FOCUS NOTE

CROSS-BORDER FAST PAYMENTS

Part of the World Bank Fast Payments Toolkit

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CONTENTS

FINANCE, COMPETITIVENESS & INNOVATION GLOBAL PRACTICE

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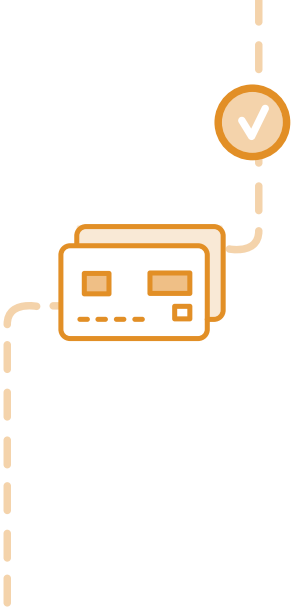
1 SETTING THE CONTEXT

The World Bank has been monitoring closely the development of fast payment systems (FPS) by central banks and private players across the globe.[1] This comprehensive study of FPS implementations has resulted in a policy toolkit. The toolkit was designed to guide countries and regions on the likely alternatives and models that could assist them in their policy and implementation choices when they embark on their FPS journeys. Work on the FPS Toolkit was supported by the Bill and Melinda Gates Foundation. The toolkit can be found at *fastpayments.worldbank.org* and consists of the following components:

- The main report *Considerations and Lessons for the Development and Implementation of Fast Payment Systems*
- Case studies of countries that have already implemented fast payments
- A set of short focus notes on specific technical topics related to fast payments

This note is part of the third component of the toolkit and aims to provide inputs and guidance to policy makers on the technical considerations and business implications of cross-border fast payments. This topic is of relevance, as cross-border payment arrangements are being explored by government and industry players and will be a critical element in ensuring interoperability between payment systems around the world.



2 BACKGROUND

Recent years have seen a number of prominent developments in both retail and wholesale payment systems. Prominent examples include the development of FPS in major markets across the globe, the introduction of same-day ACH processing in a few countries, and the expansion of operating hours for real-time gross settlement (RTGS) and settlement systems in several countries.[2] But the overwhelming majority of these developments have been focused on domestic payment processing. Most cross-border payments continue to be processed via correspondent banking arrangements that are dominated by large financial institutions and often lack transparency around timing, pricing, and compliance checks.

Defining Fast Payments

While the specific speed and service availability of fast payments may vary across jurisdictions, with some end-to-end fast payments processed in as little as a few seconds in one jurisdiction and as much as 10 minutes in another,[3] the fast delivery of funds and continuous availability of funds are the key defining features of a fast payment.

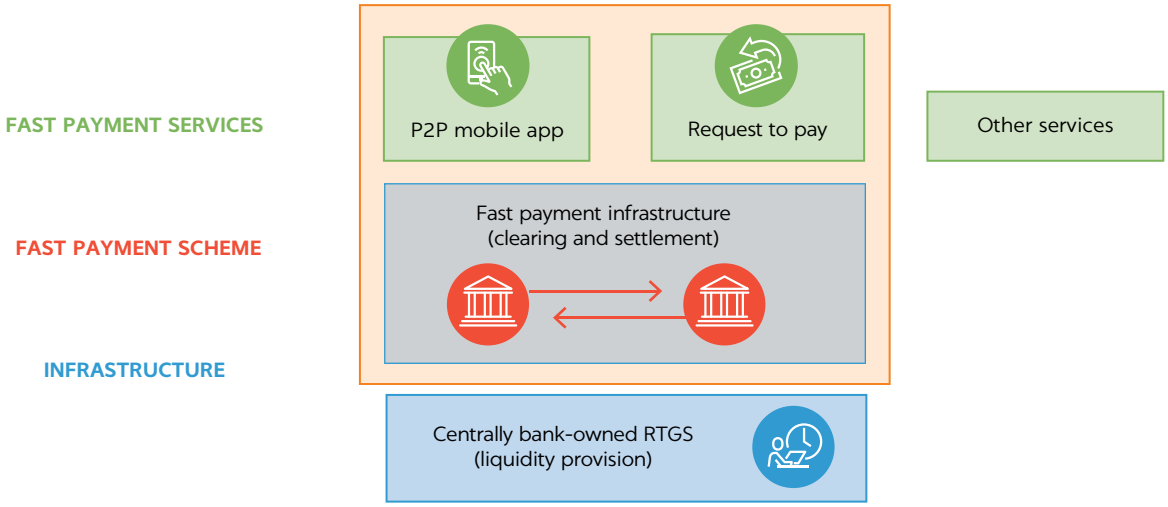
Similar to legacy payment systems, an FPS encompasses the infrastructure (or infrastructures) focused on the clearing and settlement of fast payments for its participants,[4] a scheme (or schemes) that defines the set of rules, and procedures and technical standards for fast payment orders, as well as the group of system participants that provide fast payment services to end users. Any FPS should have an enforceable legal basis, an appropriate governance structure, risk-management frameworks (including default management procedures), a mechanism for executing settlement, and access arrangements—all aimed at facilitating efficient and transparent execution of electronic payments.[5] An FPS also involves the oversight of a national authority (or authorities) responsible for ensuring that the operations of the FPS are in line with the relevant laws and regulations and for monitoring any potential systemic risk imposed by the operation of the system.

Nearly every FPS in operation today operates within a single legal jurisdiction. Some jurisdictions include multiple platforms that operate under a single set of rules—for example, the Single Euro Payments Area (SEPA), which includes a number of national and pan-European FPS. The key difference between a domestic payment system and a cross-border payment arrangement is that a cross-border arrangement does not fall under a single set of laws and regulations. In practice, most cross-border payments today do not use a payment system at all. Instead, cross-border payments are processed using a proliferation of bilateral agreements between institutions, often leveraging international messaging networks for communication (but not for payment processing).

Legacy Arrangements for Cross-Border Payments

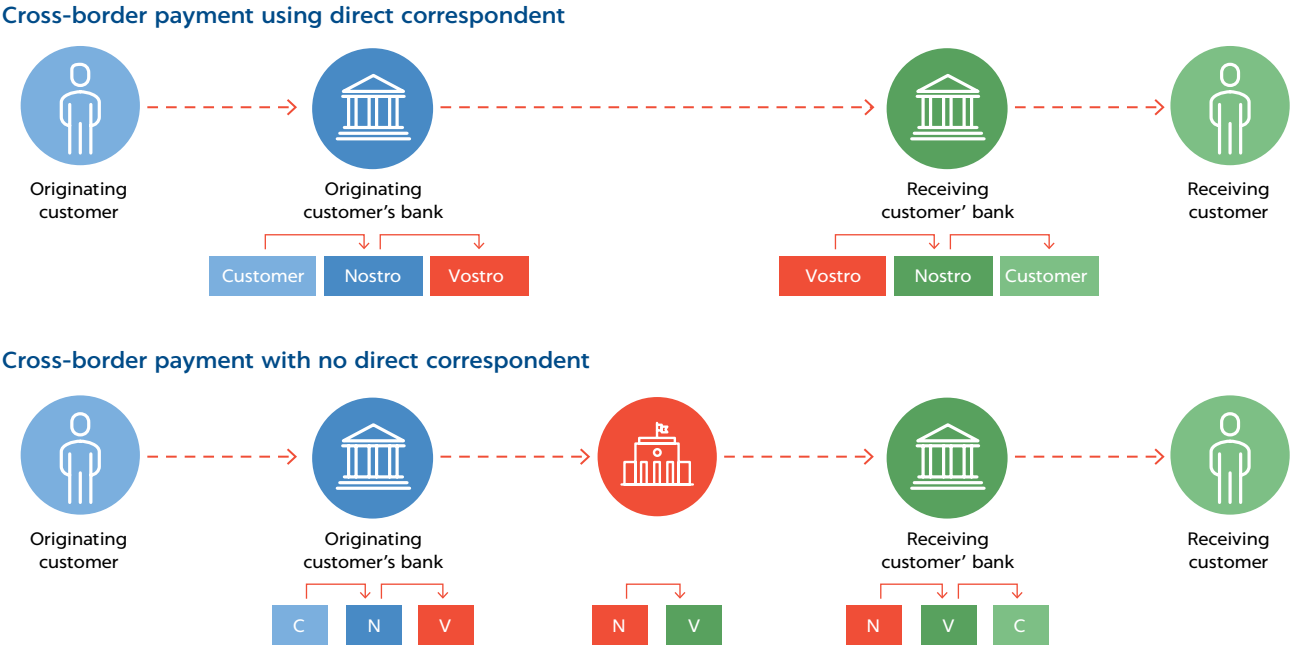
Most cross-border payments continue to be processed through correspondent banking arrangements in which a respondent bank enters into an agreement with the correspondent bank to execute payments on behalf of the respondent bank and its customers. The respondent bank's customers do not have direct access to the correspondent account, but they transact business indirectly.[6] In addition to international fund transfers, correspondent banking may

FIGURE 1 **Conceptual Representation of Fast Payment System**



Source: Own elaboration

FIGURE 2 **Cross-Border Payments via Legacy Correspondent Banking Arrangements**



Note: Dotted lines indicate message flows, solid lines indicate transfer of funds

include such services as cash management, loans, letters of credit, foreign-exchange services, and check clearing.

In each of the examples in figure 2, no domestic payment infrastructure is used. Instead, each bank manages its own liquidity in the form of nostro-vostro accounts[7] and reconciles these payments at a later date. Each correspondent that is involved in processing a cross-border transaction receives a fee for this service. It is thus very difficult for an originating bank to let its customer know how long it will take for a cross-border payment to take (unless that bank is its own foreign correspondent) or how much the originating customer will pay in fees and how much of the amount of the original transaction the receiving customer will see posted to their account. Despite the use of SWIFT messages by all players in this chain and recent efforts to accelerate the process, the actual transfer of funds often takes several days (and can take weeks in extreme cases).

Since the 2008 global financial crisis, banks providing cross-border correspondent banking services have been in the process of reassessing their business models, particularly as regulations concerning anti-money-laundering and combatting the financing of terrorism (AML/CTF) have become more stringent globally and the cost of capital and liquidity for banks has generally increased. As the regulatory costs of correspondent services have led to lower profit margins, some banks have been forced to exit this business or at least to reduce their relationships with respondent banks, particularly those that do not generate sufficient volume to justify compliance costs, are located in jurisdictions that are perceived as too risky (for example, they see a high volume of terrorist financing), or are in jurisdictions where customer information is inadequate for robust know-your-customer (KYC) checks. At the same time, competitive pressures from non-bank fintechs and other new players providing these services has increased dramatically. Because the correspondent banking system has always been dominated by a relatively small number of large banks that have global reach, the further consolidation of correspondent banking has made it increasingly difficult for smaller respondent banks, particularly in high-risk jurisdictions, to access correspondent services at a reasonable cost or, in some jurisdictions, to access these services altogether.[8]

Other challenges facing the correspondent banking system relate to the lack of standardization of the type and format of information used in KYC processes, which can generate inconsistencies and inaccurate information that can limit how effectively the processes prevent fraudulent and illegal transactions and also lead to high fines in the case of noncompliance. Sharing information across jurisdictions while also complying with national data privacy regulations can also cause conflicts that have yet to be addressed at a multilateral level.

