



FOCUS NOTE

# INTEROPERABILITY IN FAST PAYMENT SYSTEMS

Part of the World Bank Fast Payments Toolkit

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## 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.<sup>1</sup> 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](http://fastpayments.worldbank.org) and consists of the below 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 on the technical, legal, and business implications of payment system interoperability, with a focus on FPS. This topic is of relevance as new players enter the payment services industry and as FPS continue to mature in many markets.





## 2 BACKGROUND

In most markets, payment ecosystems are required to be interoperable to some degree. Consumers and businesses have multiple options for sending and receiving electronic payments. Many of these options are available through their bank account or a third-party wallet. These diverse payment ecosystems cater to a particular payment instrument operating on different payment infrastructures that are not always interoperable. Banks, infrastructure providers, and non-bank payment service providers (PSPs) often manage a complex set of IT systems, operational procedures, and scheme rules that enable them to connect to multiple payment systems and offer payment system functionality to their customers from a single account. Increased interoperability of payment systems has the potential to boost competition in payment services, resulting in more innovative products and services for end users. It could also add efficiency to payment processing for system participants and help increase financial inclusion in markets where that is a public-policy priority. Reducing the barriers between payment systems can help bring about efficient, cost-effective, and innovative payment ecosystems that benefit end users and further digitalize the economy in both a domestic and cross-border context.

With the introduction of new payment systems—particularly FPS—the potential exists to expand the interoperability of payment systems in numerous ways. Designed as platforms of the future, FPS utilize state-of-the-art technology, software, operational processes, and data standards. Establishing interoperability of FPS with other payment systems is not only a means of increasing efficiencies within a payment

ecosystem but also an important tool for facilitating fast payment adoption. Achieving critical mass of fast payment usage is essential to create the necessary foundation for the market to build new and innovative fast payments-based services for end users.

### 2.1. DEFINING PAYMENT SYSTEM INTEROPERABILITY

Payment systems are not built through technology alone. Payment systems also involve a set of scheme rules that define the guidelines for operations and interbank service levels. In addition, each payment system is made up of system participants that leverage payment system functionality to provide products and services to their customers. And all of this is underpinned by legal frameworks and oversight bodies that ensure that the operations of each payment system follow the relevant laws and regulations and have measures to mitigate any potential risks imposed by the operation of the system. In summary, a payment system is made up of the following core elements:

- **Infrastructure:** The technical systems that facilitate the clearing and settlement of payments. An infrastructure is made up of hardware (for example, servers, VPN connections, and computer terminals) and software (transaction routing and fraud and risk management). The infrastructure is managed by a system operator who ensures that the technical operations of the system are in line with the scheme rules for that payment type.

- **Scheme rules:** Scheme rules define the set of rules, procedures, and technical standards for a payment system. This includes operational specifications for the clearing of payment messages, rules for settling transactions, access requirements for participants, dispute-resolution procedures, maintenance procedures, liability and indemnity procedures, and messaging standards, among others.
- **Applications:** Applications are the payment services used by end users (consumers and businesses) that leverage the underlying functionality of a payment system. Applications may be developed collaboratively among payment system participants (in which case, specifications for these applications may be included in the system's scheme rules), or they can be developed individually by system participants or a group of system participants. (Broad parameters for these applications may be included in a system's scheme rules, but detailed operational rules would be separate from the system scheme rules.)

