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Powering Payments: The Role of Technology in ASEAN's Regional Payment Connectivity Initiative

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Powering Payments: The Role of Technology in ASEAN's Regional Payment Connectivity Initiative

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Abstract

Technological innovation has played a pivotal role in enhancing regional payment connectivity. Specifically, technological advancements in cross-border transaction system have improved operational efficiency, while enhancing security, transparency, and trust across diverse financial networks. These developments have been central to the establishment of the ASEAN RPC, paving the way for greater financial inclusion and economic development in the region. Although regulatory and governance hurdles remain, they can be addressed through coordinated efforts that integrate sound policy framework and innovative technology.

This study examines the role of technological advancements in driving the progress and recent expansion of the RPC. It focuses on key initiatives underpinning its development and benchmarks them against similar cross-border payment initiatives worldwide. Through this comparative analysis, the study highlights both the strengths and limitations of innovative technologies in addressing existing challenges, improving payment systems and identifying potential areas for further enhancement. The study also aims to provide recommendations to strengthen and refine the RPC moving forward.

JEL classification: F15, F36, G21, L86, O33

Keywords: ASEAN Regional Payment Connectivity; Cross-border payments; Fast Payment Systems; Financial integration; ISO 20022; API; Financial inclusion; Real-Time Gross Settlement

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Abbreviations

ADB	Asian Development Bank
AEC	ASEAN Economic Community
AI	Artificial Intelligence
AFAQ	Arabian Gulf System for Financial Automated Quick Payment Transfer
AML	Anti-Money Laundering
AMRO	ASEAN+3 Macroeconomic Research Office
API	Application Programming Interface
ARPCSO	Arab Regional Payments Clearing and Settlement Organization
ASEAN	Association of Southeast Asian Nations
BAC	Business Advisory Council
BIS	Bank for International Settlements
BISIH	BIS Innovation Hub
BoK	Bank of Korea
BoT	Bank of Thailand
BSP	Bangko Sentral ng Pilipinas
BNM	Bank Negara Malaysia
CBDC	Central Bank Digital Currency
CDD	Customer Due Diligence
CMIM	Chiang Mai Initiative Multilateralization
CPMI	Committee on Payments and Market Infrastructures
DLT	Distributed Ledger Technology
DEFA	Digital Economy Framework Agreement
ECB	European Central Bank
EU	European Union
FATF	Financial Action Task Force
FPS	Fast Payment System
FSB	Financial Stability Board
FX	Foreign Exchange
GCC	Gulf Cooperation Council
IBAN	International Bank Account Number
ICT	Information and Communications Technology
ISO	International Organization for Standardization
ITA	International Trade Administration
KYC	Know Your Customer
MAS	Monetary Authority of Singapore
ML	Machine Learning
MoU	Memorandum of Understanding
MSME	Micro, Small, and Medium Enterprise

PAPSS	Pan-African Payment and Settlement System
PPP	Public-Private Partnership
QR	Quick Response (code)
RBI	Reserve Bank of India
RBA	Reserve Bank of Australia
RPC	Regional Payment Connectivity
RTGS	Real-Time Gross Settlement
SARB	South African Reserve Bank
SECMCA	Central American Monetary Council

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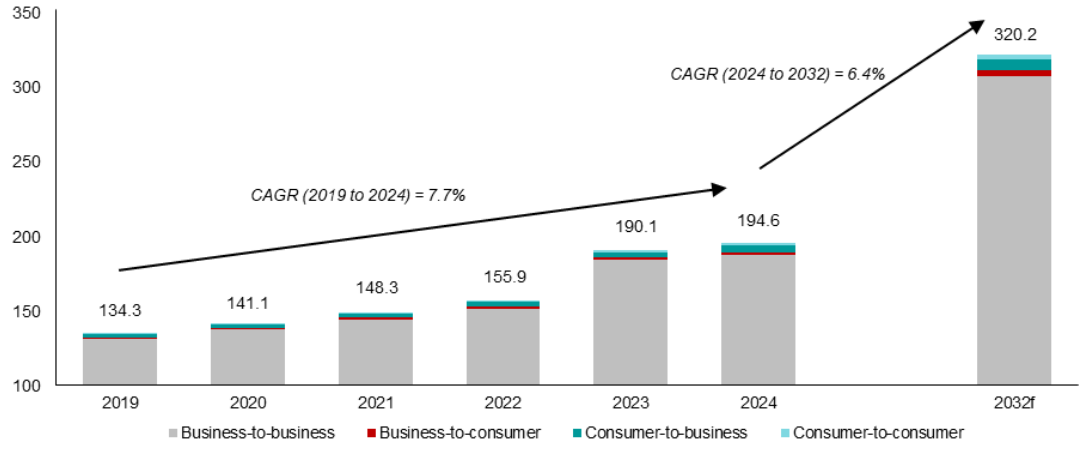
I. Introduction

1. The global payments landscape has changed significantly over the past decade due to technological advancements. Cross-border payments have historically been processed through a chain of correspondent banks for wholesale payments and through closed-loop systems (i.e. a single platform connecting both the payee and the payer) for retail payments. These led to long transaction chains, fragmented and truncated payments data, high capital costs and weak competition causing high costs, low speed, limited access, and insufficient transparency (BIS 2022). The advent of new technology (such as APIs and cloud computing) and messaging standards have provided a solution to these long-standing issues by facilitating the interoperability of various payment systems. As a result, technology has been an enabler for a significant rise in cross-border payments across the world (Figure 1).

Figure 1. Global Market Size and Growth in Cross-border Payments (In USD trillion)



Sources: Ernst & Young LLP 2024; FXC Intelligence 2025.
Note: Business-to-business segment includes wholesale payments. CAGR = compound annual growth rate. f = forecast

2. While the rise has been enabled by technological innovations, the public sector—comprising central banks, regulatory authorities, and international organizations, has played a vital role in driving progress. These entities are collaborating to harmonize regulatory frameworks, develop cross-border payment infrastructure, and implement robust data protection laws. Key global initiatives include the G20's cross border payments roadmap (FSB 2024), the Financial Action Task Force (FATF) guidelines for anti-money laundering and combat the financing of terrorism (AML/CFT) compliance (FATF 2017), and ISO 20022 adoption by various country authorities. The authorities and international bodies have strengthened AML/CFT regulations and their enforcement to ensure integrity of transactions. Several authorities have promoted innovation, development, and interoperability in payment systems, mostly in conjunction with the private sector. Various bilateral and multilateral initiatives, such as ASEAN's Regional Payment Connectivity (RPC), have also played a vital role in reflecting the commitment and encouraging cross-border payment linkages.

3. ASEAN's RPC initiative represents a significant step toward formalizing the region's commitment to enhancing the intra-region payment network. This paper aims to take stock of the developments, compare it with other similar payment initiatives, and identify potential areas for further enhancement. The paper is structured as follows. Section II provides an overview and key development milestones of the ASEAN RPC. Section III discusses the role of technology in enabling cross-border payment connectivity, not only in ASEAN RPC but also other such initiatives across the world. Section IV examines and compares the policy objectives and structures of various payment connectivity initiatives across the world while Section V lists the challenges in enabling the connectivity and mechanisms employed to achieve integration. Section VI concludes with discussing policy considerations and the way forward for the ASEAN RPC.

II. Overview of ASEAN Regional Payment Connectivity

4. In November 2022, ASEAN-5 member states—namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand—signed the Memorandum of Understanding (MoU) on Cooperation on Regional Payment Connectivity (RPC) at the sidelines of the G20 Leaders' Summit in Bali. This landmark initiative aims to strengthen bilateral and multilateral payment connectivity to promote faster, cheaper, more transparent, more inclusive cross-border payments in the region. Since its inception, the initiative has expanded to include Vietnam (25 August 2023), Brunei (29 February 2024), Lao PDR (3 April 2024) and Cambodia (8 April 2025), bringing the total number of ASEAN participants to nine.[3] Payment linkages are being developed with non-ASEAN economies, such as Hong Kong, India, and Japan.[4] [5]

5. The RPC aligned with the objectives set out by ASEAN and G20 targets on payment connectivity. The initiative aims to strengthen and enhance cooperation on payment connectivity through the development of faster, cheaper, more transparent, and more inclusive cross-border payments which aligns with the shared vision for greater regional economic integration, including payment and settlement systems, under the ASEAN Economic Community Blueprint (AEC) 2025. The initiative is also in line with Indonesia's 2022 G20 Presidency priority agenda in digital transformation and supports the targets set at the global G20 Roadmap for Enhancing Cross-Border Payments.

