to the foreign systems based on common rules, Service Level Agreements (SLAs), and access criteria.

iv. Example

NPCI International Payments Limited (NIPL) has partnered with the UAE's Mashreq to enable acceptance of the Unified Payments Interface (UPI) platform in the UAE. This partnership will enable more than 2 million Indians, who travel to the UAE every year, to make payments using UPI-based mobile applications across shops and merchant stores.

B) Bilateral model

i. Definition

A domestic payment system is directly interlinked to a foreign payment system after the establishment of a bilateral agreement between the payment system operators.

ii. Settlement process

A bilateral link requires efficient mechanisms for accounting, clearing, and settling inter-system positions between interlinked systems. This process is usually done through nostro/vostro accounts that linked systems hold with each other.

iii. Key characteristics

Protocols and rules are customised per needs of the payment system operators.

Payment system operators need to enter into several distinct bilateral agreements for every new country that needs to support the transactions.

iv. Example

The NIPL entered into agreement with the Association of Banks in Singapore, interlinking India's UPI and Singapore's PayNow, enabling users to make instant payments through a bilateral link. Payments are Virtual Payment Address (VPA) based, made by the payer using the payee's unique UPI ID.

C) Multilateral model**i. Definition**

Two or more payment systems are interlinked via an integrated technical platform, acting as a common intermediary or via Application Programming Interfaces (APIs). Payment system operators enter into agreement with this intermediate platform operator or API suite owner.

ii. Settlement process

The specific details of settlement processes can vary based on the design of the interlinkage, the regulations in place, and the agreements amongst participating institutions. Settlement is typically handled by the common intermediary/the central clearing entity and often operates on a predefined settlement period (which could be several times a day, or in some cases, based on continuous, real time).

iii. Key characteristics

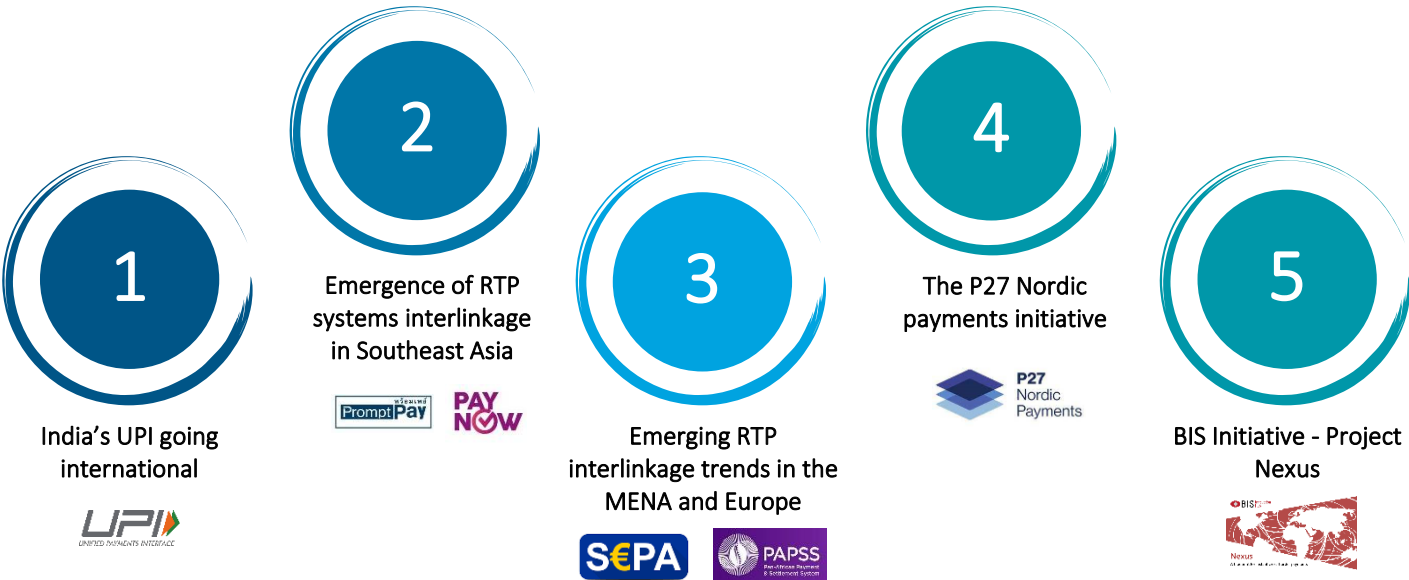
The central infrastructure (intermediary) defines the standard communication protocols and rules for interfaces. This model is highly scalable as payment systems can join the intermediate network without establishing individual agreements with each foreign RTP system.

iv. Example

The BIS Innovation Hub's – 'Nexus' is being designed to be the central infrastructure connecting RTP systems. Its gateways will manage differences in data, functionalities, and processes between different payment systems. To address the issue of non-standard payment systems, Nexus will ask for the codification of schemes in a 'Service Level Description (SLD).' The SLD will include scheme protocols and rules and will be shared across the Nexus network. On payment initiation, the payer bank will query Nexus for the SLD of the destination country. The SLD will notify the payer bank of the exact payment information required to set up a payment instruction, which will be accepted in the destination country. Nexus will use APIs for communication between Nexus, banks and payment service providers, and FX providers.

To understand some of these models, we have illustrated a few case studies that examine the various interlinkages across the globe to understand the models, benefits, challenges, etc., as outlined below in Figure 6.

Figure 6: Interlinkage case studies



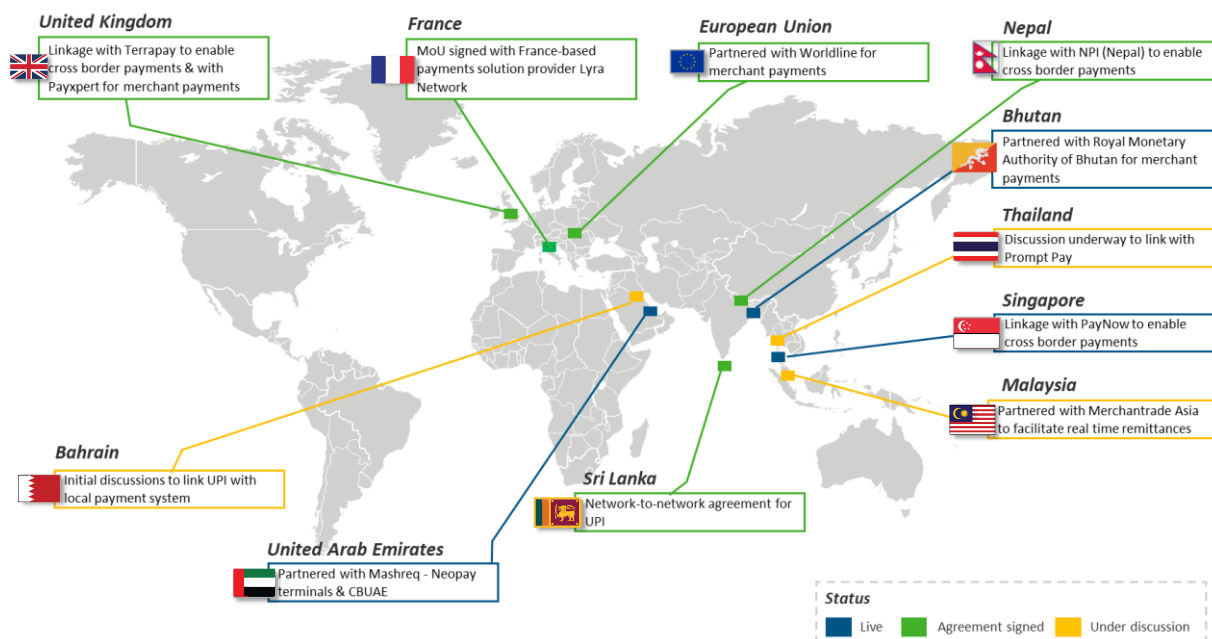
Case study 1- India's Unified Payments Interface (UPI) going international

What is Unified Payments Interface (UPI) and why is it going global?

Unified Payments Interface (UPI) is a 24X7X365 RTP system in India that facilitates person-to-person and merchant payments by the use of simple virtual addresses, such as mobile numbers⁸. UPI is managed by the National Payments Corporation of India (NPCI), which is an umbrella organisation for operating retail payments and settlement systems in India and an initiative of the Reserve Bank of India (RBI) and the Indian Banks' Association (IBA). It operates as a 'not for profit' company and was launched to enable greater penetration and usage of digital payments through easy customer experience and by supporting interoperability across multiple payment methods.