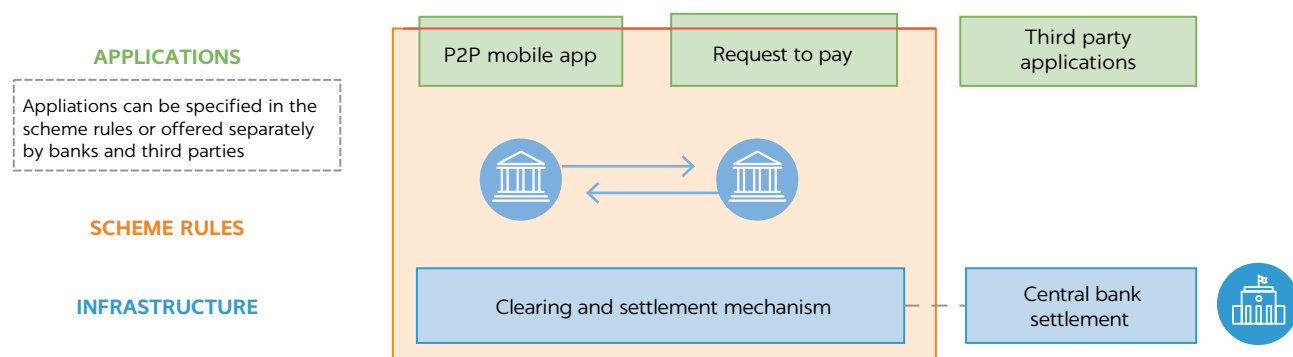
In the most basic sense, interoperability between payment systems involves the capability for one or more elements of the payment system mentioned above to communicate with each other. Payment systems underly all financial transactions—this would not be possible without some degree of industry standardization. The Bank for International Settlements defines interoperability as “the technical or legal compatibility that enables a system or mechanism to be used in conjunction with other systems or mechanisms. Interoperability allows participants in different systems to clear and settle payments or financial transactions across systems without participating in multiple systems.”<sup>2</sup> Put more simply, interoperability “enables the seamless interaction of two or more proprietary acceptance and processing

platforms, and possibly even of different payment products.”<sup>3</sup> Payment system interoperability can occur both in a domestic context and for cross-border payments.

Any interoperability agreement requires both technical interoperability and legal and commercial agreements underpinning the exchange of payments in different systems. Developing the technical, legal, and commercial agreements around interoperability requires broad collaboration and agreement among payment system stakeholders. In some cases, interoperability can be facilitated through new regulations. Ensuring interoperability is more complicated in a cross-border context, as it requires agreement between a larger number of stakeholders and involves harmonization of such issues as know-your-customer procedures, currency conversion, and legal jurisdiction. However, the underlying need for agreement on technical, legal, and commercial issues is the same for both domestic and cross-border interoperability.

Most markets have multiple payment systems that cover different use cases. ACH systems enable bulk credit and debit payments and are often used for recurring payments, such as salaries and utility payments. Debit and credit card networks enable consumers to pay in store or online. Real-time gross settlement (RTGS) systems (also referred as wire systems in some markets) are used for infrequent high-value transactions. FPS are the newest type of payment system, enabling the instant exchange of low-value payments on a 24-hours-a-day, seven-days-a-week, 365-days-a-year basis (24/7/365). Despite the plethora of different payment systems that include many of the same participants, however, the elements of these systems rarely interact with each other.

**FIGURE 1** Three Core Elements of Payment Systems



Source: Own elaboration

## 2.2. BENEFITS AND CHALLENGES OF INCREASED PAYMENT SYSTEM INTEROPERABILITY

Interoperability of payment systems is not an end in and of itself; interoperability is a means for achieving other goals that will depend on the local or regional market context. Expanded interoperability can help promote greater efficiency of payment systems, expand payment networks to enable ubiquity of reach, boost financial inclusion, or enhance competition (among other goals). But the pursuit of interoperability can also entail a number of challenges that must be managed by national authorities and payment system stakeholders alike. The following is an overview of key benefits and potential challenges associated with payment system interoperability.