6. The initiative aims to modernize payments infrastructure while strengthening intra-region economic ties. Built on the ASEAN Payments Policy Framework for Cross-Border Real Time Retail Payments Within the ASEAN Region, the RPC cooperation encompasses several modalities, including Quick response (QR) code-based and real-time cross-border payments. According to various central bank press releases (BNM 2022, BOL 2024, BOT 2022, and MAS 2023), the goal of the RPC is to modernize payments infrastructure and make inter-country transactions more seamless, convenient, and

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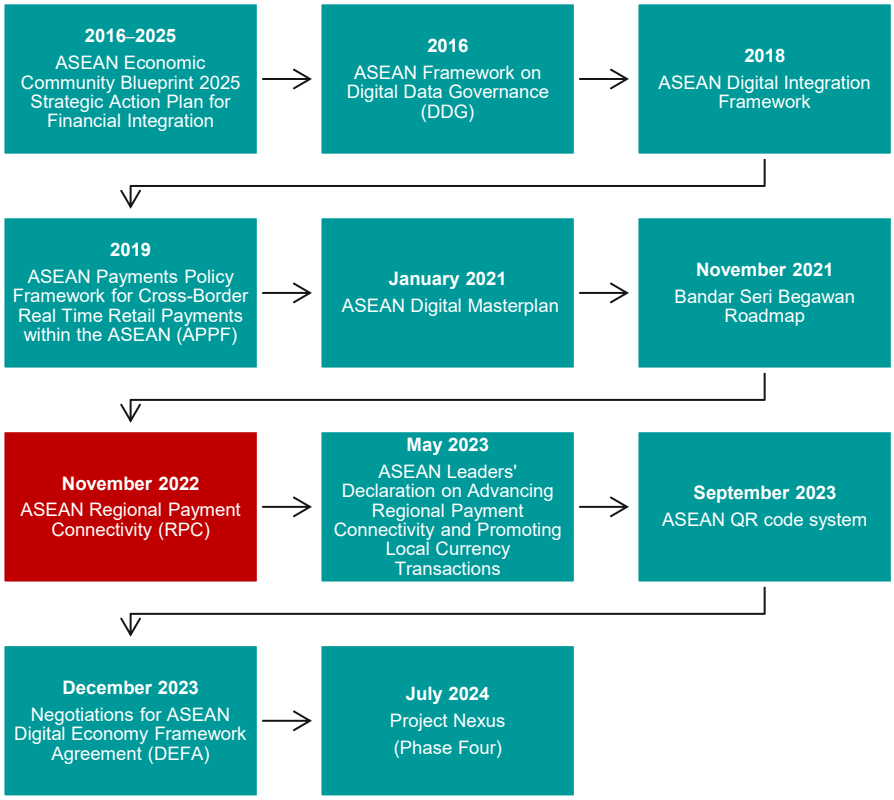
[3] For brevity, "Brunei Darussalam" is referred to as "Brunei" in the text.
[4] For brevity, "Hong Kong, China" is referred to as "Hong Kong" in the text.
[5] On 4 December 2023, the Hong Kong Monetary Authority (HKMA) and the Bank of Thailand (BOT) launched the FPS x PromptPay Link to enable cross-border QR code payment interoperability between Hong Kong and Thailand. Singapore successfully linked its PayNow system with India's Unified Payments Interface (UPI) on 21 February 2023 while the South Asian nation officially joined Project Nexus in June 2024 to enhance its cross-border payment capabilities with the ASEAN region. Meanwhile, Japan's Ministry of Economy, Trade and Industry (METI) has announced that the country would implement cross-border QR code payment interoperability with ASEAN by 2025.

affordable, allowing individuals and businesses, particularly micro, small and medium enterprises (MSMEs), to conduct transactions across the ASEAN region with ease, hence promoting trade, investment, remittances and people mobility. In parallel, authorities are working to harmonize and standardize payment systems across the region, in particular the use of proxy identifiers and the adoption of ISO 20022.[6] Furthermore, the RPC compliments ongoing efforts to promote the use of local currency for cross-border settlement in the region. With this, the RPC has been further enhanced as an additional avenue for deepening financial integration through promoting local currency usage.

Figure 2. ASEAN: Timeline of Initiatives on Cross-Border Digital Payment Connectivity



Source: AMRO staff compilation.
Note: The timeline refers to the initiation or launch dates of the respective initiatives.

7. Prior to the launch of the RPC, ASEAN had already undertaken several foundational efforts to strengthen digital payment connectivity (Figure 2). These include the ASEAN Economic Community (AEC) 2025 Strategic Action Plan for Financial Integration (2016–2025) which focused on liberalizing banking, insurance, and capital markets. The ASEAN Framework on Digital Data Governance in 2018 advanced previous efforts on data protection framework and a guidance on cross-border data flows, taking into accounts varying level of development and readiness across member states (TELMIN 2012). To harness the potential of digital integration in boosting the regional economy and competitiveness, ASEAN members have developed various frameworks, including the

[6] According to its official definition, ISO 20022 is a single standardization approach (methodology, process, repository) to be used by all financial standards initiatives. Also see Box 2 for more information.

ASEAN Digital Integration Framework (ASEAN 2018) to identify priority areas for deliberate policy actions and the ASEAN Payments Policy Framework for Cross-Border Real Time Retail Payments within the ASEAN Region (ASEAN 2019) to provide specific guiding principles for the implementation of cross-border, instant retail payments and promote interoperability between the payment rails.

8. ASEAN's shift toward digitalization accelerated significantly during the COVID-19 pandemic, as digital technology became vital for maintaining the continuity of education, business, industry, and government amid lockdowns and restrictions. In response, the region adopted the ASEAN Digital Masterplan 2025 in January 2021, followed by the Bandar Seri Begawan Roadmap in October 2021—both aimed at deepening digital transformation and supporting regional economic recovery (ASEAN Secretariat 2021a and 2021b). These foundational initiatives paved the way for the development of the Digital Economy Framework Agreement (DEFA) (ASEAN Secretariat 2023a). A comprehensive study was commissioned in 2023 to gather private sector perspectives and support the formulation the DEFA's roadmap (ASEAN Secretariat 2023b). The aim of the agreement is to forge stronger digital ties among members and to enable businesses to capitalize on the exponential growth in ASEAN's digital economy. According to the study, the digital economy is projected to expand from approximately USD300 billion in 2023 to USD1 trillion by 2030 through natural adoption of digital technologies but progressive rules in DEFA could accelerate the growth and expand the digital economy further to almost USD2 trillion by 2030. In this regard, the provision of more efficient and more inclusive payment channels under the RPC complements the goals of DEFA. Negotiations on DEFA[7] between ASEAN member states began in September 2023, with a target to conclude agreements by the end of 2025.

9. At the same time, the vision of having an ASEAN Interoperable QR code payment standard remains intact, especially with many bilateral cross-border QR code payment linkages being launched in the last few years. To date, the payment system of seven ASEAN economies, namely Cambodia, Indonesia, Lao PDR, Malaysia, Singapore, Thailand and Vietnam, have been connected through these bilateral QR payment linkages as well as linking fast payment systems (Figure 3). These initiatives will lower transaction costs and minimize foreign exchange risks, aligning the objectives of the RPC (Lukiman and others 2023).