UPI was launched in 2016 and initially, players focused on basic use cases, such as Peer-to-Peer (P2P) payments to drive customer adoption and relied primarily on incentivisation. Gradually, NPCI built multiple overlay services on top of UPI and expanded the use cases – from P2M payments to bill payments to recurring payments. As a result, UPI transactions in India have successfully grown at ~150 percent Compounded Annual Growth Rate⁹ (CAGR) in both volume and value terms from FY2018 to FY2023. As the NPCI and ecosystem players continue to innovate and bring in additional overlay services, UPI transactions are further expected to grow significantly. An increase in internet penetration (expected to grow to ~87 percent by 2025¹⁰ [up from ~49 percent in 2022¹¹]) and smartphone penetration in the country (India is expected to have 1 billion smartphone users by 2026¹²) will further push this growth.

To replicate this success globally and address cross-border payment use cases, NPCI established a subsidiary called the NPCI International Payments Limited (NIPL). NIPL has been actively signing agreements with willing nations to interlink India's UPI with their domestic payment systems (Figure 7) to mitigate some of the challenges outlined with cross-border payments earlier.

Figure 7: Snapshot of global UPI partnerships¹³

The international expansion of UPI holds significant benefits for users both in India and abroad. For users in India, the extension of UPI internationally enhances convenience by allowing seamless and familiar payment experience while making cross-border transactions. For users abroad, the integration of UPI offers a reliable and standardized payment method, simplifying transactions with Indian users/entities.

At present, there are primarily two use cases being enabled for UPI internationally:

Use case	Target customer segments	Illustrative examples ¹³
1. Cross-border remittances (both inward and outward)	Non-resident Indians Migrant workers Students	Singapore PayNow linkage (already live) Thailand PromptPay (under discussion)
2. International merchant payments	Indian tourists	The UAE – Neopay (already live) France – Lyra (under development) The EU – Worldline (under development)

The future of UPI International holds immense potential, paving the way for a myriad of additional use cases that have a potential to redefine the landscape of cross-border transactions. One notable prospect is the facilitation of cross-border business-to-business transactions, wherein UPI can reduce the complexities inherent in international trade. The evolving nature of UPI International also holds significance in the realm of global investments, tourist refunds, international education fees and related expenses, etc.

The internationalization of UPI benefits users by creating a unified and user-friendly payment ecosystem that transcends borders, promoting efficient and secure financial transactions for individuals and businesses (both India and abroad). Since all the arrangements illustrated above are bilateral in nature, there may still be challenges in terms of scalability, cost efficiency, etc. However, such challenges may get addressed when the ecosystem gradually moves towards multilateral arrangements.

How can international banks participate in Unified Payments Interface?

International banks can participate directly or indirectly in the UPI ecosystem and enable varied use cases for their customers¹³.

1. Direct participation in India

Foreign banks with a banking license in India can directly participate in the domestic UPI ecosystem. They can apply to become a Payments service provider (PSP) bank with the NPCI. Once the bank is approved as a PSP bank, it could develop its own UPI app or partner with a Third-party App Provider (TPAP) to offer UPI services to end customers. Customers of the foreign bank could then use the bank's UPI app or the third-party app to make and receive UPI payments (for all use cases enabled on the respective UPI app, including the international use cases).

Examples include DBS Bank, HSBC, and State Bank of Mauritius, which are acting as PSP banks in India.

2. Indirect participation overseas

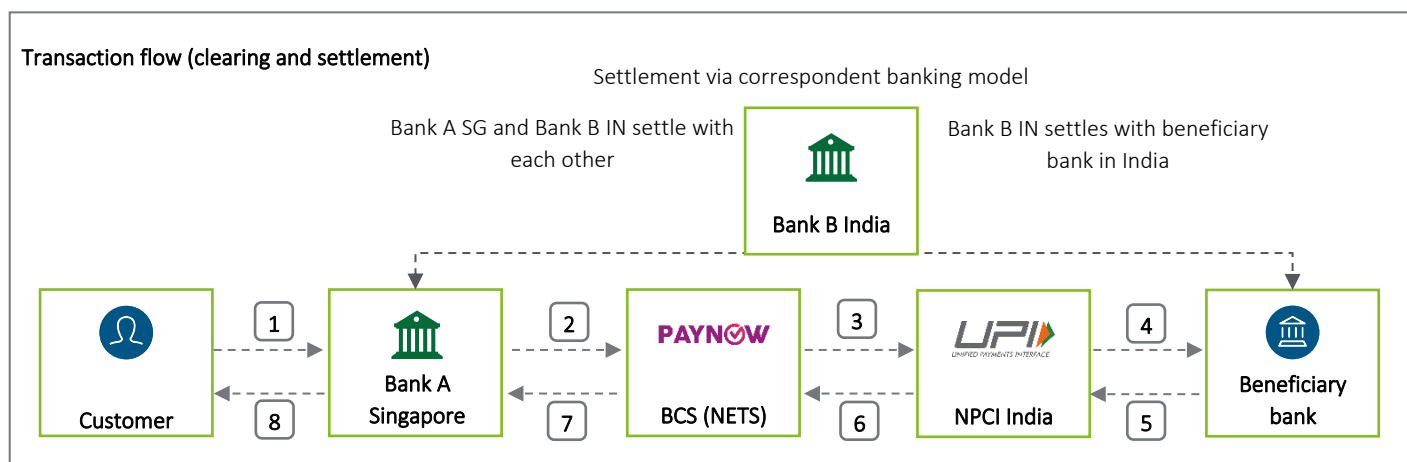
To enable UPI-based payments in their home country, a bank can indirectly participate in the UPI ecosystem by signing an MoU with NIPL and directly integrating with the UPI rails (for clearing only). This will allow the bank to settle payments through the correspondent banking model. Use cases of indirect participation in UPI include the following:

- Cross-border payments: both inward and outward cross-border payments using UPI (For example, UPI-Singapore PayNow connectivity)
- Merchant payments: enabling merchants to accept UPI payments from Indian customers (For example, UPI- Mashreq Neopay connectivity in UAE)

2.1 Use case 1: Cross-border remittances through direct connectivity between the two payment systems operators in India and Singapore, respectively¹⁴

Illustration: An immigrant in Singapore wants to send money to family in India. The payer has an account in Bank 'A' based in Singapore and Bank 'A' has enabled the functionality to support payments via PayNow to UPI in their app. Bank 'A' also has an Indian counterpart. The beneficiary has an account in a separate bank "Beneficiary Bank".

Figure 8: Illustration of cross-border payments (indirect participation)



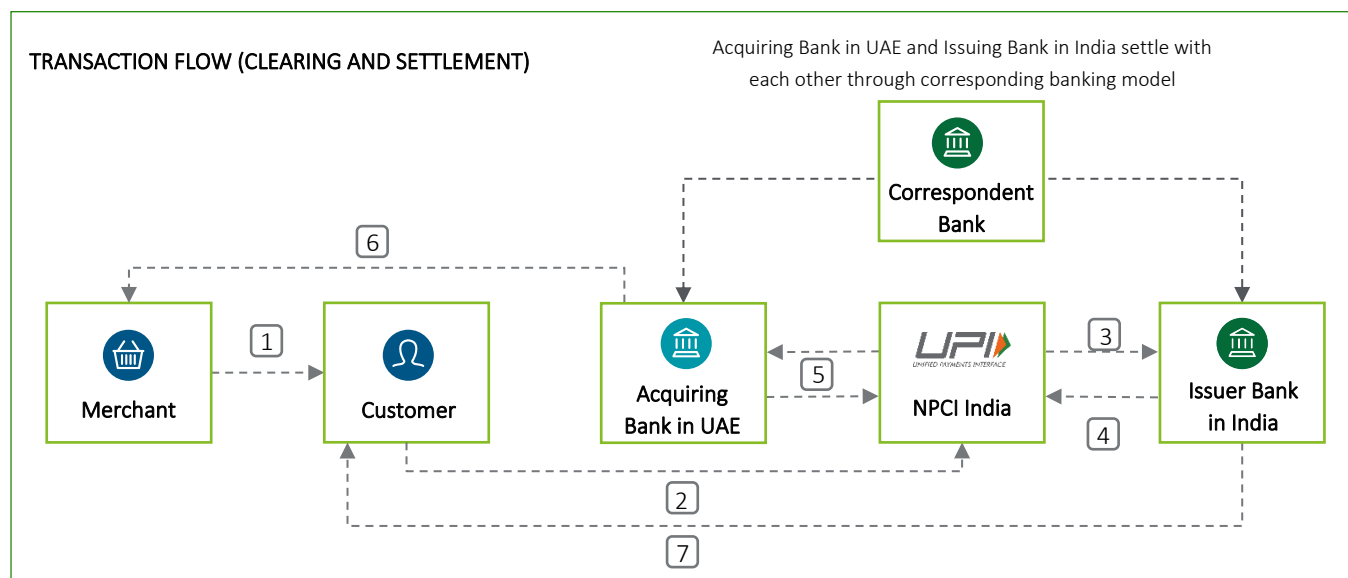
The payments and settlement happen with the following sequence (Figure 8):