2.1. OVERCOMING THE LEGACY ARRANGEMENTS

In recognition of the complicated, inefficient, and expensive legacy arrangements, a number of industry players have launched new services or partnerships to improve the speed, transparency, and cost of cross-border payments through the innovative use of traditional systems or services or by leveraging new technology, such as distributed ledger technology (DLT). These different approaches and corresponding examples are summarized below.

Improvements to Payment Processing Using the SWIFT Network

The SWIFT network connects more than 11,000 financial institutions in more than 200 countries and is the main messaging network used in account-to-account cross-border payments. In 2017, SWIFT launched the gpi initiative to increase transparency on cross-border payment flows and transaction fees and to speed up international transaction processing. Features of the service include giving each transaction a unique identifying number, allowing for real-time tracking, and providing access to a global directory of all gpi members. By late 2019, the majority of SWIFT international transactions were processed using SWIFT gpi, and almost half of these payments were received by the beneficiary within 30 minutes.[9] SWIFT also launched an additional service known as GPI instant, which connects the gpi service to domestic real-time infrastructures and further improves the speed of cross-border payment processing on its network. In December 2020, the service went live in the United Kingdom, linking to the Faster Payments System. SWIFT has also conducted several pilots of the service in cooperation with several major payment system operators and central banks, including in Australia, the European Union, and Singapore.[10]

SWIFT GPI

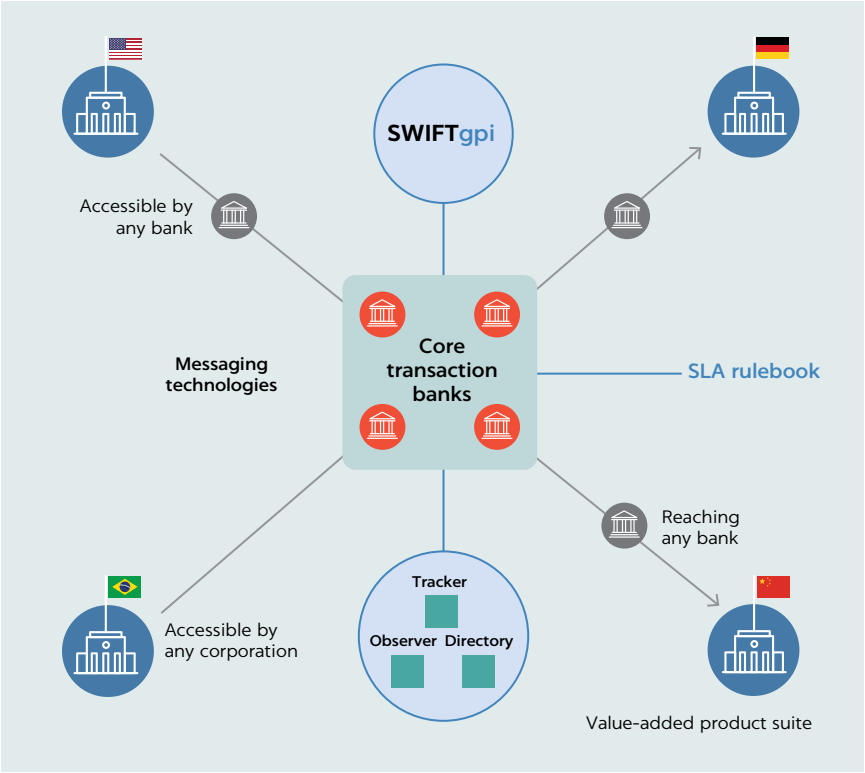
SWIFT gpi leverages the SWIFT messaging and correspondent banking system with a new set of business rules. SWIFT gpi enables same-day usage of funds and transparency in fees, including payment tracking and remittance information. SWIFT gpi provides the functionality of tracking a transaction in real time with confirmation to the beneficiary when the account is credited.

The gpi comprises three core components: a tracker, an observer, and a directory. The tracker continuously updates the information needed to provide the real-time status of a payment transaction. The gpi observer enables real-time monitoring. It monitors whether gpi members are following the rules set out in the service-level agreements. The gpi directory provides a complete picture of operational information regarding all other gpi members. This is the system's memory, listing all gpi members' names, supported currencies, and business identification codes, as well as each member's communication channels and cut-off times. Figure 4 depicts the components of SWIFT gpi.

Global Payment Service Providers Enabling Cross-Border Real-Time Account-to-Account Payments

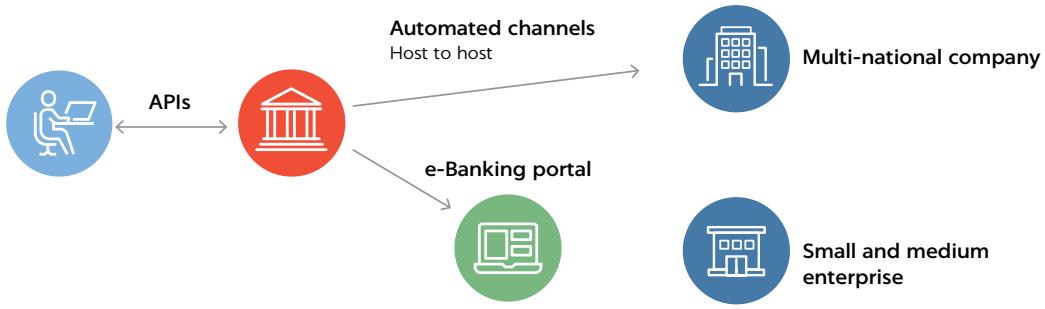
International card networks such as Visa and Mastercard have also pursued opportunities to leverage their infrastructures to improve cross-border payments. Visa's B2B

FIGURE 3 Flow of Transaction Leveraging SWIFT gpi



Source: www.swift.com

FIGURE 4 Components of SWIFT gpi



Source: www.swift.com

Connect platform[11] is a non-card network based on application programming interfaces (APIs) that uses DLT to settle large-value transactions between financial institutions in the Visa network. B2B Connect provides a single multilateral network that incorporates not just payment messaging but ID authentication and security features to allow banks to exchange cross-border payments on a same-day or next-day basis. Mastercard has recently announced a partnership with the international money-transfer start-up TransferGo to develop the near-real-time exchange of cross-border payments for consumers and businesses.[12] The initiative will leverage Mastercard Send and TransferGo's remittance network to allow customers to circumvent legacy correspondent banking networks to speed the processing of cross-border payments.

Increased Partnerships between International Remittance Providers and Other Players

The two largest global remittance providers have been active in developing partnerships to speed up cross-border transaction processing. In October 2020, Western Union announced real-time payout capabilities in 80 countries,[13]

while MoneyGram has partnered with institutions such as Visa to enable fast payments between certain corridors. While these providers are typically not used by financial institutions, their touchpoints with consumers in over 200 countries are helping improve service and increase the expectations for speed, transparency, and cost in the person-to-person space globally. More recent entrants in the international remittance space, such as Wise (formerly TransferWise), have also seen success in recent years by providing international transfers at lower cost and faster speed than legacy remittance providers, including the ability for customers to compare the cost of international transfers between Wise and other payment service providers (PSPs), including fintechs, remittance providers, and financial institutions.

Use of Distributed Ledger Technology and Emergence of Cryptocurrency Providers

Recent use of DLT in the context of cross-border fast payments should also be noted. DLT can be leveraged in cross-border payments to solve various issues currently plaguing the correspondent banking system, such as a lack of standardization of KYC processes as well as manual reconciliation processes. For example, a distributed depository of KYC and fraud information available to all network participants could eliminate the need for individual banks to perform redundant KYC checks by making KYC information freely available to all parties in a transaction. Information transparency could also reduce the costs and risks around the reconciliation of transaction information between correspondent banks. Under legacy arrangements, correspondent banks' separate ledgers must be reconciled once a transaction is complete. If this reconciliation information were exchanged via a distributed ledger, all parties would have instant access to accurate and complete transaction information without the risk of manual processing errors or asymmetrical information across parties.[14]

Over almost the past decade, Ripple has been developing a DLT-based network for cross-border payments. The RippleNet allows financial institutions to send and receive international payments from a single prefunded account. RippleNet allows for fiat-to-fiat transactions as well as the use of the XRP digital currency to bridge between different jurisdictions. Ripple has signed hundreds of banks onto its network, including such major players as Santander. Other industry examples of DLT solutions in use or in development include Visa B2B Connect (discussed earlier) and JPMCoin.[15] Although the latter is currently used only by institutional clients of J. P. Morgan to make cross-border intracompany payments, it has the potential to be used for interbank cross-border payments in the future.

National authorities have also begun exploring the use of DLT for international payments. For example, the Monetary Authority of Singapore and Hong Kong Monetary Authority have jointly developed the Global Trade Connectivity Network, a DLT-based network aimed at digitalizing cross-border trade finance. The Monetary Authority of Singapore and Bank of Canada linked their experimental DLT-based domestic payment networks, Project Jasper and Project Ubin, and in 2019 conducted a successful experiment on cross-border and cross-currency payments using central bank digital currency (CBDC).[16] More recently, the Bank for International Settlements has explored the potential role that CBDC could play in shaping the future of cross-border payments.[17] CBDC is a topic that has received much attention over the last year, but there are still very few concrete CBDC projects. Most of the work today is around research and pilot projects, but more concrete implementations are expected in the coming years.[18]

While these initiatives hold promise, the increasing expectation of fast payments in a domestic context is also leading to new expectations for fast cross-border payments. Since nearly all new FPS launched over the past decade use ISO 20022 for messaging, greater opportunities exist for the harmonization of domestic payment infrastructures to enable cross-border fast payments through the creation of technical links between domestic FPS. In contrast, some regions are also developing cross-border multilateral FPS infrastructures that exist alongside domestic FPS. These new cross-border FPS arrangements differ from the initiatives mentioned above because they depart from the legacy correspondent banking and remittance networks that continue to form the basis of cross-border payments and trade today.

Scope Definition for Cross-Border Fast Payment Arrangements

- **Technical links between domestic fast payment systems:** Domestic FPS introduce technical links (for example, interfaces, APIs, and data standards) to facilitate the exchange of cross-border payments. System participants can exchange both domestic and cross-border payments using a domestic payment infrastructure. Cross-border payments processed in this manner may be subject to different scheme rules or operational guidelines compared to domestic payments.
- **Cross-border fast payment systems:** Stakeholders in multiple jurisdictions develop a common platform for exchanging and processing cross-border payments. This type of FPS could process payments using a single currency or include a currency-conversion mechanism, enabling the processing of multiple currencies. Settle-

ment arrangements would have to be agreed to by system participants. This type of cross-border FPS could also integrate domestic FPS functionality from one or more markets or be used solely for cross-border payments.

Both of these cross-border fast payment arrangements must also include a decision on how settlement is executed. This could occur at a single central bank, among multiple central banks, or by a commercial bank.