### Benefits

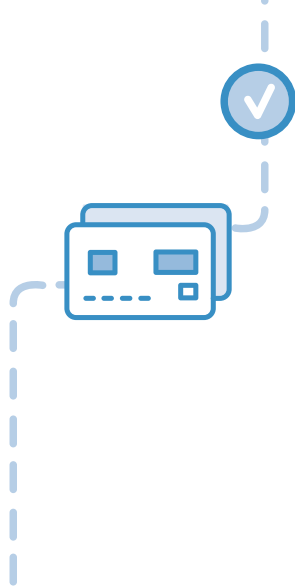
- Increased efficiencies for payment processing:** Increasing efficiency can ensure that the cost of payment processing remains as low as possible for payment system participants, which may translate into lower fees for end users.<sup>4</sup> A key enabler here is the use of common technical and messaging standards that enable seamless communication between payment systems. Banks and other payment system stakeholders today often have to manage multiple separate technical and messaging standards for different payment systems in the same market. This tangle of different standards is even more pronounced when sending cross-border payments. Developing common standards for multiple payment systems with separate message sets for different use cases (that is, bulk payments versus fast payments, retail payments versus wholesale payments, and so on) can help participants and system operators streamline their IT and business processes and reduce costs.
- Expanded reach for electronic payments:** Payment systems are fundamentally networks, and the utility of any network expands as the number of users in that network grows.<sup>5</sup> Achieving ubiquity (measured as the percentage of bank accounts reached by a payment system) is a key building block of successful payment systems. But expanding reach may not be limited to bank accounts alone. A significant percentage of users in a given market or markets may also be using third-party wallets, such as those offered by mobile-money service providers. Linking these third-party networks with interbank payment systems can help expand the reach of electronic payments. This may help support public-policy goals, such as increasing financial inclusion or decreasing the use of cash. Expanding the reach of payment systems can
- also help boost volumes, which may make a system more profitable for system operators and participants alike.
- Increased competition and innovation:** All of the above-mentioned factors—expanded reach, greater efficiencies, and a minimum level of service for end users—will ideally lead to greater competition that leads to more innovative products and services. Devoting less time to managing the operational complexities of connecting to different payment systems, each with its own technical and messaging standards, banks and other system participants can focus more of their efforts on developing new products (either on their own or through partnerships with other players). Expanding the reach of payment systems and connecting closed-loop networks to interbank payment systems has the effect of expanding the number of participants offering payment services. This essentially expands access to core payment systems such as FPS and ACH to new players who may be able to develop services that banks might not be offering.
- Increased transparency for national authorities and system participants:** Interoperability of payment systems can allow system operators and national authorities to gain a more holistic view of payment flows in a given market. This holistic view can help these entities combat fraud more effectively (for example, by detecting mule accounts), which is more difficult when payment systems remain separate. In a cross-border context, interoperability can bring a level of transparency to payment processing that not only helps combat fraud but may also help system participants more accurately identify bi- and multilateral payment corridors. This information can be used to develop new products for these corridors, thereby boosting revenue.
- Uniform service levels for end users:** Enabling interoperability between payment systems can help ensure a minimum standard of service for end users, thereby minimizing different functionality found in separate payment systems, which translates to a different level of service for end users. For instance, payments made using an ACH system are not instantly available in a customer's account, whereas payments made using an FPS are available to the beneficiary within seconds. While some differences in service levels can always be expected from varying payment systems, problems may arise when service levels in one system fall far short of a minimum standard set by a national authority or payment system operator. This is often a challenge with closed-loop payment systems developed by third parties. If a payment takes days or weeks to arrive in a customer's account (as is often

the case with cross-border payments), or if a payment message can enable only a few characters of additional information related to the payment, a national authority (or group of payment system participants) may pursue interoperability as a means of improving the level of service for end users. Allowing different payment systems to communicate could allow for an expansion of one system's functionality or for a consolidation of the functionality of two systems into a single offering for a bank's customers. It can also give end users increased choice in payment services and functionality—either in a domestic context (for example, by linking an FPS with a closed-loop network offered by a third party) or for cross-border payments (for example, by giving consumers the choice between traditional remittance providers, third-party networks, or FPS-based payments from their bank account).