[7] The DEFA negotiations are based on nine elements under four objectives. The elements and objectives include 1) facilitating "digital trade" with electronic documents and interoperable processes; 2) creating efficient cross-border e-commerce (both under the objective of accelerating growth); 3) promoting digital payments and electronic invoicing; 4) developing mutually recognizable and interoperable digital identity and electronic authentication framework (both under the objective of driving interoperability across ASEAN); 5) protect data privacy while facilitating cross-border data flow; 6) improve cooperation in cybersecurity and comprehensive protection to parties (both under the objective of ensuring responsible digital growth); 7) establishing mechanisms for regulatory cooperation; 8) facilitate digital talent mobility; 9) create a transparent competitive environment with better choice for consumers (all three under the objective of strengthening cooperation between nations).

Figure 3. ASEAN+3: Selected Cross-border Payment Linkages, Stylized

Economies	Project/ Network name	Launch Date
Japan–Thailand	MyPromptQR at merchants in Japan	December 2018
Cambodia–Thailand	Thai QR–KHQR	February 2020
Thailand–Vietnam	Thai QR–VietQR	March 2021
Singapore–Thailand	PromptPay–PayNow	April 2021
Malaysia–Thailand	DuitNow QR–Thai QR	June 2021
Indonesia–Thailand	Thai QR–QRIS	August 2021
Singapore–Thailand	NETS (QR)–Thai QR	September 2021
Indonesia–Malaysia	QRIS–DuitNow (QR)	January 2022
Malaysia–Singapore	DuitNow (QR)–NETS (QR)	March 2023
Cambodia–Lao PDR	KHQR–LAOQR	August 2023
Indonesia–Singapore	QRIS–NETS (QR)	November 2023
Malaysia–Singapore	DuitNow–PayNow	November 2023
Cambodia–Vietnam	KHQR–VietQR	December 2023
Hong Kong–Thailand	FPS QR–Thai QR	December 2023
Thailand–Lao PDR	Thai QR–LAOQR	April 2024
Cambodia–Korea	Jeonbuk Bank payment via KHQR in Cambodia	September 2024
Cambodia–Malaysia	DuitNow - KHQR	September 2024
Cambodia–Private Network*	KHQR–12 international payment users via AliPay+*	October 2024
Cambodia–Vietnam	KHQR/Bakong–VietQR	October 2024
Lao PDR–Vietnam	Cross-border payment using Lao QR code	January 2025

Source: AMRO staff compilations.

Note: The boundaries and any other information shown on the map do not imply, on the part of AMRO, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries. Cross-border payment linkages enable efficient and real-time cross-border fund transfers, usually in small amounts, among participating members. The table aims to list selected linkages and is not exhaustive. Other planned initiatives are the cross-border payment linkages between the Philippines and Singapore, and between Cambodia and Thailand. There is a wide range of FinTech products of varying scales connecting e-wallet platforms across economies that are not listed.

* Cambodia—AliPay+ linkage allows users to make cross-border QR payments to vendors using KHQR from their partner digital wallets in China, Hong Kong (China), Malaysia, the Philippines, Korea, and Singapore, as well as in Mongolia, Macao (China), and Italy.

10. The developments of the RPC have attracted interest by International Organizations as well as countries outside the ASEAN. Based on the success of bilateral payment linkages by ASEAN economies, such as PromptPay-PayNow (PPPN), the Bank for International Settlements Innovation Hub (BISIH) initiated Project Nexus, which explored the possibility transforming connectivity model from bilateral to multilateral (BISIH 2021). Since its inception in 2022, the BISIH has worked with the regulators from Indonesia, Malaysia, the Philippines, Singapore, Thailand, and India (BISIH and others 2024a) (Box 1). The project also gathered insights from international experience and has scaled up to include more global participation. For example, the Eurosystem's TARGET Instant Payment Settlement (TIPS) system was included in the project's proof-of-concept in 2022 (BISIH and others 2024a) and the European Central Bank also announced its intention to join as a special observer in Nexus, further expanding the project's reach.

Box 1. Multilateral Cross-border Payment Linkage: Project Nexus

Although bilateral connections between domestic fast payment systems (FPS) have demonstrated the potential to enable near-instant cross-border transfers, scaling such arrangements becomes significantly complex as more countries are involved. Each additional connection requires extensive legal, technical, and operational negotiations, creating a costly and unsustainable model for broader regional or global interoperability. This high cost also discourages the development of linkages to smaller economies.

To tackle this challenge, central banks and international organizations have explored multilateral approaches. One prominent initiative is Project Nexus, a hub-and-spoke platform designed to connect multiple FPS through a single hub, thereby simplifying and accelerating cross-border payments across jurisdictions. Project Nexus was initiated by the Bank for International Settlements Innovation Hub (BISIH) with a coalition of central banks and payment authorities. The concept was first explored in 2021 by the BISIH in collaboration with the Monetary Authority of Singapore (MAS) and the National Payments Corporation of India (2021). In 2022, a working prototype was established to connect the test systems between Europe's TIPS, Malaysia's Real-time Retail Payments Platform, and Singapore's Fast and Secure Transfers systems (BISIH 2023). A comprehensive blueprint of the project was completed in July 2024, outlining the governance, scheme, and oversight arrangements, business and revenue model, as well as Nexus' technology architecture and operational model. Subsequently, in March 2025, central banks from Malaysia, the Philippines, Thailand, Singapore, and India have formally established a multilateral not-for-profit organization, Nexus Global Payments, to manage the development and operations of Nexus.

Project Nexus works by establishing a hub-and-spoke multilateral network connector, or Nexus Gateway. The Nexus Gateway is an infrastructure that manages cross-border communication between domestic FPS and coordinates the processing of Nexus payments between countries. This model reduces the need for bespoke bilateral connections by allowing each system to connect once to the hub rather than multiple times to other systems. The system also leverages the domestic proxy directories of the FPS operators (which, for example, maps phone numbers to bank accounts across jurisdictions) through a lookup service to facilitate cross-border fund transfers. It also prescribes a harmonized set of rules and standards for message formats and foreign exchange provider connections to establish the connections. In addition, by lowering the participation barrier, Nexus allows new economies to join the platform without disrupting existing links, and the model is being developed to be interoperable with other cross-border initiatives.

As regional economies continue to embrace digital financial infrastructure, initiatives like Nexus exemplify the potential of collaborative innovation in achieving the G20's targets for faster, cheaper, more inclusive, and transparent cross-border payments.

III. Technological Enablers in Cross-border Payment Connectivity Initiatives

11. Around the world, regional payment initiatives share some common objectives, include enhancing payment efficiency, reducing costs, and supporting economic and financial integration. By leveraging technological advancements and multilateral collaboration, these initiatives provide a regional alternative to correspondent banking networks, facilitating faster, cheaper, and more transparent payments (Table 1). They also seek to strengthen the use of local currencies and promote financial inclusion. These initiatives were developed by enhancing existing systems or by establishing new regional connectivity infrastructure. Nonetheless, all initiatives seek interoperability and connectivity between payment systems of different countries.

12. Multiple successful regional and global payment initiatives have leveraged various technological advancements and standardizations. These include TIPS in Europe, the Pan-African Payment and Settlement System in Africa, the Arabian Gulf System for Financial Automated Quick Payment Transfer of the Gulf Cooperation Council, the Interconnected System of Payments in Central America (SIP), and various bilateral linkages (both within and outside ASEAN) between domestic payment systems. A common thread across these initiatives is the employment of one or more innovative technologies, such as real-time gross settlement (RTGS), fast payment systems (FPS), Application Programming Interface (API), and Cloud Computing. The deployment of international standards—particularly the ISO 20022—has played a crucial role in enabling system compatibility and message harmonization (Box 2). Intensified global policy directives towards financial digitalization also played a catalytic role in the technological adoption of cross-border payment initiatives.

Box 2. The Adoption of ISO 20022

Cross-border payment data was historically exchanged via SWIFT message type (MT) messaging standard; however, it lacked interoperability with domestic payment systems, which varied across economies, causing delays and adding operational challenges. Indeed, the Group of Twenty (G20)[1] has identified that differences in messaging standards between the domestic payment systems and cross-border payments as a major friction in improving cross-border payments (FSB 2022). The SWIFT MT standard, which was formatted according to ISO 15022, also does not support the exchange of necessary information, such as compliance reporting or end-to-end payment transparency, adversely affecting automation efforts.