2.2 GLOBAL POLICY-MAKER SUPPORT FOR CROSS-BORDER FAST PAYMENTS DEVELOPMENT

International cooperation will be crucial to the success of cross-border fast payments. The Financial Stability Board (FSB) published a road map to enhance cross-border payments ahead of the G20's October 2020 meeting.[19] The road map built upon two previous reports by the Committee on Payments and Market Infrastructures and the FSB, respectively, that assessed existing arrangements for cross-border payments[20] and set out 19 building blocks[21] to be used in the Stage 3 road map. The FSB's road map includes five focus areas. Four are centered on enhancements to current cross-border payment arrangements and improvements that can be made to existing payment systems to enhance the speed, cost, transparency, and service levels experienced by consumers and businesses when sending or receiving international payments, as well as potential changes that may be needed for regulatory and supervisory frameworks. The four focus areas are interdependent, and much of the FSB's work in this space will take place in 2021–22. Relevant oversight and technical assistance is envisioned to occur on a continuous basis among FSB member states.

The fifth focus area looks at the potential for the development of new payment infrastructures and arrangements. This work can be divided into two parts: considerations of the feasibility of new multilateral payment infrastructures for cross-border payments, and a review of the potential role that digital currencies can play in this space, specifically around stablecoins and CBDC. Much of this work is still in the preliminary phase, particularly around digital currencies, which are still in the research-and-development phase in most markets.

2.3 BRIEF OVERVIEW OF BENEFITS AND RISKS OF CROSS-BORDER FAST PAYMENT ARRANGEMENTS

The development of cross-border fast payment arrangements would undoubtedly lead to an increase in efficiency, transparency, and pricing for international payments. But with the vast majority of payments today still being made on a domestic basis[22] (due in part to the lack of cross-border infrastructures), the total potential market for cross-border fast payments remains unclear. Below is a brief overview of the benefits and risks of cross-border FPS.

Benefits

- **24/7/365 availability:** Using fast payment arrangements in a cross-border context can ensure that international payment processing is available 24 hours a day, seven days a week, and 365 days a year (24/7/365). The bilateral exchange of cross-border payments today means that each leg of a transaction is processed only as per the agreed terms, with no harmonized rules on the timing of payment processing. By leveraging FPS that operate 24/7/365, cross-border payments can be processed as they are submitted. This can help overcome issues around time zones and business hours in each jurisdiction, ensuring that payments are cleared (and perhaps even settled) in real time across borders.
- **Increased speed:** Moving from multiple days (in some cases, even weeks) to minutes or seconds to process cross-border payments and, specifically, to credit the payee's account is one of the key benefits of any cross-border fast payment initiative. The development of a new cross-border infrastructures or the linking of domestic FPS would enable near-real-time processing of payments that could then be posted to customer accounts in line with domestically processed payments.
- **Lower liquidity costs for banks and lower fees for end users:** Removing intermediary correspondent banks from the processing of international payments and reducing or eliminating costly nostro-vostro procedures for managing cross-border liquidity have the potential to reduce the cost of cross-border payments for financial institutions and their customers greatly. This would make it feasible for consumers and small businesses to make cross-border payments and for beneficiaries to receive the full amount of payment without costly processing fees. A cross-border FPS arrangement could also lower costs for financial institutions by reducing the need for manual processing and KYC/sanctions checks for international payments.
- **Transparency on timing and fees:** A cross-border FPS arrangement would provide all system participants with a firm understanding of processing times and the fees associated with each payment. Both timing and fees could be included in the scheme rules or service-level agreements. System participants could then share this information with their customers to offer improved service on inter-

national payments. This information could also be shared with national authorities in line with payment-system or public-policy objectives. SWIFT's gpi initiative has already brought major improvements in this regard.

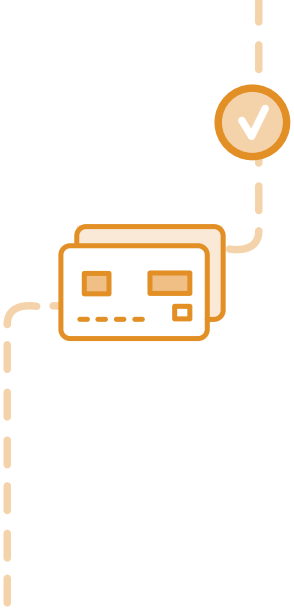
- **Enhanced national oversight:** The development of common cross-border rules and standards can actually enhance the ability of national authorities to oversee and monitor developments in payment systems and among financial institutions. Not only can current correspondent banking networks be slow and costly, but they also lack the transparency needed by national authorities for issues related to tracking money laundering, enforcing criminal law, screening sanctions, and enforcing legal judgements, such as bankruptcy proceedings. A cross-border FPS arrangement helps improve the reconciliation and reporting process and increases transparency to relevant national regulatory bodies.
- **Harmonization of KYC/AML/CTF requirements:** National KYC procedures—including the documents needed to identify customers, the verification process, and the formatting of the information required to complete the process—vary considerably by country. The complexity of the onboarding process and checking documents to complete KYC procedures is amplified by the fact that different jurisdictions have different standards for onboarding, reporting, and processing new information, and that banks are often required to know not only information related to their customers but also information on their customers' customers.
- **Improved access to cross-border payment processing for small- and medium-sized banks:** As noted, recent consolidation in correspondent banking has led to an increase in the cost of correspondent services in some jurisdictions, as well as reduced access to these services for some smaller banks. Utilizing cross-border FPS has the potential to level the playing field for these smaller players and to increase access to affordable and fast remittance services, particularly in "riskier" jurisdictions.
- **Increased competition and innovation in the cross-border payment space:** The development of cross-border FPS arrangements could provide a basis for new cross-border products and services that financial institutions could offer to their customers. This is a major goal of the P27 Initiative (see section 4), which aims to build a broader ecosystem of cross-border fast payment services and products for end users and has certainly been a benefit of fast payment adoption at the national level. The development of a cross-border FPS may also enable new players to develop and offer cross-border fast payment services, which could help increase competition and encourage greater innovation.
- **More flexible liquidity management for merchants and consumers:** Fast payments benefit banks, PSPs, merchants, and consumers by offering enhanced visibility into cross-border payment flows and enabling easier and better cash and liquidity management. More timely receipt of payment is especially beneficial for smaller merchants, who may see a positive impact on their cash flow as a result of not having to wait days or weeks for payment.

Risks and Challenges

- **Legal risks:** Including participants from multiple legal jurisdictions in a cross-border FPS arrangement will necessarily entail agreement on the enforceability of contracts across the relevant jurisdictions. This could present risks as system participants or the system governance body ensure that legal obligations do not conflict with applicable laws and regulations. Ensuring the enforceability of contracts across multiple jurisdictions may require changes to national laws related to payment systems. For example, in preparation for SEPA, the first Payment Services Directive in the European Union harmonized refund rights for direct debits throughout the European Union. This was implemented by changing national laws related to payment refunds in member states.
- **Need for significant IT and business-process renovation:** The establishment of a cross-border FPS—either by linking national FPS or through the development of a new cross-border FPS infrastructure—will require participating financial institutions to update IT systems and business processes for cross-border payments. Owing to the complexity of current cross-border payment processing, most banks process domestic and cross-border payments using disparate software and operational processes. Cross-border payments must be screened for compliance with laws on money laundering, counter-terrorist financing, and other concerns. These interfaces need to be built for domestic payment-processing systems. Even if these updates represent an improvement over legacy correspondent banking arrangements from a cost or efficiency perspective, any change to IT or business processes entails risks. For links between national FPS, banks may have to harmonize the processing of domestic and cross-border payments.
- **Lack of clear business cases:** The vast majority of payments in any jurisdiction are domestic payments. Traditional correspondent banking arrangements undoubtedly limit the potential for some cross-border payments. However, the extent to which a cross-border FPS arrangement

will unlock new business opportunities is unclear. This lack of clarity may present an obstacle for some financial institutions that need to justify investment in IT or business-process changes related to a cross-border FPS. It is possible that the potential market for cross-border FPS may turn out to be smaller than expected once a system goes live.

- **Lack of incentive to increase efficiency:** In general, banks have been able to pass the inefficiency and high cost of current cross-border payment processing onto their customers. Customers have responded to the high costs by developing ways to avoid them. Corporations use cash pooling, netting, and shared service centers to manage corporate liquidity in ways that allow them to avoid making cross-border payments. Moreover, large banks have sizable revenue streams from cross-border payments, and this may make them reluctant to take steps that could increase efficiency and lower cost.
- **Impact on domestic payment systems:** Looking ahead, it is possible that a cross-border FPS could eventually replace or integrate the functionality from one or more domestic payment systems in the long term. In this case, national payment system operators could see lower volumes or the shutting down of payment systems in favor of a cross-border payment system, which could result in temporary market frictions, transition costs, or even less direct oversight for national authorities. With appropriate controls in place, however, regulators can manage such risks and maintain their ability to oversee and monitor payment flows and financial institutions from the introduction of cross-border FPS.
- **Exchange rate:** In cross-border payments, including the FPS used for cross-border payments, the exchange rate and transparency into the amount to be received by the beneficiary are important. Cross-border systems involve the settlement of two or more linked currencies—the most significant difference between a domestic FPS and a cross-border FPS. Accordingly, currency conversion is embedded into the cross-border FPS and requires a mechanism for adjusting exchange rates—either a fixed exchange rate (predetermined) or an exchange rate that is dynamic and computed on a continuous basis or at set intervals. The cross-border fast payment arrangement may clear and settle in one or more currencies. But the risks that exist in cross-border payments need to be addressed in the cross-border FPS. The parties to the foreign-exchange transaction will need to pay the currency or an amount equivalent to the amount in the currency. The risks of settling cross-currency transactions need to be addressed, including arbitrage of the rate offered on the platform, varying rates in the market, or the risk of major intraday swings in exchange rates. The mechanism for controlling and adjusting exchange rates needs to be agreed upon, as do the necessary reserves/resources and mechanism for mitigation of risk.



3 TECHNICAL DESIGN ASPECTS AND IMPLEMENTATION PRACTICES

The design and implementation of new cross-border payment systems and the addition of cross-border links between existing domestic payment systems will entail a number of technical, legal, and governance changes. Some will be similar to those that arise when implementing improvements to a domestic payment system, while other challenges are specific to cross-border payments. This section will outline the major challenges with design and technical implementation, and it will review the changing role of central banks in this context, as well as the implications of new digital currency arrangements that are currently being explored in major markets globally.

3.1 ACHIEVING STAKEHOLDER CONSENSUS AROUND SYSTEM GOALS

Prior to deploying a new cross-border linkage or multilateral cross-border payment system, all relevant stakeholders should have a firm understanding of the goals, use cases, and target audience for a cross-border payment arrangement. The relevant authorities should also think through how the system may scale after it is introduced, with a specific focus on high-volume bi- or multilateral international corridors.

The following focus areas should be taken into consideration in the design and planning stage of any new payment infrastructure or arrangement.

3.1.1. Clearing and Settlement

The clearing of payments—where payment files or messages are exchanged between participants in a payment system—usually happens prior to the settlement of these payments at the central bank[23] Once settlement occurs, the transactions in that settlement window are fixed and irrevocable. With FPS, clearing and settlement can become more synchronous than they are in bulk-payment systems. While many FPS still settle funds on an asynchronous basis (for example, the United Kingdom's Faster Payments System has three daily settlement windows even though the clearing and posting of funds to end clients' accounts happens within seconds), some FPS clear and settle in real time. The fact that the large-value payment systems are also moving toward 24/7/365 operations should make operational linkages between FPS and the system operated by the central bank less difficult for final settlement.