### Potential Challenges

- Different payment systems tailored to different use cases:** Another key reason for the proliferation of separate payment systems is that many of these systems are tailored to a specific group of use cases that may not be a target for other systems. Batch-based ACH systems feature both credit and debit functions that can be used for high-volume scheduled payments such as salary disbursements or regular bill payments (for example, rent or mortgage payments). Debit and credit card systems are tailor-made for merchant payments (both in store and online). Wire payments (RTGS) are typically used for high-value and time-critical transactions with real-time settlement of payments, transfer instructions, or other obligations. FPS target retail ad hoc payments where speed of funds transfer is paramount—for example, person-to-person (P2P) payments, nonscheduled bill payments, wage disbursements, and so on. While interoperability between these systems may be possible on a technical level, the business logic behind interoperability may not always be clear. Thus, any attempt to boost interoperability between payment systems should be done with a clear business or technical goal in mind.
- Risk of increased fraud:** The development of any new payment system always entails the potential for an increase in fraud. Fraudsters are very flexible and innovative, and the development of a new system or payment channel will always raise their attention. By facilitating the real-time exchange of funds between accounts, FPS may be particularly attractive to fraudsters. While interoperable payment systems provide system operators, participants, and national authorities new opportunities to detect and prevent fraud, the opposite is also true. Fraudsters will pursue any advantage they can to transfer fraudulent funds faster and mask the transfer of these funds through the use of different systems and accounts. Any interoperability initiative must account for this and develop safeguards that must be constantly reevaluated as fraudsters develop new ways to take advantage of these systems. Harmonizing fraud-prevention practices by system participants in different networks may be advisable in this context, as would the sharing of information between system operators to detect fraud at a network level as it occurs.
- New barriers to access:** While interoperability promises to expand the reach of payment systems and enable new players access to payment system functionality, this potential is highly dependent on technical specifications and scheme rules. If interoperability between payment systems is developed in a way that raises the technical and compliance burden on system participants, it may lead to a situation in which only some players can afford to comply with the new system requirements. If this occurs, it may have the unintended effect of reducing the number of participants who can use these systems—which may lead some PSPs to rely on other PSPs to access payment systems (so-called indirect access) or cause a proliferation of closed-loop solutions by some players. Interoperability must be pursued with an understanding of the needs of a variety of payment system participants—especially those groups of participants who do not access interbank systems (for example, fintechs or telecommunication firms that provide mobile-money services). Any interoperability arrangement needs to strike a balance between direct participants who comply with all security requirements and the need to ensure cost-efficient methods for smaller participants and fintechs to access payment systems directly.
- Reduced resilience in case of system(s) failure:** One of the perceived advantages of having separate, non-interoperable payment systems is that failure in one payment infrastructure does not affect the operations of other payment systems. If an ACH system goes down for a time, PSPs have the option to route payments via another system, such as FPS. Depending on the length of a system failure, the process for recouping payments in one payment system can be difficult. As payment systems become more interoperable, the risk that a system failure might affect other systems could grow as well, which in some cases might result in a systemic risk.





### 3 CURRENT CONTEXT SURROUNDING FAST PAYMENT SYSTEM INTEROPERABILITY

Today, many segments of the payment ecosystem are already interoperable. However, this interoperability is not evenly distributed across all payment types. ATM withdrawals and debit and credit card networks see relatively high levels of interoperability. Consumers are able to go to ATMs around the world without worrying that the machines won't read their card. Merchants across the globe have adopted an "accept all cards" approach at checkout, so consumers do not need to worry whether their specific card scheme will be accepted. Other payment types, such as ACH and FPS, generally see lower levels of interoperability due to a lack of need. Most markets have only a single ACH or FPS system, which obviates the need for interoperability. But markets with multiple ACH or FPS, such as the United States or the Single Euro Payments Area (SEPA), do need to ensure interoperability between infrastructures—generally through common scheme rules. And as the topic of cross-border fast payments gains steam, it is expected that links between domestic FPS will grow.<sup>6</sup>

Interoperability between payment systems is typically achieved through large-scale industry cooperation to develop common operational and technical standards as well as operating rules governing different transaction types. For example, card interoperability at the merchant point of acceptance in many markets is due to the creation of common standards for physical cards and terminals, their interaction, and data-security standards (for example, PCI DSS). Interoperability of ACH payments has also been successfully achieved through the creation of common scheme rules for certain ACH transaction types. For example, in the United

States, where there exists two ACH operators (the Federal Reserve and the Clearing House), ACH payments are completely interoperable due to the National Automated Clearing House Association, the industry governing body, which develops and administers operating rules for ACH transactions processed over both ACH networks.<sup>7</sup> In Europe, ACH interoperability has been achieved through a set of pan-European scheme rules despite the proliferation of national and pan-European ACH infrastructures. SEPA now has three ACH schemes governed by the European Payments Council: SEPA credit-transfer scheme, SEPA direct-debit scheme, and SEPA direct-debit business-to-business scheme. The schemes facilitate 43 billion transactions annually across 36 countries.<sup>8</sup>

Enabling interoperability within cross-border payments has garnered more attention from both the industry and regulators over recent years amid the glaring inefficiencies of the legacy correspondent banking arrangements. For example, the key challenge facing cross-border payments is that a cross-border arrangement does not fall under a single set of laws and regulations.<sup>9</sup> 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). Developing interoperability within cross-border payments is especially challenging due to different country data standards and formatting, as well as varying legal and regulatory frameworks. The foundation for global interoperability is ISO 20022—the de facto



global standard for fast payments. However, a common data standard alone is not enough; cross-border schemes that fit within the context of different national legal and regulatory frameworks will also be required.