- 1) The payer opens a banking app and inputs recipient UPI ID, amount, and UPI PIN. The transaction then moves to payer's bank (Bank A, Singapore). The bank conducts internal checks (For example, fund availability, customer details, etc.)
- 2) Once the payment request is internally authenticated, the payment request is sent to PayNow clearing system. PayNow checks the authenticity of the payment request and then Banking Computer Services (PayNow operator) clears the transaction.
- 3) The payment request is sent to the NPCI, which is the UPI operator. The NPCI validates the payment information (including the validity of the UPI ID) and processes it.
- 4) NPCI routes the payment request to the beneficiary bank in India. The beneficiary bank authenticates the account information and clears the payment.
- 5) The beneficiary bank sends the confirmation of credit to the NPCI.
- 6) NPCI then sends credit confirmation to Banking Computer Services (BCS).
- 7) PayNow sends the confirmation of payment to the payer's bank (Bank A, Singapore).
- 8) The bank then sends the payment successful message to the customer.

2.2 Use case 2: Merchant payments through connectivity with a bank/payments service provider in the nation (the UAE in the example)¹⁵

Illustration: Payer is an Indian tourist with an Indian “Issuer bank” and the merchant is UAE-based and banks with “UAE bank”.

Figure 9: Illustration of merchant payments (indirect participation)



The payment flow for clearing and settlement is as follows (Figure 9):

1. The “UAE bank” has integrated UPI standards into its Point of Sale (POS) terminals and deployed in select merchant locations in the UAE. The merchant displays UPI QR (Quick Response) Code to the customer.
2. The customer scans the QR code using the Indian UPI app and enters UPI PIN to complete the transaction. The payment is routed to NPCI.
3. NPCI validates the payment information and forwards it to the issuer bank in India to trigger the debit of their account.
4. The Indian bank will then process the debit transaction and then route it to NPCI.
5. NPCI sends successful debit confirmation to the acquiring entity/bank in the UAE, and receives feedback from Acquiring Bank/Entity.
6. The merchant also receives payment confirmation from the acquiring bank/entity.
7. The customer receives payment confirmation from the issuing bank.

Our perspective

The interlinkage of UPI with Singapore’s PayNow marks a significant milestone as this interconnection introduces improvements poised to serve as the blueprint for worldwide real time cross-border payments interconnectivity. It uses a cloud-based network, which marks a significant improvement in infrastructure over other such interconnections before. Further, this model is more inclusive in nature as it went one step ahead and allowed a non-bank player to participate in the interconnection. This linkage has managed to automate the capital control rules for India, which simplifies the connectivity and will serve as an example for other emerging economies to follow.

We believe that for other payment systems around the world/banks/payment service providers, it becomes imperative to evaluate the business case (around parameters, such as remittances, trade volumes, tourism, etc.) for establishing such interlinkages with UPI. While most of the current UPI partnerships cater to retail use cases, there is a potential for exploration into additional use cases, such as corporate payments.

It is yet to be seen how these bilateral interlinkages could converge into a multilateral model, which could solve the challenges around scalability and cost effectiveness of establishing bilateral connections.

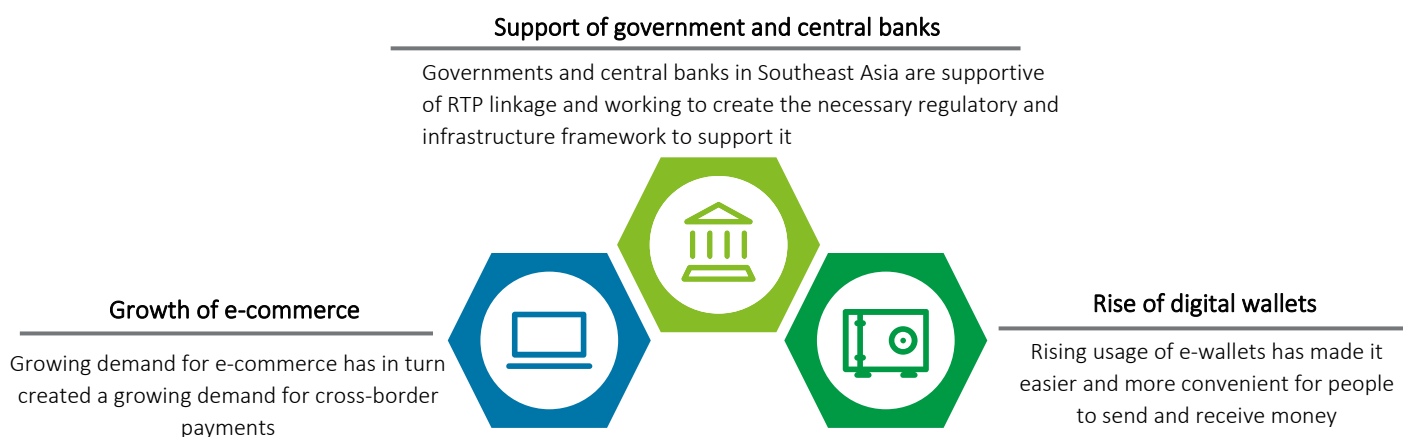
Case study 2: Emergence of Real-time Payments systems interlinkage in Southeast Asia

What are the emerging trends in Southeast Asia for cross-border Real-time Payments?

In recent years, the emergence of proxy-enabled national RTP systems has become an integral part of the digital financial services landscape in the Asia Pacific region. This development is driven by central banks' determination to enhance the speed, efficiency, and accessibility of financial transactions. Southeast Asian nations have been particularly proactive in the development of such RTP systems, initially implementing them in domestic market before gradually extending their reach to cross-border transactions.

Building on the success of the bilateral cross-border payment linkage between PromptPay of Thailand and PayNow of Singapore, the Association of Southeast Asian Nations (ASEAN) is now trying to integrate regional multilateral Faster Payment Systems (FPS) across other countries. The RTP linking initiative in Southeast Asia is being driven by several factors, including rise of digital wallets, growth of e-commerce, and the support of governments and central banks (Figure 10).

Figure 10: Factors leading to rise of RTP linkage in Southeast Asia



What are some of the examples of regional Real-time Payments interlinkages in Southeast Asia?

ASEAN has been actively pursuing initiatives to enhance cross-border payments cooperation in the region. These initiatives are aimed to facilitate faster, cheaper, and more transparent cross-border payments, which will support regional trade and economic integration.

Some of the key initiatives under the ASEAN's Cross-border Payment Cooperation (CBPC)¹⁶ framework include the following:

- **Regional Payment Connectivity (RPC):** The RPC initiative aims to establish a network of linked payment systems across the ASEAN. This will allow for direct payments between individuals and businesses in different ASEAN countries, without the need for intermediaries. The RPC is expected to be launched in phases. The first phase will focus on linking the RTP systems of five ASEAN countries: Indonesia, Malaysia, Philippines, Singapore, and Thailand.