ISO 20022, introduced in the mid-2000s and expected to fully replace ISO 15022, is an international standard for electronic data exchange between financial institutions. The standard offers a common framework for developing financial messages using a structured, XML-based syntax that enhances interoperability and data richness. For example, ISO 20022 can include up to 940 data elements for a customer credit transfer message,[2] while ISO 15022 messages for customer credit transfers includes around 23 fields (Parmar 2023 and iotafinance.com). By improving data richness, ISO 20022 improves interoperability, automation, compliance, and fraud detection. Its adoption increases the speed, transparency, and efficiency of the payments. SWIFT acknowledged the benefits of ISO 20022 and started migration in March 2023, with a coexistence phase until November 2025.

[1/] G20 comprises 19 major advanced and emerging economies, the African Union and the European Union. The member economies are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, Saudi Arabia, South Africa, Türkiye, the United Kingdom, and the United States.

[2/] See ISO 20022 Message Definitions for a full list of available data fields

13. The developments in real-time payment systems enable the establishment of regional payment connectivity. The two most common systems are the RTGS and FPS. RTGS systems process and settle high-value transactions instantly on a per-transaction basis, reducing settlement risks and enhancing liquidity management. FPS, unlike RTGS, target high-volume, low-value instant or near-instant transactions, fostering financial inclusion and economic participation. Both systems can be linked between economies to facilitate multilateral cross-border payments (Table 1). The Committee on Payments and Market Infrastructures (CPMI) (BIS 2022) suggested four thematic interlinking models (Figure 4):

- **Single Access Point Model:** Participants in one domestic payment system access a foreign system through a single entity that directly participates in the foreign system.
- **Bilateral Link Model:** Participants in a domestic system can directly reach all participants in a foreign system via a bilateral link, eliminating the need for a single gateway entity.
- **Hub and Spoke Model:** Multiple payment systems (the spokes) connect to a common intermediary (the hub), facilitating transactions among them.
- **Common Platform Model:** Participants from different jurisdictions interact on a single, integrated technical platform, allowing direct cross-border transactions.

14. At the same time, the development of APIs has played a critical role in enabling the integration of multilateral payment systems. An API is a software application that establish machine-to-machine linkages between systems at financial institutions. They facilitate seamless data exchange, system interoperability, and real-time transactions between infrastructure at banks, FinTechs, and other financial institutions.[8] A survey by the CPMI (BIS 2024b) showed that 93 percent of FPS and 65 percent of RTGS systems have been using or have plans to use API within the next five years.

15. However, APIs developed by different participants may lack a general standardization, making them incompatible. Between economies, API development is subjected to different jurisdictions and regulations, resulting in different formats. Similarly, differences in the industries, i.e. financial institutions vis-à-vis nonbank financial institutions or FinTechs, different business use cases, or competition between market participants may also result in fragmented designs of API.[9] This fragmentation of API technical standards hinders their potential in cross-border payments. Since 2023, the Financial Stability Board

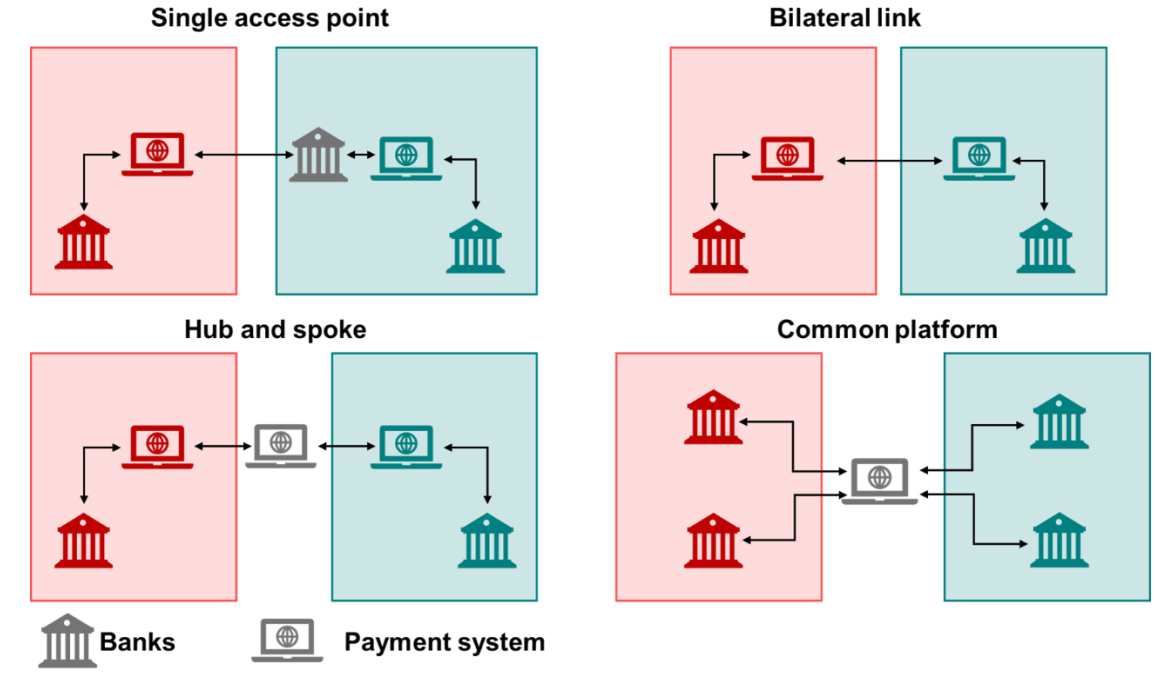
[8] An API provides a means for a software application to exchange data with other applications. In the context of cross-border payments, an API at a bank at a certain economy will allow another bank at a different economy to request and exchange information directly between the two applications. Once established, an API can be programmed to run automatically or to be embedded into a larger application serving the users. An API can also carry various security protocols and standards while limiting itself to a pre-determined data to both ensure the legitimacy of the sender as well contain the scope of the API. Because of that, APIs enable seamless and secure communication between banks, payment service providers, and FinTech platforms, which ultimately enable the possibility of real-time automation.

[9] A more detailed discussion regarding API development in financial institution can be found in BIS (2024b) and FSB (2023).

(FSB) has recommended for the harmonization of APIs for enhancing cross-border payments (FSB 2023).

16. Successful multilateral payment initiatives would need to address the challenges of API fragmentation. Regional cross-border payment initiatives have used APIs to link domestic payment systems across different jurisdictions—in bilateral linkage model—or create a standardized API framework for participants—in the hub-and-spoke and common platform models—ensuring seamless and real-time transactions despite regulatory and technical differences. For example, Singapore and India have utilized APIs to connect national fast payment systems, India's Unified Payments Interface (UPI), and Singapore's PayNow, enabling near real-time transfers between the two fast payment systems (BIS 2022). Similarly, PAPSS in Africa has integrated APIs to build connection with individual African central banks to support cross-border multi-currency transactions and allow financial institutions to process payments directly in local currencies without relying on correspondent banks (ITA 2022 and PAPSS).