Clearing

The technical implementation of cross-border clearing will depend on the type of system or arrangement that is pursued. For a payment infrastructure that operates in multiple jurisdictions, the clearing rules would need to be agreed to by all relevant parties in each jurisdiction as they design the system collaboratively. In the case of an FPS that clears payments continuously,[24] each system participant would have to ensure that its core systems and payment modules are capable of sending and receiving payments and posting incoming payments to customer accounts within seconds. In jurisdictions that already have a domestic FPS, this should already be common practice for each participating institution. However, not all banks that already process payments on a real-time basis in a domestic context may be able to do the same for international payments. The IT systems and business processes associated with cross-border payments

are often separate from those used for domestic payment processing. Many banks conduct additional KYC and sanctions screening for international payments, and these processes would either need to be sped up for payments using a cross-border payment infrastructure or a bank may need to reassess how it segregates domestic and cross-border payments in the context of a new cross-border FPS.

In the case of a cross-border FPS that results from linkages between existing domestic payment systems, system participants may be able to extend domestic processing operations to a cross-border context with little technical or operational disruption. It is likely that cross-border payments cleared under such an arrangement would contain a clearing code that identifies each cross-border payment cleared in the system. In this case, any additional screening process that banks wish to use for international payments would need to be incorporated into their internal IT and business processes, with the goal of speeding up this process for international payments to match the speed of domestic payment processing. It is possible that end-to-end processing in a cross-border FPS may not be as fast as the end-to-end service in a domestic FPS. A cross-border FPS can speed up the interbank leg of cross-border transactions, but each participating institution on either end of a transaction may need additional time to address compliance processes required by the relevant laws and regulations around cross-border payments.

Settlement

One of the major operational improvements that any cross-border FPS arrangement would bring compared to legacy correspondent banking would be in speeding up and simplifying the settlement of international payments.[25] Settlement between FPS participants is performed in real time or on a deferred net settlement basis. Indeed, in most FPS in operation today, settlement is on a deferred net settlement basis.[26] The first determination that needs to be made for any cross-border FPS arrangement is whether payments are cleared in central bank money or commercial bank money. A single authority would then be chosen to execute settlement for each cross-border transaction (for example, a central bank or commercial bank).

Operationally, settlement can occur either in real time or at predefined intervals. In the case of real-time settlement, each participating institution would have to dedicate liquidity in a settlement account and ensure that the account holds enough liquidity at all times to meet its obligations under the agreed system rules.[27] In the case of multilateral net settlement at predefined intervals, participants would need to dedicate liquidity in their settlement accounts or make arrangements to have liquidity to cover their settlement obligations and, in some cases, pledge additional collateral to guarantee settlement in the case of one or more participants failing to meet their settlement obligations at the predefined settlement intervals. Operationally, real-time settlement poses the least settlement risk. However, predefined settlement windows may allow participants to use liquidity more efficiently and avoid having funds tied up in a settlement account that could be used elsewhere. Any potential risk from predefined settlement windows can be overcome through settlement guarantees, such as the pledging of collateral by FPS participants in combination with preagreed "net debit caps."[28] Regardless of the settlement arrangement chosen for cross-border FPS, participants should use liquidity-forecasting mechanisms to determine how much liquidity to dedicate to settlement depending on their customers' cross-border payment habits and time of year.

3.1.2. Use of Single or Multicurrencies for Settlement

Perhaps the most significant difference between a domestic FPS and a cross-border FPS is the possibility to settle in different currencies. The decision to settle in one or more currencies should be considered in the context of the system goals and use cases. Some systems may have the goal of promoting the use of local currencies (for example, the Buna platform in the Arab region), in which case a multicurrency system would be preferred. Regions where a single currency is dominant (for example, the South African rand in the Southern African Development Community) or where there is a currency union (for example, the euro area) may opt for systems that settle in only one currency. Even if a cross-border FPS arrangement clears and settles payments using a single currency (either a fiat currency or a digital currency), system participants would need to convert these funds into the local currency used in their customers' jurisdiction. Any currency used within a cross-border FPS arrangement or by system participants would need to be aligned with legal stipulations in each jurisdiction (for example, laws related to capital controls). This will further necessitate coordination between national financial and tax authorities in each jurisdiction that takes part in a cross-border FPS.

Use of a Single Currency for Settlement

In the case of a cross-border FPS that uses a single currency for settlement, all system participants may exchange payment messages without needing to convert between currencies. Each system participant would need to make arrangements for converting between the currency of their home jurisdiction and that used within the cross-border arrangement. This may provide for greater efficiency within the cross-border FPS itself, but it could present obstacles for some system participants. If the currency used within the

cross-border FPS is a major reserve or regional currency, system participants may merely need to adjust liquidity-management practices to dedicate the required amount of funding for the system. System participants would then need to make their own arrangements to acquire enough of the settlement currency on foreign-exchange markets or via other correspondents. A single-currency cross-border FPS would still bring many benefits compared to current correspondent banking relationships, as it would provide more certainty and transparency in addition to increased speed and lower cost. National central banks could even play a role in obtaining and dedicating foreign currency for banks and other PSPs in their jurisdiction that use the cross-border FPS.

Use of Multiple Currencies for Settlement

A cross-border FPS can also process and settle payments in multiple currencies. In this case, the system may need to connect to multiple central banks to provide access to reserve accounts and enable oversight by each national monetary authority. Embedding currency conversion as part of a multilateral cross-border FPS would require a mechanism to adjust exchange rates on a continuous basis or at set intervals. Each system participant (and its customers) would submit or receive payments in its local currency with full transparency of exchange rates for each of the currencies processed within the system. Such an arrangement would be operationally more complicated, but it would have the benefit of ensuring uniform exchange rates and service levels for participants in every jurisdiction. It would also absolve system participants of the responsibility to obtain a system-wide reserve currency (assuming this currency is not their local currency) and to manage these foreign reserves on their own. The easiest method to implement this may be to have a single commercial bank both settle in domestic FPS and perform the currency conversion.

While a system that settles in multiple currencies is by definition more complicated than a system that settles in a single currency, technology is not a major barrier here. Once a mechanism for controlling and adjusting exchange rates is agreed upon and the necessary reserves are fixed at each national central bank (or at a commercial bank, depending on the scheme rules and governance structure of the cross-border FPS arrangement), these rules merely need to be coded into the processing requirements of the FPS.

3.1.3. Messaging Standards: ISO 20022 and Conversions

The proliferation of proprietary messaging standards and formats in domestic payment systems is sometimes seen as one of the key hurdles to efficient, secure, and cheap cross-border payments. The increased use of ISO 20022 in FPS over the past decade is widely seen as a precursor to global interoperability in payment processing. Indeed, SWIFT's MT standards have been the de facto standard for its member financial institutions over the years, and SWIFT is playing an active role in the further development and proliferation of ISO 20022 (not least in its migration from the MT series of messages to the ISO 20022-based MX series of messages planned for the end of 2022).[29] It is widely expected that ISO 20022 will play a key role in any cross-border FPS. This is due to the fact that ISO 20022 is already the preferred global standard for domestic FPS. The Nexus will use ISO 20022 standard for data messages for cross-border payment messages. Although it will provide for message translation for FPS that do not use ISO 20022, the framework highlights the advantage to end users and for cross-border interoperability if domestic FPS migrate to ISO 20022 for domestic payment messages. ISO 20022 is attractive for FPS because of its rich messaging capabilities, which are expected to enable further innovations through extensive payment data and the automation of payment processes. The ISO 20022 standard includes not only the messages that have been developed for payments and other areas of financial services (for example, trade, securities, and corporate-to-bank messaging) but also a methodology for developing new message sets as the need arises. This framework allows financial institutions to continue innovating without needing to implement a new messaging standard, providing flexibility for future needs as FPS use cases expand. The widespread use of ISO 20022 for domestic FPS also means that the same can be leveraged for any cross-border FPS.

ISO 20022 is attractive as a messaging standard for more than payment infrastructures. Its widespread and growing use in payment systems and other financial infrastructures has also resulted in the mapping of ISO 20022 to many proprietary messaging standards used in different jurisdictions. Even if a cross-border FPS uses ISO 20022 for messaging, system participants may need to convert these messages to a national standard to make funds available to their customers. In this case, ISO 20022 provides an attractive basis for automated conversion between national messaging standards. Financial institutions accustomed to processing cross-border payments using the SWIFT MT series of messages should be able to convert to the ISO 20022-based MX series seamlessly. And payments that are received from the cross-border FPS in ISO 20022 format can also be automatically converted into a national standard that could be sent via a domestic payment infrastructure or posted directly to a customers' bank account. Whether used in both the domestic and international context or merely for cross-border payments with conversion to national standards, the use of ISO 20022 can

ensure a uniform standard for end-to-end payment processing that ensures that customers in every jurisdiction receive similar service levels, increased transparency, and innovative value-added services that leverage the standard's extensive data capabilities.

3.1.4. Participation Models

One of the key reasons that cross-border payments often require multiple correspondents is that international networks such as SWIFT include only a limited number of financial institutions. While access to SWIFT is available to financial institutions of all sizes, in practice only larger institutions have the resources needed to manage the complex legal and operational requirements for cross-border payments. A key goal of any cross-border FPS arrangement will be to harmonize and simplify the legal and operational processes for international payments. This may make participation possible for a wider range of financial institutions. It could even allow for participation by non-bank payment processors.

The design of such a system would need to take this into account and develop a participation model that allows smaller institutions to send and receive payments directly, without relying on correspondents. This may involve a model where an expanded set of financial institutions act as direct participants in the system (clearing and settling payments on their own behalf), a model where direct participants provide settlement on behalf of indirect participants (which would submit payments to the system but settle via a correspondent), or a model that includes gateway providers that provide clearing and settlement capabilities on behalf of a group of indirect participants (allowing these institutions to outsource the technical processing to a gateway provider).

Newer players such as Ripple envision wider participation, particularly by smaller financial institutions. It is important to note that enabling direct access to a cross-border FPS does not mean that all smaller institutions will choose to access the system directly. Some smaller participants may find it more economical to use a correspondent for clearing and/or settling payments within a cross-border FPS. But these participants may choose to adjust their participation model over time depending on the needs of their customers or their wider strategic objectives. A cross-border FPS with multiple participation models may provide the best opportunity to expand access to international payments in a flexible manner.

3.1.5. Legal Agreements and Dispute Resolution

Implicit in the development of any cross-border FPS arrangement is an assessment of existing legal agreements and the potential addition of new legal agreements. Whether a cross-border FPS settles in a single currency or multiple currencies, all system participants must agree on a framework for adjudicating legal issues that may arise through the use of the system. A partial list of examples includes indemnification in the case of a technical or legal breach and how to resolve disputes over refunds or returns (for example, in the case of money being paid to the wrong beneficiary). Another dispute-resolution issue that any FPS may face is what to do in the case of authorized-push-payment (APP) fraud. This occurs when a consumer or business is scammed into authorizing a payment for a fraudulent good or service. National authorities in the United Kingdom are already looking into the best way to combat APP fraud in a domestic context.[30] Cross-border APP fraud would require further coordination between national authorities and financial institutions to determine the best approach for redressing APP fraud using a cross-border FPS arrangement.