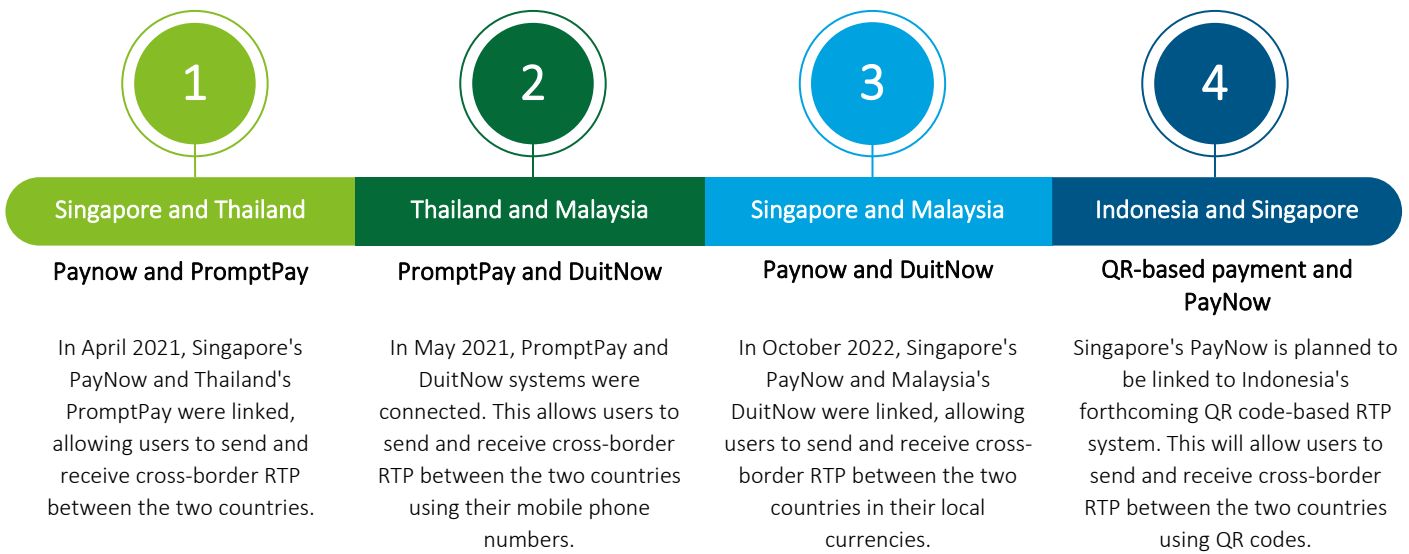
- Cross-border QR Payment: This initiative was launched in 2023 and is currently active in Indonesia, Malaysia, Thailand, and Singapore and it allows residents from the region to pay for goods and services in the local currencies using a QR code. This allows users to make transactions to merchants in the other ASEAN countries using their existing QR code payment apps.
- Common QR code: This initiative is expected to be completed by 2024 and aims to develop a single QR code standard that can be used across all the ASEAN countries. This will allow merchants to accept payments from users across ASEAN countries using a single QR code.

These initiatives are expected to significantly improve the efficiency and convenience of cross-border payments in the ASEAN region. They will also support the growth of e-commerce and other digital services in the region.

What are some of the examples of other bilateral Real-time Payments interlinkages in Southeast Asia?

In recent years, various Southeast Asian countries have collaborated to establish bi-lateral RTP linkages (Figure 11).

Figure 11: Recent bi-lateral linkages in Southeast Asia



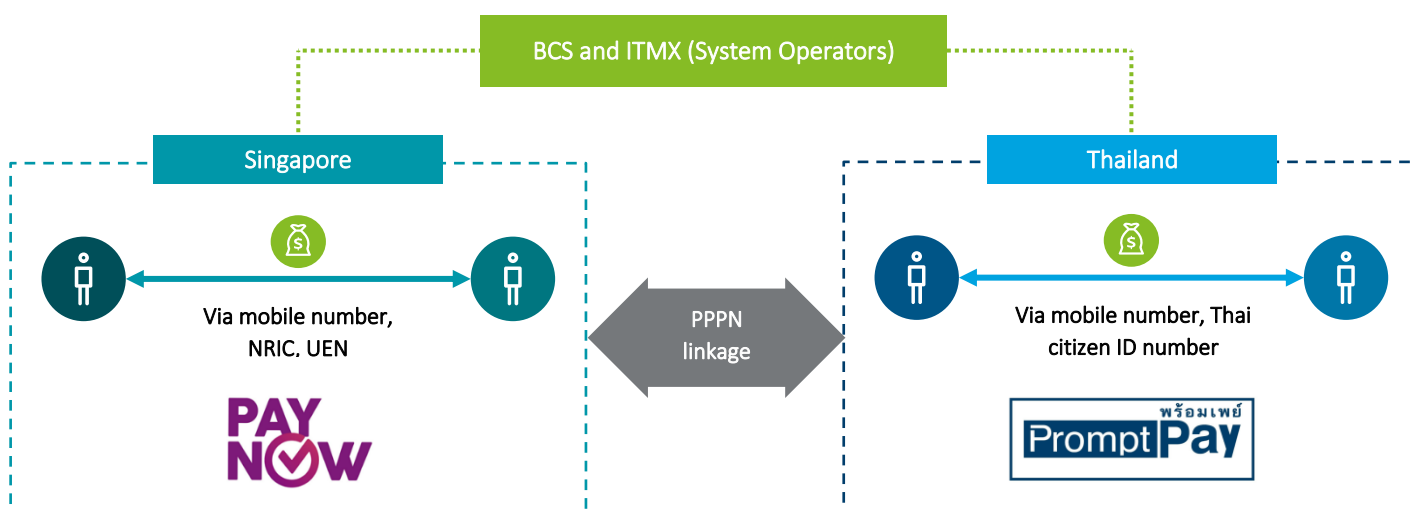
Example: PPPN: Integration of Thailand's 'PromptPay' and Singapore's 'PayNow'

PayNow is a P2P funds transfer service in Singapore. It enables users to send and receive money instantly using the recipient's mobile number, National Registration Identity Card (NRIC) number, or a Unique Entity Number (UEN).

PromptPay is the Thai equivalent of a RTP system and operates similarly. It allows individuals and businesses to transfer money using their mobile phone numbers or Thai citizen ID numbers.

The PPPN linkage, launched in April 2021, connects the RTP systems of Singapore and Thailand through cross-border gateways built and operated by both countries' systems operators (Figure 12).

Figure 12: PPPN-Integration of Singapore's 'PayNow' and Thailand's 'PromptPay'



Settlement process for cross-border fund transfers through PPPN

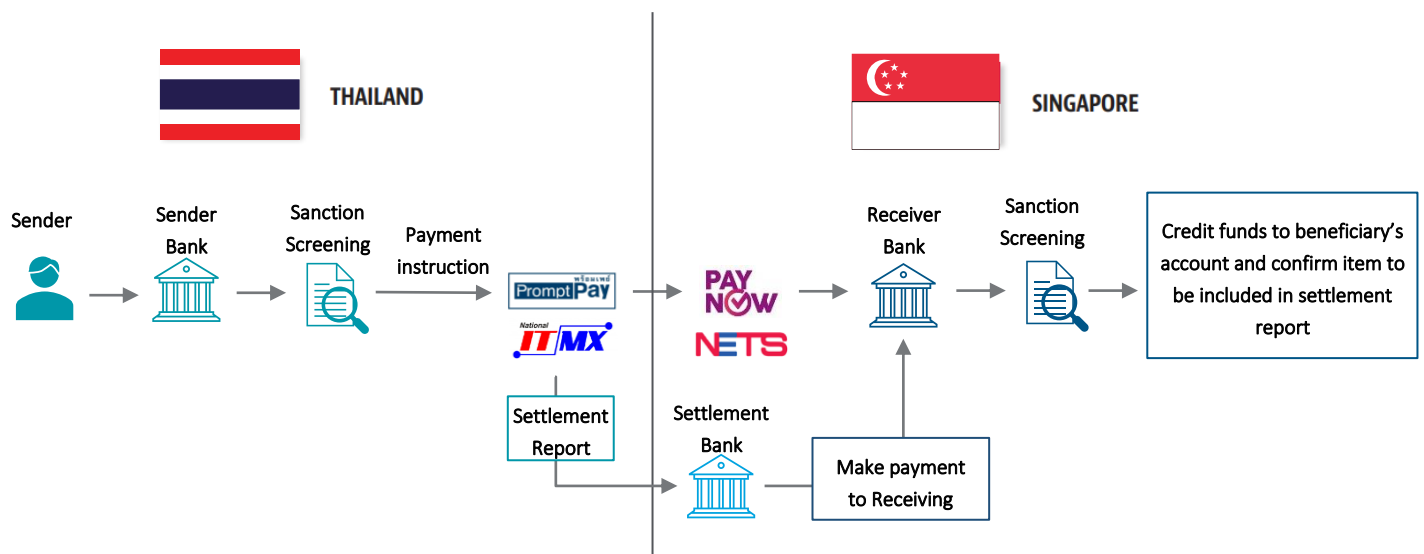
This model follows settlement cycles of the domestic schemes, namely, the fast settlement windows for Singapore Dollars (SGD), and Interbank Transaction Management Exchange (ITMX) settlement windows for THB ; and settlements, are done on a gross basis rather than netting between SGD and THB.

To facilitate these arrangements, the settlement banks chosen were DBS and Bangkok Bank (BBL) for SGD and THB settlements respectively, mandating participating banks to maintain an account with the corresponding settlement bank. This means that the participating Singaporean banks will maintain an account with the THB settlement bank and all Thai banks will maintain an account with the SGD settlement bank. All transaction fees applicable by the settlement bank were kept transparent and credit lines and interest rates remain on a commercial basis.