Figure 4. Graphical Representation of Thematic Interlinking Model



Source: Adapted from BIS (2022)

Table 1. A Brief Summary of Selected Cross-border Payment Connectivity Initiatives

Initiative — Region (Year Established)	Interlinking Model	Description	Key Objectives	Enabling Systems and Focus	Connectivity Technology and Messaging Standard
ASEAN Regional Payment Connectivity (RPC) – ASEAN (2022)	Bilateral Link Model (with considerations for other modalities underway)	Within the RPC, bilateral payment linkages between national fast payment systems, such as PromptPay-PayNow, PromptPay-DuitNow, facilitating real-time cross-border payments using QR codes and instant payment networks.	• Promotes faster, cheaper, more transparent, and more inclusive cross-border payments • Widens financial inclusion, especially for MSMEs • Encourages the use of local currencies for cross-border transactions	• FPS linkages, QR cross-border payment linkages • Retail payments	• Multiple bilateral linkages with API capabilities • ISO 20022 (migration in progress)
TARGET Instant Payment Settlement (TIPS) – Eurozone (2018)*	Common Platform Model	TIPS is a pan-European instant payment system operated by the ECB, providing a single infrastructure that connects banks across the Eurozone for real-time settlements in central bank money, targeting retail payments.	• Enables payment service providers to offer fund transfers to their customers in real time using euro and Swedish kronor • Ensure the whole of Europe enjoys instant payment services	• FPS • Retail payments	• SWIFT messaging and SIA connection, with API capabilities • ISO 20022
T2 – Eurozone (upgraded from TARGET2, launched in 2007) **(2023)**	Common Platform Model	T2 is the RTGS system for the Eurozone, handling high-value transactions and interbank settlements in central bank money within a unified infrastructure.	• Supports the implementation of the Eurosystem's monetary policy and the functioning of the euro money market • Minimizes systemic risk in the payments market • Ensures the efficient processing of payments in euro	• RTGS • Wholesale payments	
Pan-African Payment and Settlement System (PAPSS) – Africa (2022)	Hub and Spoke Model	PAPSS serves as a centralized infrastructure that interconnects African central banks and financial institutions, streamlining intra-African transactions using local currencies.	• Enables the efficient flow of money securely across African borders, minimizing risk and contributing to financial integration across the regions • Enhances intra-African trade by reducing reliance on foreign currencies, lowering transaction costs	• FPS and RTGS • Retail & Wholesale payments	• Private network with API capabilities • ISO 20022

Initiative — Region (Year Established)	Interlinking Model	Description	Key Objectives	Enabling Systems and Focus	Connectivity Technology and Messaging Standard
BUNA - Arab Regional Payment System – Middle East and North Africa (2020)	Common Platform Model	BUNA, operated by the Arab Monetary Fund, provides a unified cross-border payment platform for Arab countries and beyond, enabling real-time settlement in multiple currencies.	• Empowers Arab economies • Streamlines trade and relationships of the Arab countries with major partners • Facilitates financial inclusion and regional integration • Promote cross-border payments and making as efficient as domestic ones • Promotes usage of regional currencies • Strengthens compliance standards	• FPS and RTGS • Retail & Wholesale payments, Cross-border payments	• SWIFT messaging, API capabilities • ISO 20022
Arabian Gulf System for Financial Automated Quick (AFAQ) Payment Transfer RTGS – Gulf Cooperation Council (2016)	Common Platform Model	The AFAQ initiative interlinks GCC countries' RTGS systems, enabling high-value and cross-border transactions within the region, leveraging central bank infrastructure.	• Executes financial transactions in GCC local currencies on a real-time basis, with low fees, and within a safe, secure, and stable ecosystem	• RTGS • Wholesale payments	• Private network messaging with API capabilities • ISO 20022
Interconnected System of Payments (SIP) – Central America (2014)*	Hub and Spoke Model	SIP operates as a regional settlement hub for cross-border transactions between participating countries through SWIFT messaging.	• Promotes modernization of national payment systems • Contributes to the elimination of restrictions on cross border payments • Materializes the treaty on payment and settlement systems of Central America and Dominican Republic • Gives greater access to cross-border payment services • Compliments other regional initiatives regarding trade.	• RTGS • Wholesale payments	• SWIFT-based • ISO 20022 (planned adoption) (SECMCA 2022)

Sources: ASEAN Secretariat; TIPS; TARGET2; PAPSS; World Economic Forum; BUNA; Gulf Payments; Icon Solutions; and AMRO staff compilation.
Note: The table provides a summary of activities that have been completed as part of the initiative. Activities that are ongoing or planned for the future are not included.
Transaction values available for payment connections include TARGET Instant Payment Settlement (TIPS): USD 615 trillion in 2023 (ECB 2024); Pan-African Payment and Settlement System (PAPSS): USD 1 trillion in 2023 (Ecofin Agency 2024); and Interconnected System of Payments (SIP): USD 360 million in 2024 (Martinez 2025). According to estimates, USD 1.14 trillion of transactions were reported in the ASEAN's bilateral linkages (Twimbit 2025).

17. The adoption of ISO 20022 by institutions can offer a common standard for designing API for cross-border payments, promote interoperability of regional payment systems, and enable more efficient cross-border payments. By offering a consistent format for exchanging data and transaction information between financial systems, the standard fosters interoperability between different institutions and economies. In a study by the CPMI (BIS 2024c), 80 percent of the surveyed FPS and 88 percent of RTGS systems are expected to process ISO 20022 messages in the near future. Ten economies of the ASEAN region has also implemented the ISO 20022 to their FPS and all central banks of the region have either already adopted or are in process of adopting and implementing the standard to their RTGS systems (ABO 2023) (Table 2). By standardizing the information and form of data used across institutions, the ISO 20022 provides a standard for developers to ensure API interoperability, realising the full potential of digital connection.

Table 2. ASEAN: The Status of Implementing ISO 20022

Economy	RTGS	FPS
Brunei	Y	NA
Cambodia	Y	Y
Indonesia	E*	Y
Lao PDR	Y	NA
Malaysia	Y	Y
Myanmar	Y	NA
Philippines	Y	Y
Singapore	Y	Y
Thailand	Y	Y
Vietnam	E**	NA

Sources: Asian Bond Online (2023); JICA and others (2018); and AMRO staff updates and compilation.
Note: As of February 2025. Y = ISO 20022 implemented; NA = not applicable or missing data; E = expected; RTGS = real-time gross settlement; FPS = fast payment systems.
* The RTGS system of Indonesia is expected to implement in 2027.
** Banks in Vietnam have been implementing ISO 20022 independently, but the standard has not been implemented systemwide.

18.

19. The scalability and interoperability of cross-border payment systems can further benefit by the adoption of cloud computing. Cloud computing enables the delivery of computing services, such as servers, databases, networking, and analytics, using remote servers, allowing financial institutions to process transactions, manage payment gateways, and store financial data efficiently with minimal infrastructure set up. These features provide valuable opportunities for cross-border payment systems to support real-time transaction processing at reduced operational costs, enhanced system interoperability and scalability. Indeed, cloud computing has been used by financial institutions to enhance their operations and was used by BCS Financial Group to enable real-time cross-border payments between Singapore and India (Ping 2023).

20. In a cross-border payment system where transactions are being made seamlessly and almost instantly, additional technological solutions are needed to ensure compliance with AML/CFT and national regulations. Indeed, as cross-border

transactions can be made near-real time, risks of payments being finalized before necessary compliance checks are completed emerge. As a solution, functioning regional connectivity initiatives implement real-time user screening to ensure compliance of these transactions, as used in the PPPN and UPI-PayNow systems (Baker McKenzie, MAS, and BoT 2022 and BIS 2022), apart from merely setting a cap to transaction. The system also needs to devise additional workflow to reject and manage the transactions in the event of a screening hit.

21. The increasing digitalization of cross-border payment systems and their payment data have opened new possibilities for advanced analytics using artificial intelligence (AI) and machine learning (ML). These technologies enable financial institutions to process large volumes of structured and unstructured data, facilitating real-time fraud detection, compliance monitoring, and risk assessment. For instance, AI and ML can identify anomalous transaction patterns indicative of fraudulent activities, thereby strengthening the security of cross-border payment systems (BCBS 2024). Moreover, the integration of AI/ML tools can improve the efficiency of payment processing by automating routine tasks and enabling predictive analytics for liquidity management. However, the adoption of these technologies also introduces challenges, including model risk, data bias, or new sources of cyber risk—attackers can use AI for fraudulent activities or submit corrupted data to misguide the AI (BIS 2024a). The implementation of AI/ML in cross-border payment systems requires careful consideration and robust oversight mechanisms.