Many FPS have been designed and implemented with the eventual goal of enabling interoperability with other payment systems. When considering how an FPS is interoperable with other payment systems, it is helpful to evaluate from the perspectives described in box 1.

### 3.1. EXAMPLES OF FAST PAYMENT SYSTEM INTEROPERABILITY

#### Scheme Interoperability: SEPA SCT Inst

To adopt ubiquitous fast payments successfully, it is crucial to have a single scheme governing all fast payment transactions in a given market. Because a single currency is used by 19 member states of the European Union (each with its own national authorities and legacy payment system operators),

#### BOX 1 FAST PAYMENT SYSTEMS AND OTHER PAYMENT SYSTEMS

- **FPS and ACH:** While FPS and ACH systems are similar in that they offer account-to-account electronic transfers between bank accounts, these systems are fundamentally aimed at different use cases. ACH systems process bulk payments at regular intervals, whereas FPS process individual payment messages in real time. ACH payments are typically scheduled payments, such as salary disbursements or bill payments, whereas FPS payments tend to be for more ad hoc, flexible payments made on a one-off basis. Beyond the technical difficulty of interoperability between bulk-based and message-based payment systems, there may be little need for true interoperability between ACH and FPS due to the different use cases targeted by each system.
- **FPS and card networks:** Both FPS and card networks can be used for point-of-sale (POS)/e-commerce merchant payments. While the systems differ in terms of technical components, clearing and settlement times, fees, and pricing, both FPS and card systems enable real-time authorization of payments between consumers and merchants. Interoperability between these networks is often enabled by third-party aggregators. Further interoperability may best be pursued on the application or even scheme layer, rather than between the underlying infrastructures.
- **FPS and closed-loop networks:** Both FPS and closed-loop networks (for example, mobile-money remittances) are well suited for P2P payments and remittances, as well as ad hoc bill payments. In markets with high use of closed-loop networks (often the case where bank-account penetration is low),

developing interoperable links between these networks and an FPS system could help expand the reach of electronic payments while providing additional security and transparency on electronic payment flows. The real-time exchange of payment messages in each of these types of payment systems makes interoperability easier on an operational level, although differing approaches to settlement, payments messaging, and customer accounts will require collaboration and legal and commercial agreements to enable interoperability between FPS and closed-loop networks.

- **FPS and RTGS:** While operationally similar, in that both FPS and RTGS systems process individual payment messages in real time, the lack of 24/7 operations of RTGS systems in a majority of the jurisdictions has resulted in most FPS and RTGS systems remaining separate, yet the possibility of interoperability between FPS and RTGS systems rises. Adding FPS to an RTGS platform could enable operational efficiencies for banks and other system participants and improve the oversight capability of central banks. Ultimately, whether to make FPS and RTGS interoperable through a single technical platform will be up to local authorities. Some authorities may want to continue separating low-value payment platforms (FPS) from high-value systems (RTGS) to mitigate risks and ensure systemic stability and security for end users. But this could also be achieved by developing different scheme rules for high- and low-value payments that are processed on a single platform.

Source: Own elaboration

fast payment transactions in Europe are united by a single set of scheme rules, instead of a single payment infrastructure. In addition to national payment system operators, such as Equens (Netherlands), Stet (France and Belgium), Iberpay (Spain), nexi (Italy), and others, SEPA also has two pan-European FPS infrastructures: RT1, which was launched in 2017 and is operated by EBA Clearing (itself owned by 48 European Union banks), and the TARGET Instant Payment Settlement Service, which was launched in 2018 and is operated by the European Central Bank. Similar to the approach taken to enable interoperability of ACH transactions in Europe, all of these systems are interoperable through a common set of operating rules and technical standards, known as the SEPA Instant Credit Transfer scheme (SCT Inst). The scheme is based on the SEPA credit-transfer scheme and similarly governed by the European Payments Council. Important operating rules include mandating that funds be made available to the beneficiary within 10 seconds, capping the transaction limit at € 100,000, and stipulating 24/7/365 availability of all infrastructures processing SCT Inst payments.<sup>10</sup> Like the other three SEPA schemes, SCT Inst is based on the ISO 20022 messaging standard. The scheme is updated every two years to reflect market needs and the evolution of technical standards.<sup>11</sup>