Any cross-border FPS would likely include legal agreements on data sharing between participants, including which customer and payment-system data can be shared and processed by each participant. System rules should include stipulations of the national jurisdiction(s) for legal disputes between system participants. National authorities in each jurisdiction represented in the system should also review any relevant laws and regulations related to payment processing and currency conversion to determine any potential changes or additions that would be needed. It is possible that the development of a cross-border FPS could bolster or replace bi- or multilateral legal agreements currently in place between national authorities related to payment processing and currency reserves. A full assessment of all relevant legal agreements and regulations should be carried out by each national authority and discussed by all system participants as part of a centralized governance framework, and resolution of any difficulties must be agreed.

3.2. REGULATORY OVERSIGHT

Central banks are generally responsible for the oversight of national payment systems. This would likely remain unchanged with any cross-border FPS arrangement. Central banks are already active in forums such as the Bank for International Settlements, the FSB, and the Financial Action Task Force, among others. Coordination between central banks as part of a cross-border FPS would thus largely represent a continuation of this work and may include many of the same stakeholders. The areas where central banks may take on a new role in a cross-border FPS is in managing currency reserves processed by the cross-border FPS. Central banks could potentially also have to look into whether there would

be any need to adjust the composition of their foreign currency reserves, to share information for system oversight with other central banks or the system operator, or, potentially, to operate a cross-border FPS. The degree to which central banks take on these roles will depend on the legal framework, governance structure, and operational design of any cross-border FPS. Ultimately, the key responsibilities of central banks to oversee payment system participants and control the supply of currency will remain unchanged. The mechanisms used to carry out these functions may need to be adjusted based on the design and operation of any cross-border FPS.[31]

3.3. IMPLICATIONS OF WHOLESALE AND RETAIL CBDC CURRENTLY IN DEVELOPMENT

The conceptualization and development of CBDC—itself spurred by the rise of cryptocurrencies and stablecoins—has become a priority for central banks in such major markets as China, the European Union, and India. These efforts are largely focused on the domestic context today. But the use of CBDC in a cross-border context is also in scope for CBDC research and pilot projects. CBDC could give central banks a tool for easing the exchange of cross-border payments, providing additional transparency for end users, and fighting tax avoidance, money laundering, and fraud. The Bahamas has gone live with a CBDC (SandDollar), China has already begun distributing its DCEP digital currency in select cities, and the Swedish Riksbank is currently undertaking a pilot project for e-krona. The Eastern Caribbean Central Bank is also expected to finalize its CBDC (DCash) pilot soon and start full implementation.

Nevertheless, it is important for any jurisdictions exploring cross-border FPS arrangements to understand the potential implications of CBDC for cross-border payments. The Bank for International Settlements has begun exploring the implications of interoperable CBDCs that can be used in a cross-border context.[32] The bank identifies three conceptual approaches to cross-border CBDC: (1) interlinking compatible CBDC systems through common standards, (2) interlinked CBDC systems with a common technical interface and contractual agreements between systems, and (3) the integration of multiple CBDCs in a single multicurrency system. Regardless of which of these approaches is pursued as national authorities explore and develop CBDC projects, any stakeholders developing a cross-border FPS should account for the introduction and expansion of CBDC to determine the feasibility of including CBDC in a cross-border FPS arrangement. This includes the development of flexible interfaces (for example, using APIs) as part of a cross-border FPS arrangement that would allow for a future linkage with a CBDC network(s).

4 PROFILE AND COMPARISON OF SELECTED CROSS-BORDER FAST PAYMENT ARRANGEMENTS

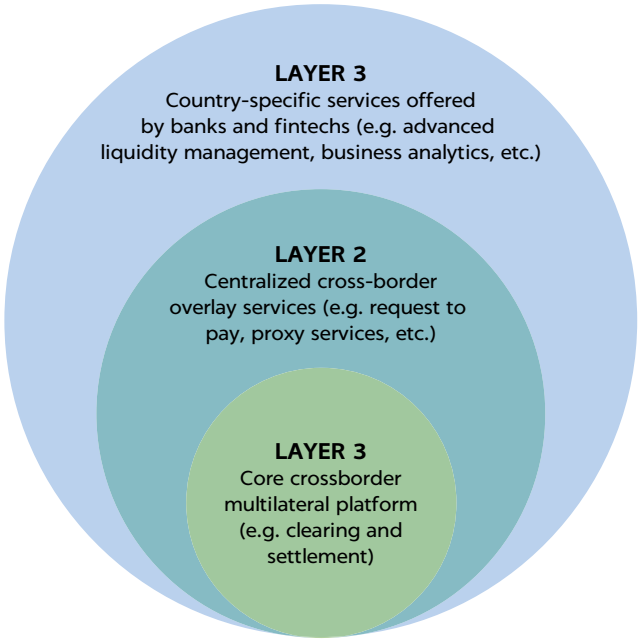
This next section profiles five cross-border FPS, services, and/or schemes that are currently in use or in development globally: the P27 Nordic Payments Initiative, the European Central Bank's TARGET Instant Payment Settlement (TIPS) infrastructure, SWIFT's GPI instant service, the linkage between Thailand's PromptPay and Singapore's PayNow, and the Southern African Development Community's Transactions Cleared on an Immediate Basis (TCIB) scheme.

P27 Nordic Payments

The Nordic region has perhaps the most digitalized payment sector in the world, as all four countries report the share of cash payments between 10 and 20 percent. The region is therefore well positioned to launch the P27 Initiative, perhaps the most ambitious and pioneering cross-border FPS in development.[33] Following years of prior collaboration between Nordic banks to develop shared payment services and infrastructures, the initiative aims to establish the first integrated regional payment platform for domestic and cross-border transactions in multiple currencies.[34] Having been conceived of by a consortium of Nordic banks, the system is now being governed by the Nordic Payments Council. Aiming to overhaul the various legacy systems that tend to be relatively inflexible and therefore hinder innovation, the platform's architecture reflects three planned layers: a core platform, providing pan-Nordic, multicurrency clearing based on ISO 20022; a second layer, allowing for the development of a proxy registry that could allow for the development of a range of overlay services, such as onboarding for both consumers and businesses, request-driven bill payments and e-invoicing, enhanced transaction-fraud management and transaction-screening services, and digital receipts; and a third layer, upon which individual banks and fintechs could develop new and innovative products and services for their customers.

Financial institutions in the Nordic countries see P27 as an eventual replacement for national FPS and as a foundational platform for standardized innovative services throughout

FIGURE 5 **Conceptual Representation of P27 Model**



Source: Own elaboration

the region.[35] A go-live date for the system has not been set, but the first P27 transaction could happen as early as 2021. In the meantime, the initiative is still seeking to overcome various hurdles. The introduction of a new state-of-the-art platform requires large transformations for banks in the form of modernizing or replacing existing internal payment infrastructures, and amid the COVID-19 pandemic, banks have been struggling to prioritize various modernization initiatives. P27 is also highly dependent on various approvals and license clearances from regulators, including approval for P27's acquisition of the Swedish clearing house Bankgirot, and the development of a clearing platform with Vocalink (a Mastercard company).

TARGET Instant Payment Settlement

TIPS is a classic example of a cross-border multilateral system that serves a single-currency union. It was developed as an extension of TARGET2 in 2018. Institutions must fulfill the same eligibility criteria to join TIPS that they fulfill to participate in TARGET2. TIPS is based on the ISO 20022-based SCT Inst scheme developed by the European Payments Council, and it operates on a cost-recovery not-for-profit basis; the price per transaction is fixed at €0.20. While it currently settles payment transfers only in euros, beginning in May 2022 it will also settle instant payments in Swedish krona.[36] Key features of the system are its ability to process 500 payments per second (2,000 at peak rate), or 43.2 million payments a day.[37] Volumes averaged roughly half a million transactions per day as of late 2020 or about 7 percent of all SCT Inst volumes.[38]

Following the development of the pan-European SCT Inst scheme for euro-denominated fast payments and the launching of national FPS and solutions, European policy makers have become increasingly concerned about the reemergence of fragmentation in the European retail payment market. Achieving pan-European reach and greater adoption of fast payments has become an important policy priority in Europe and largely motivated the European Central Bank's introduction of TIPS following the introduction of EBA Clearing's R1 infrastructure in 2017. In July 2020, the bank approved a set of measures known as the "Pan-European Reachability Package," mandating that all PSPs that have adhered to the SCT Inst scheme and have access in TARGET2 should also have access to a TIPS account, and requiring that all automated clearing houses migrate their technical accounts from TARGET2 to TIPS to offer instant payments.[39]

PromptPay and Paynow Linkage in Thailand/Singapore

There are several examples of advances in the cross-border payment space in the Association of Southeast Asian Nations (ASEAN) region. The Bank of Thailand in particular has become a regional leader, collaborating with various central banks and other stakeholders to enhance cross-border payments using new technologies. Current pilot projects include the use of DLT, interoperable QR payments, and APIs in countries such as Cambodia, Indonesia, Laos, and Myanmar.[40]

With regard to FPS linkages, the Bank of Thailand and Monetary Authority of Singapore have been working since 2018 to support the creation of a cross-border link between the mobile peer-to-peer transfer services PromptPay and Paynow to facilitate cheaper and easier remittance flows between the two countries.[41] Used by approximately a third of Thai consumers, PromptPay comprises a real-time clearing and settlement infrastructure with a "translator" for converting messages from ISO 8583 to ISO 20022 and a proxy lookup service that securely maps recipient mobile-phone numbers to bank account details.[42] Similarly, Paynow is a highly successful central addressing scheme that builds on Singapore's FAST and allows registered users to send money in real time using their mobile numbers.[43] Both systems were originally built by Vocalink, a Mastercard company. The first cross-border transactions went live on April 28, 2021, with just a small group of banks participating. In August 2020, the deputy governor of the Central Bank of Malaysia (Bank Negara Malaysia) announced that the linkage would be extended to Malaysia's DuitNow, an equivalent service available only in Malaysia at present.[44]

Buna

Historically, the Arab region has relied heavily on correspondent banking for cross-border payments and settlement. Recent stricter AML/CTF requirements from banks in the United States and Europe, and the consolidation of correspondent banks that has occurred over the last decade hit the region's correspondent banks particularly hard, leading to higher administrative and compliance costs and higher fees for end users. In response, the Arab Monetary Fund launched the Buna platform, a new cross-border multilateral payment platform that currently clears and settles in three regional currencies and US dollars and plans to include euros and at least one other regional currency in the near future.[45] Other goals for the platform included promoting the usage of local currencies for cross-border transactions. The system is based on CMA's RTS/X product and supports ISO 20022 for payments and ISO 15022 for eventual securities clearing and settlement. Although it does not process fast payments at present, the Arab Monetary Fund has announced plans for Buna to launch a fast payments service, to offer trade-finance solutions, and to provide securities-settlement and ATM/point-of-sale processing services at a later stage, although concrete details are limited at this stage.[46]

Transactions Cleared on an Immediate Basis

As early as 2016, members of the SADC Banking Association and other regional stakeholders began development around a scheme for processing cross-border peer-to-peer mobile payments to ease remittance flows between countries in the Southern African Development Community (SADC) and increase financial inclusion in the region. Gaining traction over the past year, the scheme has since evolved to become TCIB, an interoperable payment scheme that will be based on ISO 20022 and operated by BankservAfrica. Initially, TCIB will support transactions only in South African rand and US dollars, but the goal is to support transactions in any SADC currency eventually.[47]

Prior regional cooperation on the cross-border RTGS system SIRESS in the SADC region will likely help to facilitate a future framework for the creation of new cross-border FPS. However, past challenges facing the TCIB project will likely be similar as well, such as how to encourage usage of the system, given the large underbanked population, low mobile-phone penetration, and consumers' general lack of trust in banks. A lack of proper customer documentation for KYC purposes in some SADC countries also poses challenges for standardization of these requirements at a multilateral level. Creating uniform business-continuity plans across countries is also challenging in this context, given differences in the quality of IT and other infrastructure across countries and varying degrees of country risk.