22. Another transformative innovation is proxy mapping technology, which plays a vital role in making cross-border payments more accessible and inclusive. The use of proxy identifiers—also known as aliases—allows customers to replace technical bank details, such as the international bank account numbers (IBANs), with more familiar information, such as phone numbers, email addresses, and national identification numbers. Proxy identifiers help eliminate the need to share complex account information in cross-border payment, streamlining the payment process and significantly reducing the likelihood of errors and fraud. Proxy identifiers are managed in proxy data bases by the payment system operators, who also carry out necessary Know Your Customer (KYC) and AML/CFT checks, authenticity verification, and data storage. Recognizing the benefits of intuitive and user-friendly payment processes, regional payment initiatives across Europe, the Arab region, and ASEAN have widely adopted alias layers to enhance retail payment adoption. However, implementing alias systems across borders requires alignment in system design, such as differences in proxy lookup and proxy storage protocols, while also ensuring consumer protection through robust privacy safeguards and dispute resolution mechanisms, as discussed in the PPPN system (Baker McKenzie, MAS, and BoT 2022).

IV. Comparison of Various Payment Initiatives Across the World

23. Most payment interlinkages in emerging economies aim to promote more inclusive cross-border payments for the users. While the ASEAN RPC does not have an explicit set of objectives, it is understood from various central bank press releases of participating members that the initiative seeks to promote more inclusive cross-border payments for users, particularly for MSMEs (Table 1). The ADB estimated that such businesses accounted for 98.7 percent of total establishments in Asia. Additionally, MSMEs contribute 64.6 percent to employment, 38.3 percent to regional GDP, and 15.1 percent to

exports in 2023 (ADB 2024). The importance of MSMEs underscores the need to expand essential financial services to the sector, enabling them to scale effectively and promote financial access and inclusion. In other emerging markets apart from the ASEAN economies, the mission to enhance financial inclusion through digital payment connectivity leverages on mobile and internet networks to bring small businesses online and enable access to financial services digitally.

24. Modernizing cross-border connectivity also enables cost-efficient and faster payments between users. By linking individual country payment systems with regional counterparts, it reduces the hassle for users to switch systems and currencies, while facilitating real-time, secure transactions at low costs. Indeed, payment linkages such as the PPPN reduced the transaction time from days to seconds, with significantly lower fees (Baker McKenzie, MAS, and BoT 2022). This reduction in friction eases the flow of money for businesses and consumers, who have traditionally faced higher costs when dealing with cross-border transactions and remittances. Indeed, one of the objectives for the RPC and other payment initiatives is to enhance efficiency in payments and transfers to strengthen intra-regional economic activities such as the transfer of remittances, trade transactions, and tourism.

25. Another common objective for payment initiatives is to promote the use of local currencies for payment settlements within a region. During the 42nd ASEAN Summit in 2023, leaders advocated for increased use of domestic currencies, which are linked to individual fast payment systems, to facilitate transactions through the ASEAN RPC. This aligns with the ASEAN Guideline on Local Currency Settlement Cooperation Framework (LCSF), which aims to promote local currency settlements, lower business costs, and reduce the reliance on the US dollar. Table 1 highlights that, in addition to the ASEAN, payment systems such as TIPS, PAPSS, and BUNA share a similar objective in enhancing the use of a common or local currency, or the currency of a regional counterpart, through digital payment connectivity.

26. Payment integrations outside of ASEAN include other objectives for idiosyncratic reasons and are enabled by the structures of the integrations. Most other integrations are for wholesale payments, which allows them to cater to objectives other than those of the ASEAN RPC. One objective of the eurozone's T2 network is supporting monetary policy and the functioning of money markets. According to the European Central Bank (ECB), T2 offers various features for efficient liquidity management, such as payment priorities, timed transactions, and liquidity reservation facilities. These tools help banks manage liquidity effectively, thus supporting the smooth functioning of money markets. T2 also helps to minimize systemic risk in the payments market by reducing the possibility of a single actor causing market collapse, thereby helping maintain financial stability. In the Middle East and North African region, the BUNA empowers the regional economies through improved financial infrastructure, while simultaneously strengthening compliance standards across the region. BUNA's infrastructure is built on microservices-based architecture with flexible APIs, allowing easy integration and real-time connectivity and supporting innovation in financial services (Ping 2024). According to BUNA, the system also operates under the framework of the Arab Regional Payments Clearing and Settlement Organization (ARPCSO), ensuring regulatory oversight and adherence to international principles for

financial market infrastructures. Through the RPC, ASEAN participants also implicitly strive to meet some of these objectives by strengthening economic integration among member states and enhancing compliance frameworks including those for AML/CFT and ISO 20022 messaging standardization (MAS 2023). However, many objectives such as supporting monetary policy and money markets, efficient liquidity management, and providing improved and integrated financial infrastructure would need more cooperation amongst ASEAN participants.

27. While the various payment initiatives share similar objectives, we find that the structures of these initiatives and the underlying infrastructure are very diverse. The structural differences are an outcome of the circumstances of each region, existing infrastructure, and policy priorities of the relevant authorities. So far, ASEAN RPC is the only initiative with a sole focus on retail payments (Table 1). While this may change over time, many other retail payment initiatives have been built over an existing wholesale payment infrastructure or have been developed with such infrastructure. This unique feature of the RPC emerges from the strong linkages between the economies on the level of consumers and small businesses. The retail payments requirements from tourists, migrant workers, and MSMEs are significant, and the payment linkages help address the pain points of cost and speed of transfers.

28. The RPC is not centrally managed and, so far, relies on efforts of individual countries to establish and manage the payment linkages. In contrast, other payment initiatives, such as the PAPSS (through a centrally managed common, digital market infrastructure), TIPS (operated and overseen by the Eurosystem)[10], BUNA (operated by Arab Regional Payments Clearing and Settlement Organization, a subsidiary of Arab Monetary Fund), and SIP (managed by an institutional manager), are centrally managed. A centrally managed system can help oversee, standardize and harmonize various aspects of the payment initiatives, such as registration of participating institutions, control of operations, reporting, risk management, messaging, and dispute resolution. In this regard, a centrally managed system could be important for an integrated payment system of the ASEAN region.

29. The underlying agreements between the participating countries play an important role in the integration of payment systems. The ASEAN RPC is based on a MoU which encourages the integration of payment systems. In contrast, many other initiatives are driven by stricter mandates. For example, the BUNA was created due to a decision by the Council of Governors of the Arab Central Banks and Monetary Authorities to establish a cross-border, multi-currency payment system. The PAPSS is a flagship initiative of African Continental Free Trade Area, which aims to create a single market for goods and services. The SIP was established and operated under a legal framework established by the treaty on payment and securities settlement in Central America and Dominical Republic. The presence of a clear and consistent legal framework and cross-country agreements expedite the development of the payment integrations. On the other hand, the absence of hard

[10] The Eurosystem consists of the European Central Bank (ECB) and the national central banks of the eurozone countries. The ECB acts as the central operator of TIPS and is responsible for the initial setup, daily operations and overall governance of TIPS.

commitments could still allow for the development of integration organically i.e., driven by use cases and demand.

V. Challenges for the RPC in Integrating Payment Systems

30. For the RPC and the larger ASEAN+3 region, the prevalence of bilateral linkages poses a challenge to future growth and scalability. As of April 2025, eight ASEAN member economies had established bilateral connections from the national FPS with at least one other member economies via QR-payment linkages and fast payment linkages, along with private-led linkages between economies in the larger ASEAN+3 region. However, the establishment of bilateral linkages between economies requires substantial resources to harmonize the infrastructure, operational arrangements, and regulatory policies. The significant effort in setting up the bilateral linkages can be an obstacle in scaling up the payment initiatives. To put the numbers in perspective, if links are set up between each pair of RPC members, there would be 45 bilateral links. As shown in Figure 3, over the past six years, only thirteen bilateral links have been established between these members with Thailand leading the way with six bilateral links while Brunei and the Philippines yet to have an operational payment link with any of the ASEAN members.

31. The domestic focus of the payment systems is the primary reason for the difficulties in establishing the linkages. Typically, the national payment systems, including the FPS, are initially set up with a primary focus on domestic usage. In this context, the systems are optimized to suit the existing organizational arrangements, technological infrastructure, and laws and regulations in that country. While authorities involved in the development of these payment systems are aware of global standards and strive to adhere to them, the design of the system is weaved into available technologies and existing legal frameworks. This makes the systems across countries heterogeneous, making them difficult to integrate.