The United States will have to confront a challenge similar to that of Europe, as the Federal Reserve is expected to launch its FedNow service by 2023, operating alongside the Clearing House's existing Real-Time Payments (RTP) system.<sup>12</sup> Although both the Federal Reserve and industry stakeholders have acknowledged that achieving interoperability is important for fast payments to achieve wide reach in the United States, the Federal Reserve has indicated that interoperability with RTP will likely not be the case at its initial launch and has not yet indicated a timeline for interoperability with RTP. Some industry stakeholders have suggested that this could lead to a fragmented market for fast payments and delay the adoption of fast payments in the United States. The Federal Reserve has committed to using ISO 20022 for FedNow, which should help facilitate interoperability with the Clearing House's RTP system.<sup>13</sup>

#### **Infrastructure Interoperability: Technical Linkage between PromptPay and Paynow**

In April 2021, the Bank of Thailand and the Monetary Authority of Singapore jointly launched a cross-border linkage between the mobile peer-to-peer transfer services PromptPay and Paynow to facilitate cheaper and easier remittance flows between the two countries.<sup>14</sup> Used by approximately a third of Thai consumers, PromptPay comprises a real-time clearing and settlement infrastructure

with a “translator” for ISO 8583 to ISO 20022 messages and a proxy lookup service that securely maps recipient mobile numbers to bank account details.<sup>15</sup> Similarly, Paynow is a highly successful central addressing scheme that builds on Singapore's FAST FPS system and allows registered users to send money in real time using their mobile number.<sup>16</sup> Both systems were originally built by Vocalink, the United Kingdom's payment system operator for ACH and FPS payments (now owned by Mastercard). In August 2020, the deputy governor of the Central Bank of Malaysia (Bank Negara Malaysia) announced that the linkage will be extended to Malaysia's DuitNow, an equivalent service available only in Malaysia at present.<sup>17</sup>

### **3.2. EXAMPLES OF FPS INTEROPERABILITY WITH MOBILE-MONEY TRANSFER SERVICES**

Mobile-money transfer systems have exploded in popularity over the last decade, particularly in developing economies where bank account penetration is low. In many markets, payments made via mobile wallets on such apps as M-Pesa (Kenya), AliPay (China), and Paytm (India) are used and accepted almost as widely as cash. Many of these systems operate as closed-loop systems<sup>18</sup> and do not connect directly to users' bank accounts.<sup>19</sup> In some markets, the existence of multiple closed-loop schemes has led to market fragmentation. In countries such as Tanzania and Nigeria, regulators have responded to this development by issuing mandates to enable interoperability between the various closed-loop schemes. In Kenya, the approach to achieving interoperability across closed-loop schemes was market led, and the Kenyan market has now achieved interoperability across services offered by Safaricom (owner of M-Pesa), Airtel, and Telkom Kenya.<sup>20</sup> Also, mobile-money transfer platforms have moved from the traditional role of transferring money to providing banking services for both banked and unbanked customers. The commercial banks have partnered with mobile-network operators to enable customers to access their bank accounts through mobile phones, including withdrawing and credit facilities.<sup>21</sup>

Enabling interoperability with FPS could offer a basis for linking multiple closed-loop systems to each other in the future. From the perspective of the end user, mobile-money transfer services always make funds available in the payee's mobile wallet immediately, even if the underlying settlement occurs in commercial bank money instead of central bank money. At present, there are several examples of interoperability between money-transfer services and FPS. Global examples include the Zelle network in the United States, a bank-owned real-time P2P transfer service

that recently moved settlement from the ACH network to the RTP network. Another example is Singapore's Paynow, a similar service to Zelle, which settles via the country's FAST infrastructure. In some markets, the popular Chinese mobile apps Alipay and WeChat also connect to FPS. For example, in Hong Kong SAR, China, Alipay and WeChat carry out settlement via the Hong Kong Monetary Authority's fast payment infrastructure.<sup>22</sup> FPS are attractive for linking with closed-loop systems due to operational similarities: both FPS and closed-loop schemes operate 24/7/365, make funds available to the beneficiary in real time, and are often used with mobile phones. The widespread use of ISO 20022 for fast payments should also make links between closed-loop schemes and FPS easier, as a closed-loop scheme operating in multiple markets may have to develop only a single link to access multiple FPS.