During the settlement window, scheme operators generate a settlement report, which is sent across to the settlement bank, which debits the respective accounts of the participating banks and settles with other banks in its jurisdiction. If a participating bank fails to settle their account with the settlement bank, the settlement bank maintains the right to escalate and trigger a suspension of the defaulting bank to help manage the system's credit risks.

Figure 13 outlines the settlement and sanction screening process for transfers from Thailand to Singapore. The flow from Singapore to Thailand is similar, in the reverse direction.

Figure 13: PPPN-Sanctions screening and settlement process



Some of the notable points to facilitate cross-border fund transfers through PPPN are outlined below:

- Standardisation of communication and data sharing to alleviate disparities in individual payment system protocols and development of fresh payment infrastructure:** The implementation of the PPPN requires defining shared standards for communication, messaging, and data sharing amongst participants in each market. The two countries' payment system operators (BCS and ITMX) developed a cross-border gateway with common criteria for messaging and data exchange. Both operators agreed on ISO 20022 as the cross-border messaging format. This allowed each jurisdiction to retain their existing domestic message formats, requiring conversion of local data fields to the common message format only for the cross-border transactions.
- Network connectivity:** BCS and ITMX finalised the network design, ensuring security, resiliency, and redundancy. The selection of telco service providers followed a collective agreement on evaluation criteria and methodology. Each country chose a telco, and both links were used jointly. Considerable efforts were made in setting up, testing, and validating VPN settings to meet both operators' security standards.
- Jurisdiction specific rules:** Due to the international and domestic aspects of the PPPN linkage, jurisdiction-specific rules were implemented. Some rules were available to all participants through the multi-party agreement, while others were incorporated by reference and accessible only to participants in a specific jurisdiction.
- Legal and regulatory issues:** Resolving key issues included addressing data protection, intellectual property, Anti-Money Laundering and Combating of Financing of Terrorism (AML and CFT) requirements, and dispute resolution. The fast nature of PPPN transfers necessitated specific AML and CFT risk mitigation measures, such as implementing caps on payment amounts per sender, developing real-time name screening modules, and creating new workflows to handle transfers associated with screening hits.

Our perspective

The proactive development of RTP systems in Southeast Asian nations, with a focus on both domestic and cross-border transactions, highlights a strategic approach to standardisation of regional payments infrastructure. The emphasis on multilateral FPS integration within the ASEAN countries is driven by essential factors, such as government support, central bank initiatives, and the growing influence of digital payments and e-commerce.

This case study offers valuable insights for countries aspiring to establish similar cross-border payment linkages. Addressing operational disparities, such as varying turnaround times and AML/CFT screening protocols stemming from diverse legal frameworks, underscores the need for a harmonised approach to compliance. The call to embrace flexible technical standards, adaptability to challenges, and collaborative efforts for evolving technologies reflects a forward-thinking mindset essential for sustainable cross-border payment systems.

The emphasis on extensive testing, comparable methodologies, and navigating complex legal agreements highlights the importance of meticulous preparation and risk management. The establishment of robust governance structures involving central bank officials and collaborative working groups emphasizes the intricate web of coordination required for successful implementation, making this case study a valuable guide for countries navigating the complex landscape of cross-border payments standardisation.

Case study 3: Emerging Real-time Payments interlinkage trends in the MENA and Europe

Europe: What is the Single Euro Payments Area Instant Credit Transfer (SCT Inst)?

The Single Euro Payments Area (SEPA)¹⁸ is an initiative launched by the European banking and payments industry to synchronize and simplify electronic payments within the EU, and several non-EU countries.

SEPA aims to:

- Create a single, integrated market for euro-denominated payments;
- Eliminate barriers on cross-border transactions, making them as seamless as domestic transactions; and
- Level the playing field across the eurozone for participating countries.

Implemented in 2017, the SEPA Instant Credit Transfer (SCT Inst)¹⁹ is a major step forward for payments in Europe, offering consumers and businesses faster, convenient, and secure payment options. The European Payments Council (EPC) developed the SCT Inst scheme in response to the recommendation of the European Retail Payment Board (ERPB) for a Europe-wide immediate payment scheme. Users can use SCT Inst through their online banking, mobile banking, or QR codes. Some banks also allow the use of SCT Inst at ATMs or branches.

SCT Inst payments are based on the ISO 20022 messaging standard, which facilitates the exchange of structured data between financial institutions. As a result, SCT Inst and other SEPA transfers support seamless cross-border transactions and ensure interoperability and data consistency in payments. SCT Inst enables payments in euros in ~10 seconds across 23 countries. This scheme is based on the existing SEPA Credit Transfer (SCT) scheme of the European Payments Council (EPC).

Africa: What is the Pan African Payment and Settlement System?

The Pan African Payment and Settlement System (PAPSS)²⁰ is a project of the African Continental Free Trade Agreement secretariat and Cairo-based Afreximbank. The African Continental Free Trade Area (AfCFTA) is a free trade area encompassing most of Africa. It was established in 2018 by the African Continental Free Trade Agreement, which has 43 parties and 11 signatories. The system aims to link African central banks, commercial banks, and FinTechs into a network that would enable quick and inexpensive transactions amongst any of the continent's 42 currencies. According to the Society for Worldwide Interbank Financial Telecommunication (SWIFT), as of 2017, only ~12 percent of intra-African payments were cleared within the continent. The rest were routed through overseas banks, mostly in Europe and North America. As a result, an African currency must first be exchanged for dollars, pounds, or euros and then swapped a second time for a different African currency.

PAPSS aims to solve such problems by settling transactions in local African currencies, obviating the need to convert them into dollars or euros before swapping them for another African currency. It aims to eliminate costly overseas intermediaries and complete transactions in less than two minutes.

Arab countries: What is Buna?

Owned by the Arab Monetary Fund and supported by Arab central banks, Buna²¹ is a centralised cross-border and multi-currency payment system. The Arab Monetary Fund is a Regional Arab Organisation, founded in 1976. The organisation started its operations in 1977 and includes 22 member countries, including Jordan, the United Arab Emirates, Bahrain, Tunisia, Algeria,

Djibouti, Saudi Arabia, Sudan, Syria, Somalia, Iraq, Oman, Palestine, Qatar, Kuwait, Lebanon, Libya, Egypt, Morocco, Mauritania, Yemen, and Comoros. Buna is operated by the Arab Regional Payments Clearing and Settlement Organization (ARPCSO), which is owned by the Arab Monetary Fund. It enables financial institutions and central banks in the Arab region to send and receive payments in either Arab currencies or other key international currencies, in a safe, cost-effective, risk-controlled, and transparent environment. Buna promotes cross-border payments in the Arab region and beyond by making cross-border payments less costly, faster, more transparent, and more accessible. It supports deeper economic integration within the Arab region and stronger commercial and investment ties between the Arab countries and their global trading partners²².

Our perspective

SEPA

The 2017 launch of SEPA Instant Credit Transfer (SCT Inst) marked a significant shift in the European payments landscape, showcasing strategic adoption of the ISO 20022 messaging standard to promote standardisation. This forward-thinking approach promoted seamless cross-border transactions and data consistency through a layered implementation, including scheme, clearing, and settlement layers. This established a robust infrastructure and allowed for agile development and market-driven innovation in end-user solutions, especially in mobile payments.

The SCT Inst scheme's adaptability to various use cases, defined transaction limits, and flexibility in negotiating execution times reflected a nuanced understanding of the dynamic payments landscape, providing a foundation for scalability. Its adherence to a single-currency cross-border payments system in euros, streamlined processes setting it apart as a unique model globally. The commitment to a 10-second maximum transfer duration underscored a dedication to efficiency and customer-centricity.

The SCT Inst scheme, with its layered architecture, standardised messaging, and flexibility, establishes a benchmark for modern payment systems, positioning Europe as a leader in the global push for real time, secure, and innovative financial transactions.

Our perspective (cont.)

Buna

Buna's versatility in supporting diverse financial activities, remittances, and interbank transfers across six currencies, positions it as a robust platform in the evolving financial landscape. The strategic alliances with key entities, such as NIPL (NPCI), PAPSS, and Raast (Pakistan's instant payment system) enhance interoperability and signify a commitment to a seamless and interconnected global financial ecosystem.

Buna has a strong focus on addressing cross-border payment inefficiencies through transparent APIs and by providing end-to-end tracking, payment confirmation, FX transaction handling, and fee insights, Buna empowers participants with the tools to enhance transparency and efficiency in their transactions.