Launch of India's BHIM UPI App in Singapore

The National Payments Corporation of India launched the Unified Payment Interface (UPI) in 2016. It facilitates fast payments through a mobile device that can be used at the point of sale, for bill payments, and for online merchant payments, as well as many other use cases. The service is widely used in India: 216 banks offer it, there are more than 100 million users, and over two billion transactions are processed per month.[48] The other FPS is the Immediate Payment Service (IMPS), which is based on ISO 8583. The deferred net settlement for IMPS and UPI is performed separately six times a day for each system. In 2020, the National Payments Corporation launched its UPI-based BHIM app in Singapore in partnership with the Network for Electronic Transfers, Singapore's local debit card network. As a QR code–based app, it allows anyone with the BHIM UPI app to scan the Singapore Quick Response Code at the point of sale and pay for transactions in Singapore while using India's UPI system for settlement. This allows Indian bank account holders to make point-of-sale payments in Singapore without having to exchange currencies or use an internationally valid payment card.

Comparing Cross-Border FPS Arrangements

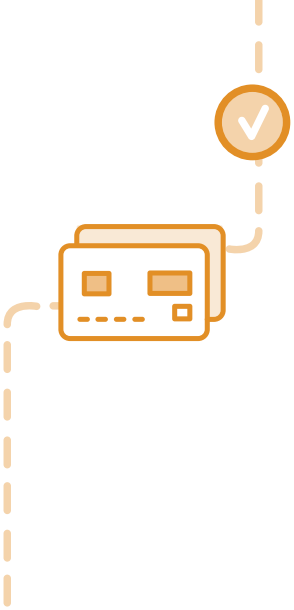
A variety of differences in the design and implementation of the cross-border FPS currently live or in development can be highlighted. These differences can generally be interpreted as a function of the types of economies involved

TABLE 1 **Summary Comparison of Cross-Border FPS in Use or in Development**

	TYPE OF STAKE-HOLDERS	BILATERAL OR MULTI-LATERAL	COUNTRIES	SYSTEM TYPE	LAUNCH DATE	CURRENCY	MESSAGING STANDARD
P27	Private	Multilateral	Denmark, Norway, Sweden, Finland	New	2021	Danish krone, Swedish krona, euro	ISO 20022
TIPS	Public	Multilateral	European system (and Sweden, beginning in 2022)	New	2018	euro (Swedish krona beginning in 2022)	ISO 20022
Buna	Public	Multilateral	Arab Monetary Fund members	New	2020 for interbank payments, not yet live for "fast payments"	UAE dirham, Egyptian pound, Saudi Arabian riyal, US dollar Jordanian dinar, euro (expected)	ISO 20022, ISO 15022
PromptPay and PayNow linkage	Public	Bilateral, may extend to be multilateral	Thailand, Singapore, with plans to include Malaysia	Linkage between existing infrastructures	2021 (expected)	Thai baht, Singapore dollar	ISO 20022
SADC TCIB	Public	Multilateral	17 countries in southern Africa	New	2021 (expected)	South African rand, US dollar	ISO 20022
BHIM UPI Launch in Singapore	Private	Bilateral	India, Singapore	Linkage between existing infrastructures	2020	Indian rupee	Proprietary

(for example, cash based or cashless), the level of economic integration already achieved (for example, Euro system versus ASEAN), existing regional payment habits, and the specific legal and regulatory hurdles to be overcome. Moreover, if public stakeholders are involved, policy makers' specific policy priorities (improved ease of remittance flows, increased trade and economic integration, increased innovation and digitalization, and so forth) also have a great influence on the system design and implementation approach observed thus far.

Despite the uniqueness of each of these cross-border FPS arrangements, some commonalities stand out. The first is the use of ISO 20022 for payment messaging (including the conversion from ISO 8583 to ISO 20022 in the ASEAN region). The second is the trend toward multicurrency arrangements (either from the outset or as an envisioned future state). As these systems go live and existing systems such as TIPS include additional currencies for settlement, this may influence the further development of cross-border FPS elsewhere.



5 POTENTIAL IMPLICATIONS FOR NATIONAL SYSTEMS

The development of cross-border FPS need not entail the replacement of national FPS or other legacy payment infrastructures. While some initiatives, such as P27, do envision the eventual replacement of domestic payment systems with a common domestic and cross-border FPS infrastructure, it is unlikely that cross-border linkages between FPS or the development of a multilateral cross-border FPS will result in the shutting down of domestic payment systems in most countries. But the development of cross-border FPS arrangements will have implications for legacy domestic payment systems because it will represent a significant step in further leveraging domestic payment systems for cross-border payments. This is new territory in most markets.

Global card schemes such as Visa and Mastercard—which also facilitate the processing of domestic debit and credit card transactions in some markets—already play a role in facilitating cross-border payments for consumers. But these are not strictly domestic payment systems. Domestic payment systems such as ACH or FPS do play a role in cross-border payments today, but only in a limited way. The United States' ACH system features the International ACH Transaction (IAT) format to identify cross-border payments that are partially processed using the ACH system,[49] while the United Kingdom's Faster Payments System includes the Payments Originating Overseas code to identify international transactions. While these domestic payment systems may be used for one leg in a cross-border transaction today, banks still rely on correspondents to route transactions overseas and provide foreign-exchange services, and the majority of cross-border payments still rely on nostro-vostro accounts and reconciliation. These larger correspondents are free to determine the route that a cross-border transaction takes (a route that may include a domestic payment system as part of the larger transaction flow). Introducing codes such as IAT, which can help identify a cross-border transaction that flows through a domestic payment system, does not address issues around compliance and reporting requirements that do not apply to domestic transactions.

Major players have begun to rethink how to leverage domestic systems for cross-border use in more innovative ways, such as Western Union's partnership with India's UPI for cross-border remittances[50] and the linkage of SWIFT gpi instant with the United Kingdom's Faster Payments System.[51] But this is still not common. As such, domestic FPS operators and system participants have rarely had to take cross-border functionality and use cases into account. Despite this fact, some of the core elements that can enable cross-border FPS can already be seen in many domestic FPS today. Core elements include the use of ISO 20022, real-time fraud checks and KYC processes, and new FPS architectures that separate the clearing and settlement layer from access and services. As the development of cross-border FPS arrangements proceed, stakeholders involved in domestic payment systems should consider the following issues in domestic payment processing.

5.1. MESSAGING STANDARDS

ISO 20022 is already the de facto global standard for domestic FPS and is highly likely to play a key role in cross-border FPS arrangements. For markets that have not yet launched a domestic FPS, the choice of ISO 20022 for payment messaging is clear. For existing domestic FPS that use legacy standards, such as ISO 8583 or a proprietary national standard, there has already been pressure to replace these legacy standards with ISO 20022. The United Kingdom's New Payments Architecture, which is currently being developed, will consolidate legacy ACH and FPS payment systems on a single platform. This platform will use ISO 20022 for messaging in an effort to standardize payment processing and enable new services enabled by the standard's rich data capacity. The development of SEPA began with the development of common scheme rules for ACH payments that leverage ISO 20022. The expansion of SEPA to include FPS has also involved the use of ISO 20022 for the SCT Inst scheme. The continued expansion of domestic FPS, the renovation of legacy systems such as ACH, and the development of cross-border FPS arrangements are helping solidify data standardization through the use of ISO 20022.

5.2. SYSTEM ARCHITECTURE

The development of cross-border FPS is part of the larger evolution of FPS. The first generation of FPS focused exclusively on the real-time clearing of payment messages (often with deferred settlement). As use of these systems evolved and new systems were introduced (which typically feature real-time settlement and the use of ISO 20022), system participants recognized that the true value of FPS comes not in the underlying clearing and settlement of payments, but in creating new interfaces that interact with FPS to offer end users improved products and services. The development of common person-to-person apps, such as Swish in Sweden or MobilePay in Denmark, have enabled consumers to send and receive FPS payments using a proxy, such as a mobile-phone number or an email address. Many systems are now developing request-for-payment functionality, allowing a beneficiary to initiate a transaction by sending a payment request to the sender, who can accept the request to trigger an FPS payment.[52]

This shift in focus from the underlying clearing and settlement mechanism to end user–facing products and services has also heralded a shift in FPS architecture for newer FPS. Australia's New Payments Platform includes an overlay-services interface that allows financial institutions or other authorized PSPs to offer services to all system participants that leverage the platform's real-time clearing and settlement mechanism. The development of cross-border FPS is another step in this process. The linking of different domestic FPS or linkages between a domestic FPS and a cross-border FPS will require new interfaces with domestic FPS or with financial institutions themselves. As cross-border FPS becomes a reality with systems such as P27, there may be a new push to develop interfaces in domestic FPS that ease the links with a cross-border FPS arrangement. The seamless integration of both domestic and cross-border FPS will require such interfaces in new or existing domestic FPS. Any market that is currently developing a domestic FPS may take this into account as they design their system architecture, and any modernization program for legacy payment systems may do the same.

5.3. KYC AND SANCTIONS CHECKS

The move from batch-based clearing and settlement to real-time clearing and settlement in FPS has necessitated speeding up KYC and sanctions checks by system participants. In an FPS environment, where end-to-end processing occurs in seconds, banks cannot afford to hold payments for additional checks or manual processing. In a domestic environment, where all system participants are overseen by a single national authority, all stakeholders have clarity on the KYC requirements and sanctions lists against which the payment transactions are to be screened. But for cross-border FPS, participants in different jurisdictions may have different requirements for KYC, AML/CTF, and sanctions screening.

This lack of uniform standards and the need to comply with requirements set by national authorities is one of the key reasons why cross-border payments are so slow and expensive today. In a typical cross-border payment today, each correspondent performs its own KYC and sanctions checks, even if another trusted institution has already performed these checks. Any cross-border FPS arrangement will likely include a process for harmonizing the requirements for KYC and sanctions checks among all participants. This may in turn have effects on KYC and sanctions checks in national FPS as well, particularly if the cross-border FPS arrangement involves linkages between national infrastructures. This may result in changes to existing national payment systems or a new approach to KYC and sanctions checks in domestic FPS currently in development, as stakeholders may take the needs for KYC and sanctions checks in an international environment into account.