Another cross-border example of this is the recent partnership between Western Union and India's Unified Payment Interface (UPI). The partnership allows Western Union customers globally to send money into bank accounts in India simply by using the receiver's UPI ID, rather than providing bank account and routing details.<sup>23</sup> India is currently the world's largest remittance recipient country,<sup>24</sup> and leveraging UPI could help improve customer experience and boost Western Union's remittance volumes in India. PayPal's Xoom service also enables cross-border transfers to India using a recipient's UPI ID.<sup>25</sup> Other remittance providers, such as MoneyGram, have partnered with card schemes such as Visa to enable real-time cross-border remittances.<sup>26</sup> As fast payments networks expand and use cases mature, remittance providers may look to these systems as a cheaper and more efficient link for real-time cross-border payments.

### 3.3. EXAMPLES OF INTEROPERABILITY OF FAST PAYMENT SYSTEM WITH MERCHANT ACCEPTANCE INFRASTRUCTURE

Integrating fast payments at the merchant acceptance point, whether at the POS or online, is another important area of interoperability that is gaining traction. From an end user's perspective, merchants can already accept many different payment types, including multiple card schemes (Visa and Mastercard, along with American Express and other card networks), payments made via closed-loop schemes, and, in some cases, even ACH payments. The ability of merchants to accept multiple payment types is due to common standards and processes for accepting cards, as well as a market of payment aggregators who help merchants with the technical links and operational

rules for different payment types. The core infrastructures of these different payment types are rarely interoperable.

In markets where adoption of fast payments is high, integration of FPS at the merchant point of acceptance is already becoming more common. In Sweden, for example, consumers are able to make Swish payments at the POS by scanning a QR code from their mobile app into the merchant's card terminal.<sup>27</sup> This is similarly true for MobilePay in Denmark. A cross-border example is the linkage between India's UPI-based BHIM app and Singapore's Network for Electronic Transfers, Singapore's local debit card network. A QR code-based app, the BHIM UPI app is able to scan the Singapore Quick Response Code at the POS and pay for transactions in Singapore while using India's UPI system for settlement. This allows Indian bank account holders to make fast payments in Singapore at the POS without the need for currency conversion or a credit card.

One interesting development in this space was the launch in July 2020 of the European Payments Initiative, which aims to create a unified card, online, and mobile-payment solution leveraging SCT Inst and reaching across Europe (that is, across both euro countries and non-euro-based countries).<sup>28</sup> The initiative is intended to overcome the problem of a fragmented European retail payment market for consumers while leveraging fast payment infrastructure in Europe, such as the TARGET Instant Payment Settlement Service.<sup>29</sup>

### 3.4. EXAMPLES OF FAST PAYMENT SYSTEM INTEROPERABILITY WITH LEGACY SYSTEMS: RTGS, ACH, AND SWIFT

The challenge of enabling interoperability between FPS and legacy payment systems, such as RTGS and ACH systems, is quite hard to overcome, and there are few examples of this globally. This is due not only to the technical challenges associated with integrating two systems that were often developed at different times and using different technologies, but also to the differences in the operational requirements between running an ACH versus an FPS. Similarly, the operating rules for high-value wire transfers (RTGS) are likely to differ from those governing low-value fast payments so greatly that scheme interoperability between RTGS and FPS is often not seen as appropriate.

Nevertheless, potential benefits are associated with offering these services via a single interoperable platform, including reduced operational costs for banks, which no longer have to connect to multiple payment systems, and expanded access to new players that can help drive system reach and ubiquity. In Mexico, for example, RTGS and

fast payment services are offered in a single interoperable infrastructure called the Interbank Electronic Payment System (*Sistema de Pagos Electrónicos Interbancarios*, or SPEI). Operated by the central bank, SPEI processes both high- and low-value fast payments on a message-by-message basis. Although the system does not impose a transaction value limit, different rules apply for transactions depending on value.<sup>30</sup> In the United Kingdom, the New Payments Architecture (NPA), currently in development, seeks to take this to another level by creating a system that will run the previously separated retail infrastructures (Fast Payments, Bacs, Cheque and Credit Clearing) on a single infrastructure platform based on ISO 20022.<sup>31</sup> The NPA system architecture will also include an access layer that enables the development of value-added services based on application programming interfaces (APIs) that leverage the underlying clearing and settlement mechanism.<sup>32</sup> In the case of the NPA, while the core infrastructure may offer various payment types on one consolidated platform, it will still require different standards and rules for different transaction types (for example, bulk-based ACH payments versus message-based FPS payments).