The adoption of Three Lines of Defense model for risk management aligns with international best practices, ensuring a secure and resilient platform. Buna's commitment to redundancy with active primary and secondary data centres, achieving a two-hour recovery time objective, reflects a proactive approach to minimise disruptions and reinforce its reliability in the financial sector.

Our perspective (cont.)

PAPSS

The Pan-African Payment and Settlement System (PAPSS) is a groundbreaking advancement in cross-border payments within Africa. It accommodates both direct participants, such as banks with mandatory central bank settlement accounts and indirect participants, who can access liquidity through a direct relationship. This inclusive framework eliminates the need to convert payments into major international currencies before converting to an African currency, relieving account pressure, reducing forex liquidity demands, and fostering regional economic growth. By engaging directly or indirectly with PAPSS, banks enhance operational efficiency by cutting costs and by reducing liquidity requirements. This efficiency empowers African banks to allocate funds for additional services, fostering adaptability in the continent's financial ecosystem.

Moreover, PAPSS's adoption of real-time gross settlement systems for exchange rates establishes stability and fairness. Real-time benchmark reference rates set by PAPSS prevent arbitrage, instilling confidence in financial markets and positioning PAPSS as a catalyst for harmonising cross-border transactions in Africa. We would also highlight PAPSS's holistic impact, emphasising its role in cost reduction and efficiency gains, and its substantial contribution to broader economic development and the establishment of an equitable payment infrastructure across the continent.

Case study 4: The P27 Nordic payments initiative

What is P27 Nordic payments platform?

P27 Nordic²³ payments initiative was a collaborative project initiated in 2017 by six major Nordic banks, including Nordea, Danske Bank, Handelsbanken, OP Financial Group, SEB, and Swedbank to establish a common clearing platform for payments. The platform was envisioned to conduct domestic and cross-border payments in real time between Denmark, Sweden, and Finland to support three currencies, including Danish Krone (DKK), Euro, and Swedish Krona (SEK).

P27 acquired Sweden's proprietary payment clearing system, Bankgirot (BGC) to build a solid, Nordic clearance infrastructure. This acquisition was done, to ensure that all payments were cleared through a single system ensuring better compliance, streamlined operations, and ease of integration.

Where is P27 now?

P27 applied for a clearing license in 2019, but the application was rejected by the Swedish Financial Supervisory Authority. In 2022, P27 submitted a second application, but ultimately decided to withdraw it.

What factors led P27 to withdraw its clearing license request?

As stated in public domain, P27 Nordic payments faced several challenges and issues that contributed to the withdrawal²⁴. Some of these included the following²⁵:

- **Slow start:** P27 never received full commitment from Norway, which left a critical gap in the project. This delayed the achievement of a substantial user base.
- **Technology limitations:** P27 acquired Bankgirot, a Swedish A2A clearing house responsible for most of the payments being cleared in Sweden, including payments through SWISH, a widely used mobile payment platform. However, Bankgirot was using a technology stack which lacked critical aspects, such as lack of ISO20022 XML (Extensible Markup Language) support, which posed a challenge for P27's modernisation efforts
- **Conflicting interests of stakeholders:** The merger of Norway-based smartphone digital payments app Vipps and Denmark-based mobile payments app MobilePay in 2021 created a competing pan-Nordic infrastructure for A2A payments, which likely disrupted P27's plans. Danske Bank, a key participant in P27 was part owner of MobilePay and is thought to have played a major role in influencing the Danish banking sector's backing out from the P27 initiative
- **Regulations:** Sweden's existing legal framework was developed in the 1990s, well before the era of smartphones and widespread Internet banking. These regulations created additional challenges in adapting them to a modern platform, such as the P27 platform

What are the key learnings from P27 Nordic payments?

P27's highlights the challenges of large-scale collaboration, including conflicting priorities, importance of solid business case, and clearly articulated vision. Some of the learnings include the following:

- **Collaboration:** Establishing collaboration across geographies necessitates a shared vision, unwavering commitment, and strong stakeholder synergy for successful execution across participating institutions
- **Conflict of interest:** Conflicting priorities amongst participating stakeholders, can affect the success of such initiatives

- **Need for strong value proposition:** Initiatives that require collaboration from multiple stakeholders should focus on unmet needs, revenue models, and market research to ensure significant stakeholder investment. It is important to address common issues and build solutions that can fit local market needs, in case of diverse requirements. This was a challenge in the case of P27, which ultimately led to a lot of countries backing out from the initiative
- **Unrealistic aspirations:** Overly ambitious vision requiring substantial investments and infrastructure development can cause problems. It is always better to do a pilot launch and scale slowly to mitigate risks and failures along the way.

Our perspective

The P27 Nordic payments platform provides several valuable learnings, which are key to ensure the successful launch of payment systems. The case emphasizes the importance of gathering clear commitment from the payments system owners and key governmental stakeholders. Any multi-jurisdictional initiative requires complete dedication and alignment on vision and technology stack and has to be supported by conducive regulatory guidelines, with upfront commitment on the investments required in the infrastructure development.

Case study 5: BIS initiative - Project Nexus

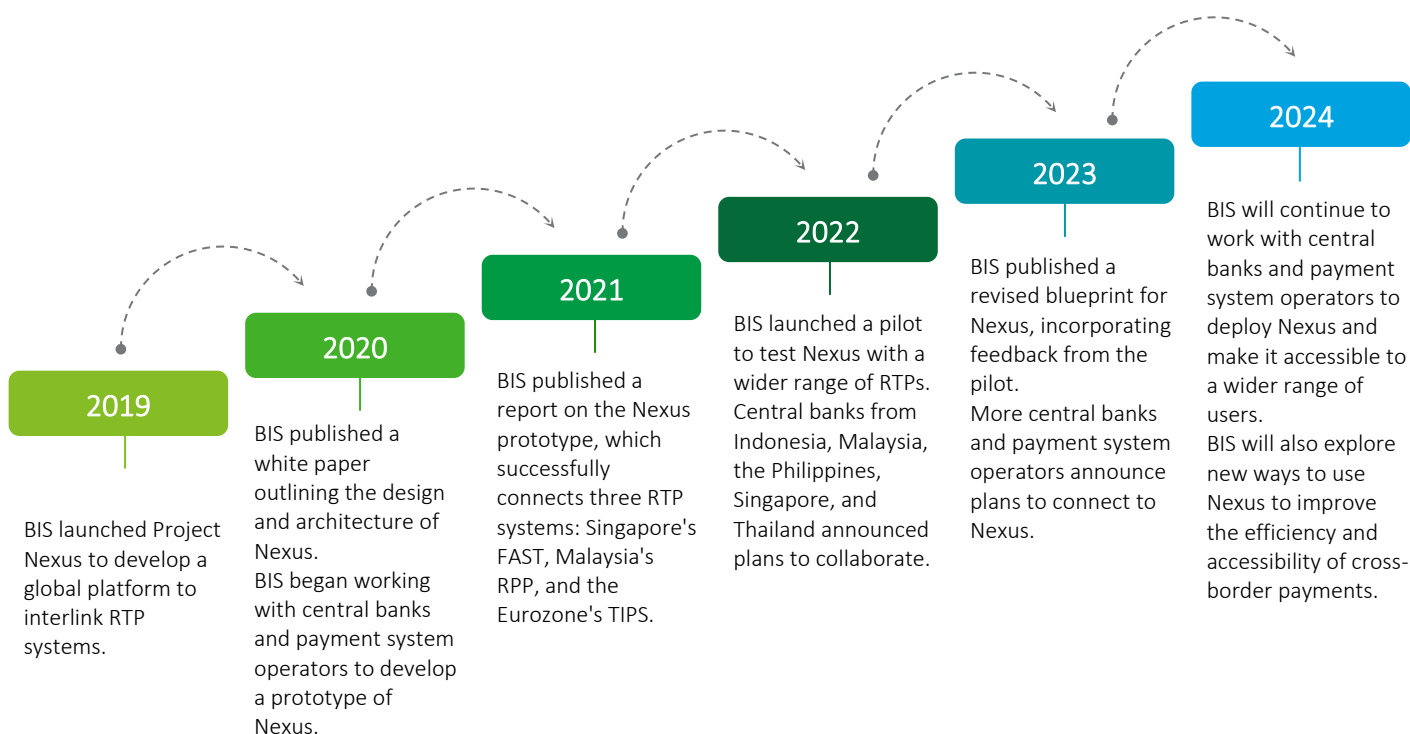
What is BIS-Nexus?