32. Broadly, integration issues can be divided into technical, regulatory, and governance issues.

- Technical issues include issues related to differences in standards and formats used for APIs, data, and messaging. For example, different data standards and formats can lead to fragmentation and truncated data leading to increased processing time and costs (BIS 2022). Similarly, the unique identification of customers can be done using different tokens in different jurisdictions. Some of these tokens include phone numbers, national identity or registration numbers, virtual payment address (VPA), and others.

- Regulatory issues are a consequence of different laws and regulations across jurisdictions. Data sharing, privacy and storage regulations, divergent implementation of AML/CFT laws, and different settlement finalities are a few examples of these differences. Notably, the divergent implementation of AML/CFT laws is a critical difference as countries could have different levels of FATF-compliant systems, inconsistent risk assessments (e.g., different thresholds for transaction monitoring), and differences in risk scoring for real time transaction monitoring.

- Governance issues arise from agreements, rules and operational aspects. For instance, differences in the requirements for participating institutions may restrict the payment service providers to only those who satisfy the criteria for both jurisdictions. The systems may have differences in service level agreements (SLAs) such as the maximum time in which the transfer happens. Dispute resolution protocols and loss-sharing also form an important source of disparity.

33. The integration issues are resolved using a combination of technological solutions and streamlining of processes. The integration of payment systems requires harmonization of technologies, regulations, and governance standards. However, as noted earlier, most payment systems have been designed and optimized to cater to domestic use cases. The cross-border integrations are considered only after the system is operational domestically. Therefore, changing these standards for the purpose of integration could have significant implications for the domestic use of the payment system. Therefore, authorities have refrained from introducing large scale changes to their payment systems to facilitate integration. Based on inputs received from authorities, the integrations require the authorities to work closely and find solutions which are mutually agreeable while respecting the laws and regulations of each other's jurisdictions. These include the use of technological solutions, process streamlining, and agreements on standards for the integration.

- Technological solutions can be innovatively used to bridge data and compliance related issues. These solutions include data masking (to address privacy concerns), standardization of data and messaging formats, automating compliance checks, and real-time monitoring of suspicious transactions. In the PPPN linkage between Singapore and Thailand, new modules were developed to enable real-time name screening to ensure compliance with AML/CFT requirements in the fast cross-border payment system and address differences in system design (Baker McKenzie, MAS, and BoT 2022).

- Process streamlining makes sure that the regulatory standards on either jurisdiction are met while improving efficiency, reducing costs and increasing transparency. Streamlining the processes help enable straight-through processing i.e. automated processing of payments from initiation to completion without manual intervention (BIS 2020).

- Standards related to service delivery include agreements on processing and settlement timelines, error and exception handling, and dispute resolution. In this regard, the standards for the payment integrations need to be defined in consultation with the stakeholders. These may include adhering to international technical standards, establishing minimum data requirements, and agreeing on various service level descriptions such as aliases, data formats, payment limits, timeouts and rules for dispute resolution.

VI. Policy Discussion and the Way Forward

34. As discussed in the previous section, integrating cross-border payment systems poses significant regulatory challenges. The cross-border payments transcend

a wide range of laws and regulations. These include, but are not limited to, data and privacy protection, AML/CFT, KYC, licensing and authorization of payment service providers, consumer protection, currency conversion and capital flow management, cross-border taxation policies, settlement finality and cybersecurity. Different countries may have different sets of laws and regulations, or in some cases, there could be an absence of laws and regulations. The differences in organizational structures of regulatory bodies in each country can add to the complexity of integration.

35. While many jurisdictions share common regulatory frameworks – variations in implementation create practical barriers to harmonization. The FSB has identified regulatory misalignment as a key impediment to seamless payment integration, as it increases costs, delays transactions, and limits interoperability between national payment infrastructures (FSB 2024). For instance, data protection and privacy laws across countries can vary, and may have different practices for data sharing and storage. As cross-border transactions involve data from a minimum of two different countries and hence need a common ground for implementing these laws to cross-border transactions. Similarly, the extent of customer due diligence for KYC/AML requirements can be different across jurisdictions and the inconsistencies may cause delays or rejection in the payments.

36. Achieving harmonization is an inherently a gradual process, but can be accelerated through advancements in technology and cooperation. Though the primary focus of payment systems is to cater to the needs of the domestic economy, the authorities must adhere to international standards to the extent possible while designing the payments systems. As demonstrated by ASEAN members, diverse payment systems can be integrated using technological solutions and deeper cooperation between participating countries. However, the integration has been time and resource intensive. Therefore, it is important to adhere to international standards while designing new payments systems. Existing payment systems can be gradually aligned to these norms to ease future integration, while minimizing disruptions to the existing users.

37. Economies may also choose to implement a common international standard or engage bilaterally to facilitate integration. International best practices can be implemented for issues such as KYC/AML, to make sure that the practices are standardized. The recommendations provided by FATF provides global standards for AML/CFT, especially the requirement of including complete originator and beneficiary information, which helps detect the transfers by criminals and terrorists. The FATF also recommends sharing financial intelligence and taking collaborative actions to trace and curb money laundering and terrorist financing. APEC's Financial Regulators Training Initiative is one such program which aims to align KYC/AML in the region. The payment integrations may also consider BIS/CPMI best practices for SLAs to standardize service delivery. The APEC Framework also lists various considerations and risk management objectives for cross-border payments and remittances (APEC 2022). On the technological front, the differences in system design across systems can make any API adaptation difficult and suboptimal for broader expansion, requiring the need for API standardization. The adoption and implementation of ISO 20022 standards will ease the integration and scalability of the RPC. However, issues such as tax compliance may require much deeper cooperation between relevant authorities and the solution may include tax treaties and common reporting standards.

38. Multilateral collaboration can offer an effective solution to regional cross-border payment. The high costs of establishing bilateral connections not only hinder the scalability of regional payment connectivity but also pose challenges for smaller economies as low transactions volume results in lower incentives. Therefore, majority of payment initiatives worldwide focus on a centralized approach, either with a common platform model or with a hub-and-spoke model. In these models, economies can connect to the rest by establishing one single connection to or integration with the central system. These initiatives also encourage the standardization of payment standard at each economy and promote best practices.

39. A centralized hub-and-spoke model can offer a scalability solution for the RPC and could be the way forward. Initiatives such as Project Nexus by BISIH explore direct linkages between domestic FPS networks, allowing real-time transactions across borders without significant infrastructure overhauls. Instead of establishing multiple bilateral linkages between economies, an economy can instead connect to the Nexus system to gain access to all members. This is achieved by setting common API standards, ensuring compliance with ISO20022 messaging standards, setting up gateways to convert domestic payment formats to a common structure, setting up a rulebook which defines roles, responsibilities and operational rules for the participants, and establishing a governing body to oversee compliance, onboarding, and standardization. The governing body was set up in November 2024 by the BSP, BNM, BoT, MAS, and RBI and is known as the Nexus Global Payments (Nexus Global Payments).

40. Beyond the core technological innovations, emerging technologies are being considered for the development and enhancement of regional payment initiatives. For instance, distributed ledger technology (DLT) is being explored for their potential to improve transparency, security, and efficiency in cross-border transactions, with some central banks looking into the potential role of Central Bank Digital Currencies (CBDCs) in cross-border interoperability. While not yet materialized in regional payment systems, cross-border CBDC initiatives such as Project Dunbar or mBridge showcase the technology's potential for instant, low-cost international transfers (Box 3). Another initiative, the Mandala project, between the BISIH, RBA, BoK, BNM, and MAS (2024), explored the possibility of streamlining cross-border payment compliance in a digital payment system. The project created a prototype that integrated compliance into machine-readable code to enable automation, resulting in faster compliance check. However, this innovation can only adapt quantifiable and configurable measures and require a highly digitalized payment system. Private institutions also used the DLT technology to develop private stablecoins or private DLT-based infrastructure to facilitate cross-border transactions, although the usage is limited to certain customers (Partior 2021, Gosh 2023, and SCB 2024).