5.4. SCHEME RULES AND OPERATIONS

As the development of cross-border FPS arrangements continues, processing flows for domestic and cross-border payments will merge. This may prompt a reassessment of scheme and operational rules in domestic FPS. This may involve new message codes to identify cross-border payments, changes in response times or technical processing windows for cross-border payments versus domestic payments, an expansion of participation beyond financial institutions, or additions to indemnity or liability for transactions involving cross-border payments. The degree to which cross-border FPS affects scheme and operational rules in national FPS will depend on the type of cross-border FPS arrangement that is pursued. An arrangement that links domestic FPS may entail more changes to domestic scheme rules than the development of a multilateral cross-border FPS infrastructure. But even the development of new multilateral cross-border FPS could have effects on national FPS as system participants adjust their core IT systems and business processes. Greater efficiency in cross-border payments could therefore enable greater efficiency for domestic payments and vice versa.

5.5. LEGAL RISKS AND LIABILITY AND FRAUD

As cross-border FPS arrangements go live—whether by linking domestic FPS or through a multilateral cross-border FPS—issues around legal liability and fraud in domestic payment systems may have to be reassessed. If a domestic FPS processes payments originating from a foreign jurisdiction, system participants will need legal clarity on liability in the case of a system malfunction, mistaken payment, or failure to settle by one or more participants. Similarly, any linkage between national FPS or between stakeholders in different jurisdictions in a cross-border FPS infrastructure may require participants to adjust fraud-screening processes. This may also involve the cross-border FPS operator (or the national FPS operators linked in a cross-border FPS arrangement) playing a stronger role in detecting fraud patterns (for example, mule accounts in multiple countries). As payments speed up, the potential for fraud does as well. The cross-border context brings a new dimension to fraud and liability that will need to be dealt with proactively and continually reassessed as fraud threats evolve.

5.6. CONTINUED OPERATION OF LEGACY NATIONAL PAYMENT SYSTEMS

Perhaps the biggest long-term implication of cross-border FPS arrangements is the potential for a cross-border system eventually to replace one or more legacy domestic payment systems. This is not expected to be an issue in the near term, however. While the introduction of domestic FPS has not led to the replacement of legacy systems such as ACH or card networks, the continued development of FPS in a domestic and cross-border context could lead to a reassessment of the utility of legacy payment systems as volumes grow and system participants make the necessary internal adjustments to IT and business practices to process payments and transactional data in real time. The introduction of cross-border FPS could also lead to the integration of domestic FPS into a cross-border FPS arrangement. Regions with a lower degree of cooperation may not see this as an end goal today, but the drive for operational efficiency in payment processing will not end with the introduction of domestic or cross-border FPS. This process is based on the capabilities of current systems, the evolution of end users' expectations, and advances in technology that make new arrangements not only possible but desirable.

The Bank for International Settlements Innovation Hub Singapore Centre and the Monetary Authority of Singapore have jointly published the report *Nexus: A Blueprint for Instant Cross-Border Payments*. Nexus is a blueprint to connect multiple instant-payment systems. It aims to enable cross-border payments in less than 60 seconds. Nexus is a model for connecting multiple national payment systems into a cross-border platform that could enable international payments to happen as quickly as sending a text message. (See box 1.)

BOX 1 THE POTENTIAL FOR LINKING FAST PAYMENT SYSTEMS

FPS enable domestic account-to-account payments, with the recipient being credited in real time (or near real time) on a 24/7 basis. Fintechs are participating in the domestic FPS with a number of fintech providers that have direct or indirect access to FPS to provide near-instant cross-border payments. With the potential of the FPS being leveraged for cross-border payments, linking FPS would go further by creating interoperability and connecting payment infrastructures—rather than banks—across borders. The Committee on Payments and Market Infrastructures has identified linking FPS as one of the "building blocks" for enhancing cross-border payments.

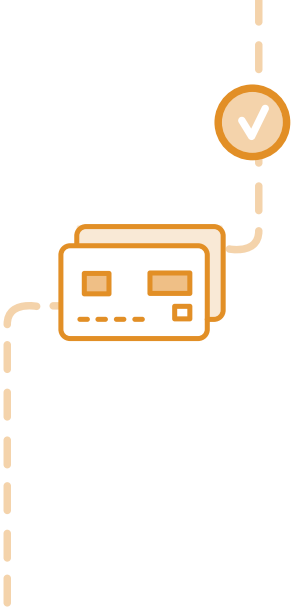
However, linking FPS is not straightforward and has challenges, apart from currency conversion, related to such aspects as differing processes and functionality and, often, different "languages" in the way they share data and payment instructions. Each FPS may use different

- Data formats, standards, and mandatory fields;
- Processes and the sequence of steps in a payment process;
- Scheme rules around liability, disputes, data protection and privacy, and so on; and
- Functionality, including whether aliases are used and whether there is a confirmation of payee service.

The complexity increases exponentially as more participants join the network. For example, three countries require just three country-to-country links, but a network of 20 countries would require 190 country-to-country links. Most problematically, the complexity involved could potentially put the resilience of the domestic payment system—which may be systemically important—at risk.

Nexus overcomes the complexity of linking FPS on a country-to-country basis by providing a standardized way for domestic payment systems to speak to each other. This enables "interoperability" between payment systems. Nexus will use the ISO 20022 standard for data messages when sending cross-border payment messages. It will also provide message translation for FPS that do not use ISO 20022, as well as storage for "overflow" data that will not fit into domestic payment messages. However, where the domestic FPS can migrate to ISO 20022 for its domestic payment messages, there are advantages for end users, FPS members, and cross-border interoperability.

Source: Bank for International Settlements, "BIS Innovation Hub and Monetary Authority of Singapore Publish Proposal for Enhancing Global Real-Time Retail Payments Network Connectivity," press release, July 28, 2021, https://www.bis.org/press/p210728.htm.



6 CONCLUSION

Since the modernization of domestic payment systems in many markets is well underway, many in the financial services industry are looking at ways to improve the speed, efficiency, and cost of cross-border payments. The inefficiencies of current correspondent banking arrangements are clear. But this fact alone is of little help for policy makers and other stakeholders who are interested in finding the best approach for cross-border FPS. Every geography begins with a different starting point. Some markets already have a domestic FPS, while others may have only batch-based payment systems or a proliferation of closed-loop solutions aimed at serving the unbanked. The World Bank's guidelines for successful regional integration provide high-level guidance for developing cross-border integration. (See box 2.)

BOX 2 WORLD BANK GUIDELINES FOR SUCCESSFUL REGIONAL INTEGRATION OF FINANCIAL INFRASTRUCTURES[53]

The G25 Panel of Experts, led by the World Bank, drafted 19 guidelines to provide high-level guidance to principal policy makers and stakeholders on developing regional or cross-regional integration of financial infrastructures. The guidelines belong to the following categories:

Enabling and Institutional Guidelines
Outline the set of institutional arrangements that enable a proposed regional integration of financial infrastructures to move forward from its preliminary vision to an actual operational arrangement in an effective fashion.

Planning Guidelines
The basis for determining if regional integration of financial infrastructures is necessary and justifiable for the stakeholders in the region at that particular time. This is the make-or-break stage at which regional integration initiatives either move forward or are postponed.

Design Guidelines and Implementation Guidelines
Deal with the heart of the program to integrate regional financial infrastructures. It is at these stages of the integration initiative that leadership, commitment, consultation, and effective management become most crucial.

Sustainability Guidelines
Help establish a strategic direction and sound business culture for the regional arrangement that, together with the continuous oversight from public-sector authorities, will help ensure that it will continue to evolve and develop to meet future stakeholder needs, legal and regulatory requirements, and policy standards affecting its operations, and do so in a transparent and credible fashion.

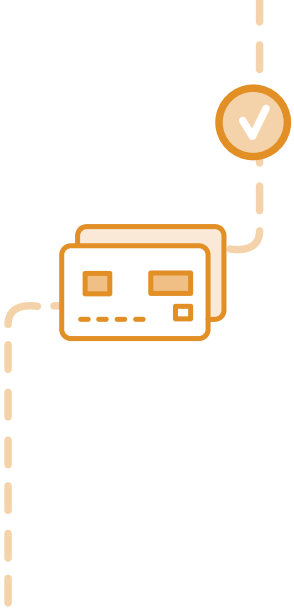
Different regions may feature a single powerful economy or a mix of similarly sized economies with a history of collaboration (as in the Nordic region). But regardless of where stakeholders start, policy makers everywhere should make a number of key decisions to determine the type of cross-border FPS arrangement that is appropriate for the local context. Table 2 provides an overview and sequencing of these key decisions.

TABLE 2 Decision-Making Framework for Establishing Cross-Border Fast Payments

DECISION	DESCRIPTION	BEST PRACTICES	STAKEHOLDERS INVOLVED
1) Determine key use cases/goal of cross-border fast payment arrangements.	Understand the purpose of cross-border FPS arrangement, including target use cases (for example, remittances, business-to-business payments) and major international corridors.	• Conduct wide public and private stakeholder engagement. • Focus on cross-border solutions, including non-bank solutions, to determine end users' needs and expectations. • Formal market consultation backed by national authorities and linked to major public-policy goals (for example, financial inclusion).	• National payment authorities • Financial institutions • Non-bank payment providers • Major industry • Regional economic institutions (if applicable)
2) Assess existing payment systems for cross-border use.	Examine functionality of existing payment systems (FPS and batch-based systems) and assess against the goals/use cases identified in step 1. This step can help stakeholders determine whether a cross-border FPS arrangement can be developed by linking existing national FPS or if the creation of a new cross-border FPS is necessary.	• Assess existing FPS functionality, data standards and messaging of existing systems, potential for multicurrency settlement, and capabilities for enhanced KYC and AML/CTF processes. • Conduct cost/benefit analysis of using existing systems versus building a new system (for example, estimate size of investment required for modernization).	• National payment authorities • Provider operating/setting up the system • Financial institutions
3) Assess existing legal/regulatory frameworks.	Determine whether the necessary payment system functionality is in line with existing legal and regulatory frameworks.	• Identify key legal and regulatory issues related to cross-border payments. • Identify any obstacles to cross-border FPS that arise from existing regulations (for example, licensing). • Assess need for reform of existing regulations or need to introduce new legislation.	• National payment authorities • Financial institutions • Relevant government bodies (for example, tax and legal departments)
4) Identify participating markets and FPS participants.	Determine market scope of cross-border FPS arrangement (for example, bilateral corridor, multilateral corridor) and the participating institutions in the system (for example, central banks, national payment system operators, financial institutions, non-bank payment providers).	• Identify key regional corridors (bi- and multilateral) for cross-border payments. • Determine key stakeholders in relevant markets. • Engage these stakeholders and determine willingness to join a cross-border FPS arrangement. • If a cross-border FPS arrangement begins with a smaller number of countries (for example, a subset of countries within a regional trade association), determine mechanisms for expanding market scope at a later date.	• National payment authorities • Financial institutions • National/regional banking associations • If applicable, regional trade association
5) Determine appropriate governance structure for cross-border FPS.	Before the technical infrastructure for a cross-border FPS is developed, it is crucial to determine a governance structure for the FPS.	• If an appropriate governance structure does not already exist (for example, as part of an existing bilateral/regional institution), it may be necessary to create a new institution to govern the cross-border FPS arrangement. • All markets and stakeholder groups taking part in the cross-border FPS arrangement should be represented in the governance structure.	• National payment authorities • Financial institutions • If applicable, regional trade association
6) Determine key functionality and technical specifications for cross-border FPS.	Following the work done in steps 1 and 2, stakeholders can begin identifying specific functionality needed in a cross-border FPS arrangement. The necessary functionality will inform the technical specifications used in the system design.	• A partial list of key functionality to determine: settlement method (real-time or deferred), data standards and messaging, single-currency or multicurrency processing, access methods, the need for centralized value-added services (for example, proxy messaging service, request for payment, and so on), cybersecurity standards, KYC requirements, reporting requirements, and fraud detection and prevention.	• Cross-border FPS governance body • Financial institutions • National payment authorities (if applicable)