BIS-Nexus²⁶ is a project by the BIS Innovation Hub Singapore Centre (BISIHs). It aims to explore and propose a solution for improving cross-border payments by connecting Instant Payment Systems (IPS) across different countries.

Nexus's approach is to interlink multiple instant payment systems on a distributed network through a standardised and multilateral approach. It is aimed to facilitate cross-border proxy resolution, instant cross-border payments, and the management of foreign exchange quotes across multiple IPS. Nexus could significantly accelerate the growth of instant cross-border payments as it overcomes the limitations of bilateral interlinkage by standardising the way multiple IPS could connect with each other.

Where is BIS-Nexus and where is it going (Figure 14)?

Figure 14: BIS Nexus timeline



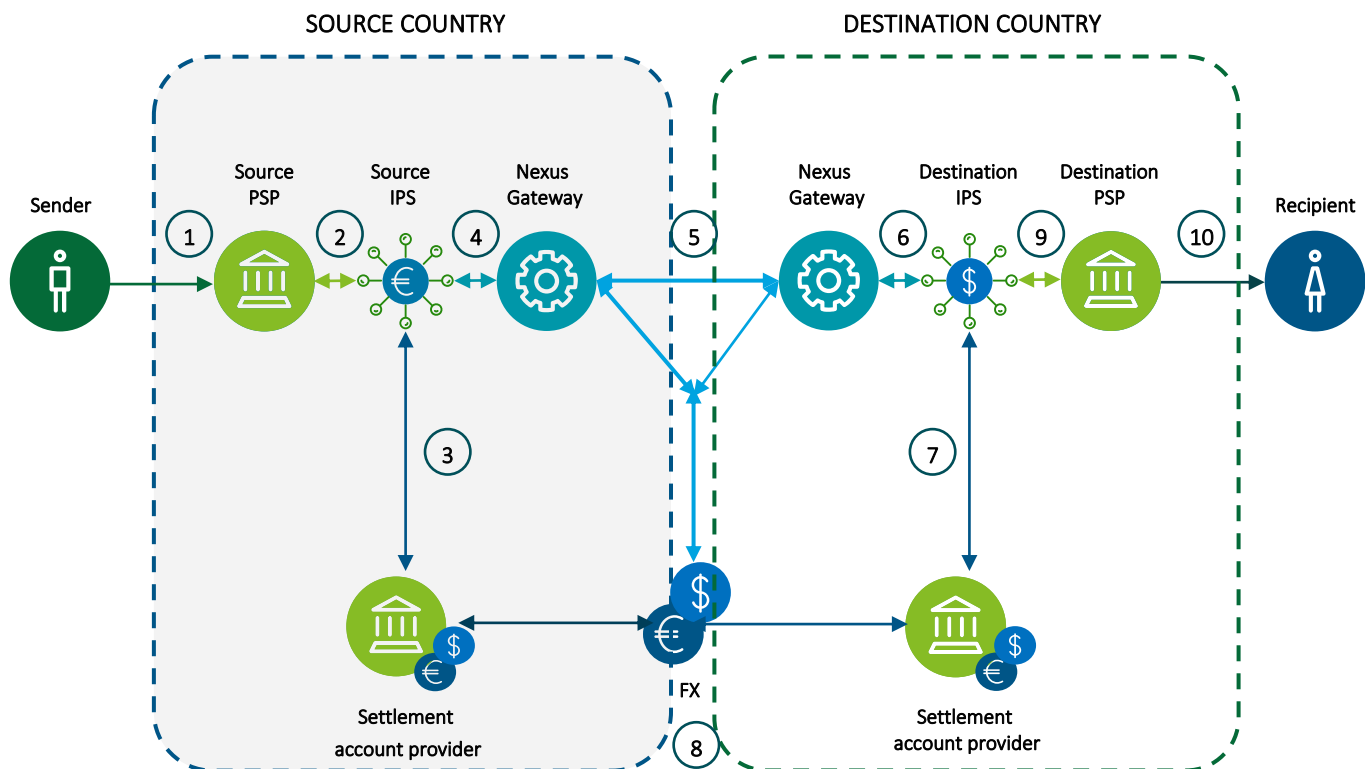
How does BIS - Nexus work?

BIS – Nexus works on a multilateral linking model which removes challenges around linkages and integrations. As per BIS, connecting 60 IPS via Nexus (multilateral linkages) would require 60 technical integration projects (one between each IPS and Nexus) as opposed to 1,770 bilateral linkages. This would reduce the effort required by more than 95 percent.

Nexus comprises of the following two primary components:

- The Nexus Scheme: which outlines the regulations and responsibilities governing the IPS, banks, and PSPs engaged in cross-border payments, referred to as 'Nexus payments.' This scheme aims to complement existing domestic IPS schemes, which typically do not cover cross-border transactions. It introduces the necessary modifications to facilitate cross-border payments with the least number of changes required.
- The Nexus Gateway: which serves as a software component that orchestrates various processes, including compliance, foreign exchange conversion, message translation, and the orderly execution of payments between participating countries.

Figure 15: Payments flow in BIS- Nexus



Source : <https://www.bis.org/about/bisih/topics/fmis/nexus.htm>

Process flow (Figure 15)

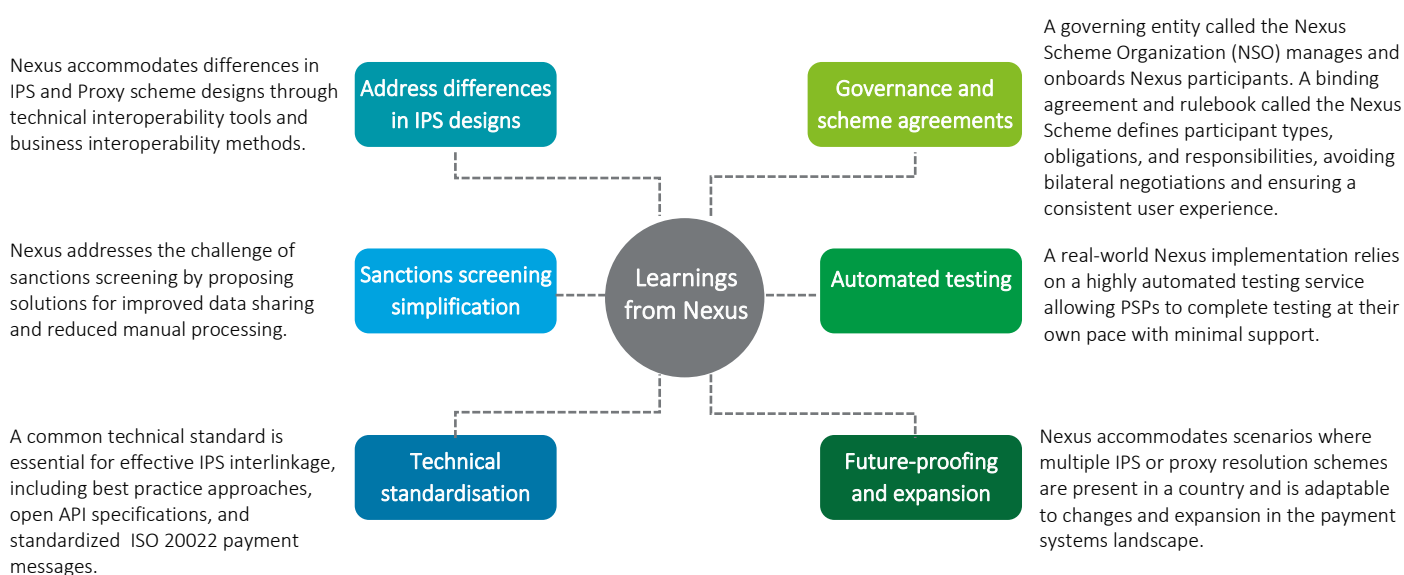
1. Once the sender initiates the payment, the source PSP with which their account is held begins its execution
2. The source PSP deducts the payment amount from the bank account and sends the payment instructions to the source IPS
3. The source IPS then transfers the payment amount to the FX provider's account
4. The source IPS also forwards the payment instructions to the source Nexus Gateway, which looks up the payment amount quoted and applies the respective currency conversion
5. The instruction is then forwarded to the destination Nexus gateway
6. The destination gateway forwards the payment instructions to the destination IPS
7. The destination IPS sends the payment instructions to the FX provider's settlement account provider for review
8. The Destination Settlement Account Provider checks whether the FXP has sufficient funds and then sends the payment instructions back to the Destination IPS as an instruction to make the payment to the Destination PSP
9. The Destination IPS forwards the payment instructions to the Destination PSP for their review and acceptance, after which the PSP sends a confirmation of acceptance back to the Destination IPS
10. The destination IPS then transfers from the FXP's account at the Destination Settlement Account Provider to the Destination PSP, which in turn credits the recipient

11. Finally, the Destination PSP sends a confirmation message (not shown), which flows back through Nexus to the Source PSP, who informs the sender about the payment completion

What are the learnings from BIS-Nexus?