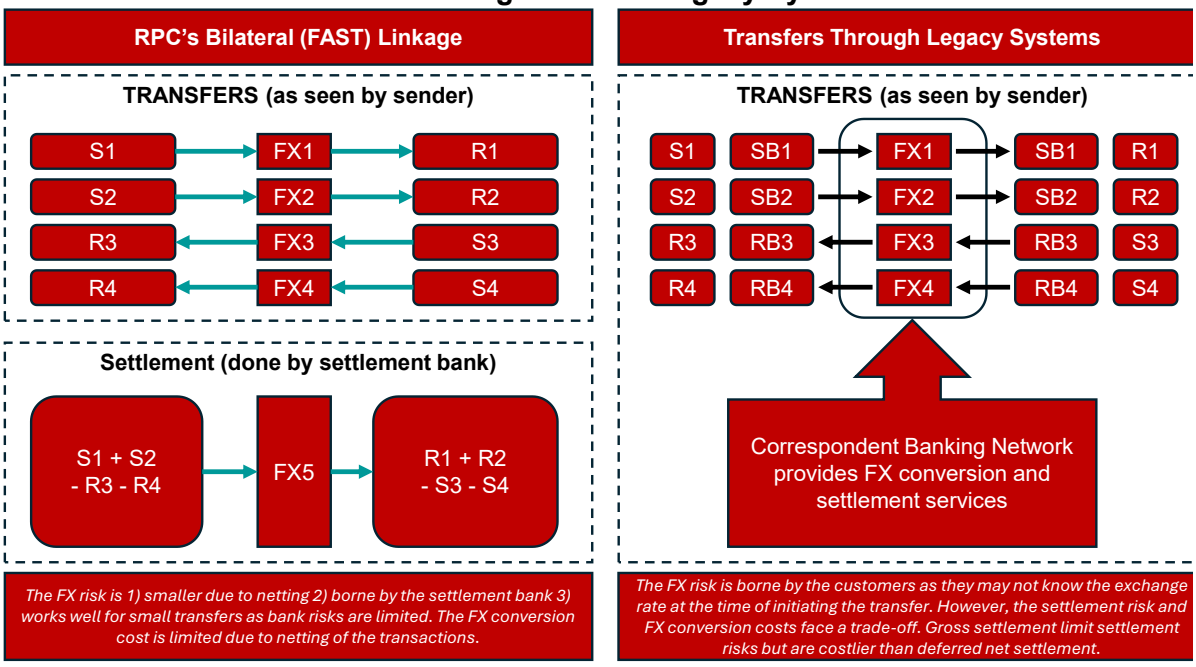
41. As technology evolves and regulations are standardized, the scope of the ASEAN RPC can be enhanced further. The ASEAN RPC primarily focuses on cross-border retail payment solutions. This aligns well with the objective of the authorities to provide an efficient cross-border payment solution to individuals and businesses, including the MSMEs. However, as the regional integration deepens, the focus will likely broaden to integrate wholesale payment solutions, such as RTGS, in the region. This integration will help generate high value transactions and further reduce the costs associated with cross-

border transactions. The integration of wholesale payment infrastructure can also provide a significant boost to local currency usage.

42. However, the risks posed by cross-border payment integrations warrant a cautious approach towards integrating wholesale payments in ASEAN+3. The larger transaction amounts involved in wholesale payments would need tighter risk management, stronger due diligence, compatible implementations of AML/CFT protocols and if applicable, effective capital flow monitoring and management measures. The expansion to wholesale payments will also need a higher level of consistency in fraud detection mechanisms and dispute resolution procedures. Cross-border connections facilitating large amounts of payments can also pose a risk from a capital flows perspective. The speed and ease of the transfers can make the capital flows more volatile and in extreme situations, may cause liquidity stress for institutions. These cross-border transfers depend on a chain of participants working seamlessly together, but the system is only as strong as its weakest link. Cybersecurity lapses, platform outages, data security breaches, and process failures at any participant could compromise the integrity of payment systems on either side of the linkage. While these risks also exist in retail payment integrations, the systemic risk is lower due to the regulated transaction sizes, and in many cases, the limited number of participating organizations.

43. The extent of financial market integration will also be a key determinant of the RPC expanding to wholesale payments. The existing payment linkages are bilateral and open for retail transactions with limits on the transaction size which limits the market risks faced by the participating banks. The participating banks accumulate and net-off the positions, before settling them at pre-determined times. Smaller transaction amounts and the netting of transactions make sure that the exchange rate risks carried by banks remain low (Figure 5). However, expansion to wholesale payments may facilitate the flow of large amounts through the linkage. This will require banks to have access to liquidity facilities or backstops in local currencies on either side, availability of hedging instruments and sufficient volumes to develop the relevant infrastructure for direct trading between local currencies on a larger scale (AMRO 2023). This calls for a significant development and integration of regional financial markets.

Figure 5. A Simplistic Representation of Settlement and FX Conversions in RPC's Bilateral Linkages versus Legacy Systems



Source: AMRO staff visualization.
Note: S = Sender, R = Receiver, SB = Sending bank, RB = Receiving bank, FX = Foreign exchange rate.

Box 3. Distributed Ledger Technology in Cross-Border Payment in the ASEAN+3

Distributed Ledger Technology (DLT) is a decentralized digital system that records transactions across multiple nodes (computers) in a secure, transparent, and tamper-resistant manner. Unlike centralized databases, where a single entity, such as a central server, controls data, DLT distributed the ledger among all participants in the network and synchronize the update with a pre-determined consensus process. This method allows the network to run without a centralized authority to manage while ensuring trust and security. Blockchain, the technology behinds cryptocurrencies such as Bitcoin, is a popular example of DLT.

For cross-border payments, DLT has the potential to reduce the needs for intermediaries, reducing delays and fees by allowing direct peer-to-peer settlements. DLT also supports multi-currency interoperability, making it easier to integrate central bank digital currencies (CBDCs) across borders. Additionally, DLT enables the use of smart contracts, which automate payments based on pre-set conditions, streamlining trade finance and remittances.

The ASEAN+3 economies have explored the use of DLT enhance regional cross-border payments. These economies have participated in exploration initiatives to experiment with and evaluate the use of DLT to create multiple-CBDC platforms to facilitate cross-border payments, such as project mBridge and Dunbar:

- Project mBridge is a collaboration between the Hong Kong Monetary Authority, the Bank of Thailand, the Central Bank of the United Arab Emirates, and the Digital Currency Research Institute of the People's Bank of China. The project developed mBridge Ledger, a DLT-based platform designed to facilitate real-time cross-border payments and currency conversion. In 2022, mBridge conducted a pilot involving 164 payment and foreign

exchange transactions, totaling over $22 million (BISIH and others 2022a). Since 2024, the project has entered the minimum viable product (MVP) phase.

- Project Dunbar was a multi-CBDC initiative led by the BISIH Singapore Centre in collaboration with the MAS, the Reserve Bank of Australia (RBA), BNM, and the South African Reserve Bank (SARB). The project aimed to develop a shared settlement platform enabling multiple central banks to issue, hold, and transact with CBDCs directly, reducing reliance on intermediaries. As proof of concept, Dunbar successfully demonstrated that a multi-CBDC shared ledger could improve cross-border payment efficiency while maintaining central bank autonomy (BISIH and others 2022b). The project also identified key policy, regulatory, and operational challenges that would need to be addressed before real-world implementation. Completed in 2022, Project Dunbar provided valuable insights but has not progressed to further development or deployment.

Central banks in the ASEAN+3 region have also participated in other DLT-powered projects to explore other use cases, such as tokenization and automated market making usages (Bank of France, MAS, and BISIH 2023). While these efforts remain limited to exploratory phases, they underscore the region's growing interest in leveraging DLT for financial innovation. Moving forward, further collaboration, regulatory harmonization, and technological advancements will be crucial in determining whether DLT can transition from proof-of-concept projects to fully operational systems in cross-border payments and CBDC ecosystems.

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