DECISION	DESCRIPTION	BEST PRACTICES	STAKEHOLDERS INVOLVED
7) Develop scheme rules and operational guidelines.	If a new infrastructure is developed as part of the chosen cross-border FPS arrangement, the technical specifications should then be developed into a tender bid/request for proposal, which can then be published to elicit responses from payment technology providers.	• A partial list of elements in FPS scheme rules: system scope, currencies used, transaction value limits, time cycles, messaging specifications and message flows, rights and obligations of system participants, dispute-resolution procedures, service-level agreements among system participants, risk-management frameworks, and cybersecurity standards. • Operational guidelines should take into account IT specifications and cybersecurity guidelines. • Determine the applicable legal jurisdiction(s) in which any disputes arising from the cross-border FPS arrangement will be heard.	• Cross-border FPS governance body • Financial institutions • National payment authorities (if applicable)
8) If applicable, develop tender specifications for cross-border FPS and assessment criteria.	If a new infrastructure is developed as part of the chosen cross-border FPS arrangement, the technical specifications should then be developed into a tender bid/request for proposal, which can then be published to elicit responses from payment technology providers. Note: This step can be avoided if the stakeholders decide to build a cross-border FPS infrastructure on their own. Even in this case, elements of the system may be outsourced to technology providers in a limited request for proposal.	• Determine financing needs of cross-border FPS system and identify potential source of investment (that is, system investment to come from participating institutions, national authorities, or development organizations). • For assessment criteria, determine preference for more turnkey solution or a customized solution. This may be driven by financing, functional specifications, existing technology stack in participating institutions, or other factors. • Consider use of third-party consultants to assist in developing tender specifications and managing selection process, in case of internal capacity constraints.	• Cross-border FPS governance body • If applicable, national authorities or third-party consultants
9) If applicable, assess tender responses and select a technology provider.	Once proposals are received, the cross-border FPS governance body should assess the bids in line with the assessment criteria developed as part of the tender process. This may involve assistance from other national authorities or third-party consultants. During the assessment process, short-listed technology providers may be asked to present their proposal in more detail to the assessment team. In addition to the technical functionality and system design specifications, the tender process will also include the development of service-level agreements and legal agreements between the chosen technology provider and the cross-border FPS governance body (or any relevant national authorities).	• Consider use of third-party consultants to assist in developing tender specifications and managing selection process, in case of internal capacity constraints.	• Cross-border FPS governance body • Technology providers • If applicable, national authorities or third-party consultants
10) If applicable, test and implement.	Once a technology provider is selected, the system operator and system participants will work to test and implement the cross-border FPS. The implementation schedule should take into account the needs of system participants and feature clear milestones and a go-live date.	• Determine appropriate testing and migration period collaboratively with system participants. • Set clear milestones for implementation and system go-live date. • Develop post-implementation milestones (for example, expected volumes, use cases, and so forth).	• Cross-border FPS governance body • Technology providers • Financial institutions • If applicable, national authorities or third-party consultants

Any cross-border FPS arrangement will require cooperation between financial institutions and national authorities from multiple jurisdictions. This international cooperation is absolutely vital to the success of any cross-border FPS. Developing cross-border infrastructures on the basis of FPS and functionality holds immense promise to improve cross-border payments for all stakeholders involved. The success of such initiatives will be a crucial step in the expansion of global trade and economic development.



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NOTES

1. According to the Committee on Payments and Market Infrastructures, a fast payment can be defined as a payment 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-hour and seven-day (24/7) basis as possible."
2. For example, the Federal Reserve expanded its operating hours for its Fedwire Funds Service beginning in March 2021. See https://www.frbservices.org/news/communications/020521-fedwire-expansion-operating-hours-associated-changes-fedwire-funds-nss.html#:~:text=As%20previously%20announced%20(Off%2Dsite,to%207%20p.m.%20ET%20from
3. The United Kingdom's Faster Payments System requires payments to be processed end to end within two hours of initiation, although in practice most banks make funds available within seconds. In Europe, the SCT Inst scheme requires end-to-end processing within 10 seconds, although many banks are able to process SCT Inst payments within a few seconds.
4. Note: An FPS must clear payments in real time (meaning that all payments must be processed and made available to the beneficiary within seconds), but an FPS does not have to settle payments in real time. (Settlement occurs when financial institutions exchange funds at the central bank.) Most FPS systems today do not settle payments in real time. Many newer systems have adopted real-time settlement (either at the central bank or through the use of prefunded accounts), but this is not a requirement for a system to be an FPS.
5. See the 2016 BIS report on FPS for more definitions related to the implementation of fast payments.
6. https://www.bis.org/cpmi/publ/d147.pdf
7. In this terminology, a nostro account is an account that a bank opens at a foreign correspondent to enable it to send and receive funds in a foreign currency, while a vostro account is an account held by a foreign bank on a local bank's books in foreign currency.
8. See the 2016 CPMI report on correspondent banking for more information: https://www.bis.org/cpmi/publ/d147.pdf
9. https://www.finextra.com/newsarticle/34458/sibos-2019-the-adoption-of-swift-gpi-and-impact-on-global-payments
10. https://www.swift.com/news-events/news/swift-enables-instant-247-cross-border-payments
11. https://usa.visa.com/partner-with-us/payment-technology/visa-b2b-connect.html
12. https://www.paymentsjournal.com/new-mastercard-launch-allows-fast-and-secure-cross-border-payments/
13. https://www.pymnts.com/news/cross-border-commerce/cross-border-payments/2020/western-union-expands-real-time-payouts-to-80-countries/
14. [FOOTNOTE MISSING]
15. JPM Coin is a permissioned shared-ledger system that is intended to facilitate the real-time transfer of value between J. P. Morgan subsidiaries around the world. See https://www.jpmorgan.com/solutions/cib/news/digital-coin-payments.
16. https://www.mas.gov.sg/schemes-and-initiatives/project-ubin
17. https://www.bis.org/publ/bppdf/bispap115.pdf
18. China has already started a limited rollout of its Digital Currency Electronic Payment (DCEP) project in select cities, making it the forerunner in retail CBDC globally. See https://forkast.news/china-dcep-digital-yuan-pros-cons/
19. https://www.abe-eba.eu/media/azure/production/1550/cryptotechnologies-in-international-payments.pdf https://www.fsb.org/wp-content/uploads/P131020-1.pdf
20. https://www.fsb.org/wp-content/uploads/P090420-1.pdf
21. https://www.bis.org/cpmi/publ/d193.pdf
22. Lipis Advisors estimates than 97 percent of global payment volumes are domestic, while only 3 percent are cross-border.
23. In some cases, the settlement of transactions can occur in commercial bank money instead of at the central bank. This happens in some jurisdictions for debit or credit card payments. Central bank settlement removes residual settlement risk that could be present in commercial bank settlement.
24. Most FPS mandate end-to-end processing of payments within 10 seconds, and most system participants clear each payment within seconds.
25. A simplified way to understand settlement versus clearing is that settlement occurs when funds are exchanged between payment system participants (that is, banks), while clearing is when funds are exchanged between end users (that is, consumers or businesses).
26. Many newer FPS systems that have gone live in the last decade do settle FPS payments in real time. This can be done either by updating a central bank's RTGS system to enable 24/7/365 real-time settlement (as in Australia) or through a prefunding mechanism that interfaces with a central bank's RTGS system during its operating hours (as is done in the United States). While there appears to be a trend toward newer FPS systems settling in real time, an FPS system can settle on a deferred net basis.

27. This may either occur through an update to a central bank settlement system or via a prefunding mechanism. In both cases, each system participant needs to ensure that it has adequate liquidity in a settlement account to fund its customers' transactions. This may require new links to top up settlement accounts during off-hours settlement as well as liquidity-forecasting tools for high-volume periods or nights, weekends, or holidays (in the case of a settlement system continuing to operate only during banking business hours).
28. Net debit cap: A participant's net credit or net debit position in a netting system is the sum of the value of all the transfers it has received up to a particular time less the value of all transfers it has sent. If the difference is positive, the participant is in a net credit position; if the difference is negative, the participant is in a net debit position. Depending on the circumstance, these net positions may be calculated on a bilateral or multilateral basis. The cap limits—that is, the quantitative limits on the fund-transfer activity of individual participants in a system—may be set by each individual participant or imposed by the body managing the system; limits can be placed on the net debit position or net credit position of participants in the system. The limit placed on the net debit position is the net debit cap (based on a definition in the Committee on Payments and Market Infrastructure's glossary).
29. https://www.swift.com/swift-standards/iso-20022/iso-20022-programme/timeline
30. https://www.psr.org.uk/our-work/app-scams/
31. The currency composition of reserves is based on several aspects: trade flows, aid, remittances, payments by persons, corporations, and governments, and, in addition, is guided by the statutory provisions in the central banking law (which usually has provisions on the type of assets, markets, and currencies in which the reserves can be invested). Given this dimension, there may not be any need for adjustment in the currency composition of reserves, as the amount involved in cross-border FPS (being largely retail in nature) would not be so significant as to warrant or necessitate any changes to the composition of reserves. In any event, FPS would not necessitate adjustment in the currency composition of reserves, as payments are already factored in to a large extent in deciding upon the composition.
32. https://www.bis.org/publ/bppdf/bispap115.pdf
33. P27 White Paper, November 2020.
34. P27 White Paper, November 2020.
35. https://nordicpayments.eu/nordea-the-true-value-of-p27-is-what-we-can-add-on-top/
36. https://www.ecb.europa.eu/paym/target/tips/html/index.en.html
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38. https://www.ecb.europa.eu/stats/payment_statistics/large_value_payment_systems/html/19_table1.en.html
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41. https://fintechnews.sg/45923/mobilepayments/singapore-and-thailand-to-enable-cross-border-payments-using-only-mobile-numbers-in-2021/
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47. https://www.sadcbankers.org/subcommittees/PaySystem/sadcpsoc/Documents/SADC%20PSOC%20Report%20-%20April%202017%20to%20March%202019.pdf
48. https://www.npci.org.in/what-we-do/upi/product-statistics
49. https://www.nacha.org/content/international-ach-transactions-iats
50. https://ir.westernunion.com/news/archived-press-releases/press-release-details/2019/Western-Union-Expands-Real-Time-Global-Cross-Border-Payments-to-India/default.aspx
51. https://www.swift.com/news-events/news/swift-enables-instant-247-cross-border-payments
52. In effect, a request for payment mimics a direct debit payment by allowing the beneficiary to initiate a transaction. However, a request for payment is still a "push" payment—meaning that the sender has full control over the sending of funds. Traditional direct debits are "pull" payments that actually allow a beneficiary to initiate the transfer of funds.
53. https://documents1.worldbank.org/curated/en/553331468182345838/pdf/96464-WP-Box391445B-PUBLIC-ADD-TOPIC-payment-systems-remittances-and-other-related.pdf

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