The Nexus project aims to improve cross-border payments by providing a technical framework, scheme rulebook, and working software to facilitate the connection and interoperability of RTP systems. There are six key learnings to be drawn from the Nexus project's efforts to develop an effective and efficient system (figure 16):

Figure 16: Learnings from Nexus



Our perspective

By analysing the operational execution of the Nexus scheme, valuable insights emerge for the implementation of similar models. The proof of concept showcased technical feasibility and laid a robust foundation for future multilateral initiatives.

The provision of a detailed technical framework, including API specifications, ISO 20022 message guidelines, and business processes, serves as a valuable guide for connecting Instant Payment Systems (IPS). The Nexus scheme's scheme rulebook, addressing cross-border aspects and defining participant obligations, adds a layer of clarity and structure to the often-complex realm of cross-border payments.

The development of working software, built on open-source components, underscores a commitment to innovation, interoperability, and efficiency. The key lessons learnt, such as maintaining onus for conversion and establishing ISO 20022 guidelines for Nexus usage, showcase a nuanced approach to addressing technical challenges. Notably, the Nexus scheme's focus on securing funds before payment instructions and its flexibility in internal processing provide a strategic perspective on risk management and operational adaptability. In addition, its efforts to mitigate inconsistent regulatory requirements through design flexibility demonstrate a proactive stance in navigating complex regulatory landscapes, making the Nexus scheme a noteworthy case study for the evolution of cross-border payment systems.

Summary of Key learnings

#	Case study	Geography	Model	Key learnings
1	India's UPI going International	India and Singapore	Bilateral linkage	<ul style="list-style-type: none"> • Scalability & high performance: usage of a cloud-based network, allows highly efficient interlinkage. • Inclusive: Allowance of a non-banking entity to participate in the interconnection makes this linkage more inclusive in nature. • Simplification: This linkage has managed to automate the capital control rules for India, simplifying connectivity and serving as an example for other emerging economies to follow.
2	Emergence of RTP systems interlinkage in Southeast Asia	Southeast Asia	Bilateral linkage	<ul style="list-style-type: none"> • Flexibility: Technical standards were made flexible to ensure adaptability, promote collaboration, and facilitate the integration of evolving technologies. • Robust Testing: Extensive testing and comparable methodologies were critical in the identification of unanticipated issues, such as subtly different data-field norms, which led to transaction failure. • Novel multiparty structure: Allowed handling of legal issues such as governance, liability, and dispute resolution seamlessly.
3	i. Emerging RTP interlinkage trends in the MENA and Europe: SEPA	Europe	Multilateral linkage	<ul style="list-style-type: none"> • Standardisation: Adherence to a single-currency cross-border payments system in euros streamlined processes, setting it apart as a unique model globally. • Fair Competition: A layered implementation approach was adopted splitting the scheme layer and clearing and settlement layers to ensure delivery based on different layers belonging to the competitive and cooperative space. • Support for multiple use cases: The SCT Inst scheme's adaptability to various use cases, defined transaction limits, and flexibility in negotiating execution times reflected a nuanced understanding of the dynamic payments landscape, providing a foundation for scalability. • Efficient Operations: The commitment to a 10-second maximum transfer duration underscores dedication to efficiency and customer-centricity.
	ii. Emerging RTP interlinkage trends in the MENA and Europe: PAPSS	Africa	Multilateral linkage	<ul style="list-style-type: none"> • Cost optimization: the need for converting payments into major international currencies first was eliminated, reducing forex liquidity demands, and relieving account pressure. • Transparency: Real-time benchmark reference rates prevent arbitrage, instilling confidence in financial markets and positioning PAPSS as a catalyst for harmonising cross-border transactions in Africa.

	iii. Emerging RTP interlinkage trends in the MENA and Europe: Buna	MENA	Multilateral linkage	<ul style="list-style-type: none"> • Interoperability: Proactive collaboration, exemplified by MOUs with major payment system operators, such as NIPL and PAPSS, underscores the importance of fostering partnerships to achieve interoperability. • Effective Risk Management: Adopting the Three Lines of Defense Model in the risk management framework serves as a valuable lesson. It establishes a common risk culture and governance structure that ensures a comprehensive and effective approach to risk management across business, oversight functions, and internal audits.
4	P27 Nordic payments	Scandinavia (Europe)	Multilateral linkage	<ul style="list-style-type: none"> • Need for all-in commitment: Lack of clear and unwavering commitment from stakeholders, poor alliance, political misalignment of key participants, and conflicting interests majorly led to the initiative's failure. • Focus on modernization: Transformational initiatives, such as the P27 linkage necessitate the update of the supporting payment infrastructure, the lack of which leads to inevitable incompatibility.
5	BIS Initiative-Project Nexus	Asia	Multilateral linkage	<ul style="list-style-type: none"> • Value of proof of concept: Strategic proof of concept established a detailed technical framework, scheme rulebook, and functional software, forming a strong foundation. • Flexibility: Differences in internal processing of individual IPSs were allowed to remain, while the IPSs were mandated to ensure that funds were secure before payment instructions reached Nexus.

Key considerations for banks/financial institutions

What are the key considerations for interlinkage of Real-time Payments systems across the globe?

The global expansion of domestic RTP systems of various nations brings forth several key considerations that need careful attention. Some of the key considerations include the following:

1. Regulatory compliance

- a) Adherence to diverse regulatory frameworks across countries (local financial regulations, data protection laws, and other relevant guidelines) to ensure legal conformity in each jurisdiction.

2. Security and fraud prevention

- a) Build robust security measures to protect user data and financial transactions (for example, advanced encryption, authentication protocols, and fraud prevention mechanisms) to instill confidence amongst users and stakeholders.

3. Standardisation of protocols

- a) Standardise protocols across borders and establish common standards to facilitate smooth communication and transaction processing between the two payment systems to avoid any data loss during transmission

4. User education and awareness

- a) Educate users about the features and benefits and build awareness amongst users in both countries to foster widespread adoption.

5. Currency conversion and exchange rates

- a) Address currency conversion challenges and provide transparent exchange rate information.

6. User experience and localisation

- a) Tailor the user experience to local preferences and languages so that it resonates with the cultural and linguistic diversity of international user base.

7. Cross-border dispute resolution

- a) Establish effective mechanisms and policies for cross-border dispute resolution, clear protocols, and procedures to ensure fair and timely resolution for users involved in international transactions.

8. Data transmission and security

- a) Ensure the security of data in transit. Banks must employ robust encryption protocols to protect sensitive customer information and financial transactions.

9. Technology stack and use of APIs

- a) The chosen technology stack should be scalable to accommodate increasing transaction volumes and evolving business requirements. Banks should also adopt industry-standard API protocols for interoperability.

10. Seamless integration with other banking systems

- a) RTP systems must integrate seamlessly with a bank's banking infrastructure to ensure accurate and real-time updates to account balances and transaction records.

Key takeaways

The interlinkage of RTP schemes on a global scale signifies a collaborative effort amongst nations to streamline and enhance financial transactions. By bridging the gaps between domestic RTP systems, countries are working towards establishing a seamless and efficient framework for cross-border payments. The interconnected world of payments offers a plethora of benefits for both individuals and businesses. The benefits include better speed, enhanced accessibility, competitive rates, and increased financial inclusion. It can also strengthen global trade and build international ties, thus fostering overall economic growth.

Crafting a strategic roadmap is imperative for the future expansion of interlinked RTP schemes. Policymakers, financial institutions, and FinTech entities should collaborate to establish comprehensive frameworks that prioritise security, interoperability, and direct connections between payment systems. The continued pursuit of such initiatives is crucial for fostering a globally connected and efficient financial landscape.

How can Deloitte help?



01

Assist with definition of business case, use cases, customer journeys, process flows for cross-border linkage of RTP rails.



02

Support in identifying and enabling partnerships with correspondent banks, technology vendors, etc. to support the payments operations



03

Support in integration with various RTP players, such as NPCI in India and translation of payments messages.



04

Support in designing and implementing the infrastructure to enable cross-border RTP.



05

Testing services to test successful integration with the destination RTP system.

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