In 2017, SWIFT launched the gpi initiative in an effort to provide increased transparency on cross-border payment flows and transaction fees as well as speed up international transaction processing. Features of the service include providing each transaction with a unique ID number, allowing for real-time tracking, as well as 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.<sup>33</sup> 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 with a link to the Faster Payments System to facilitate near real-time cross-border payments. 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.<sup>34</sup>

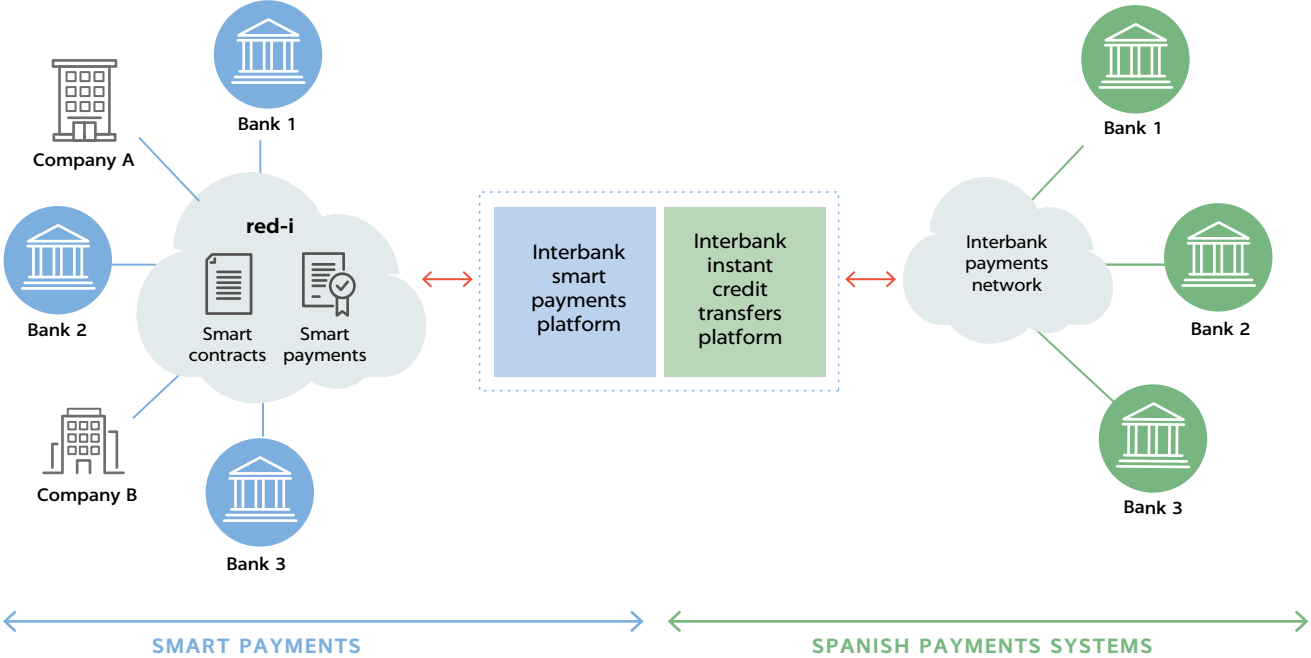
### 3.5. EXAMPLES OF FPS LINKAGES WITH DIGITAL CURRENCY INITIATIVES AND DISTRIBUTED LEDGER TECHNOLOGY

Digital currency is on the rise globally, whether it be central bank digital currencies (CBDC) such as China's DCEP, third party-issued stablecoins (such as Facebook's Diem), or private cryptocurrencies (Bitcoin or Ethereum). As these new forms of payments go live and gain more mainstream acceptance, the question arises whether or how these digital currencies will become interoperable with existing payment systems. The additional functionalities and future designs of digital currency may require the standards and schemes of legacy payment system to be adjusted.

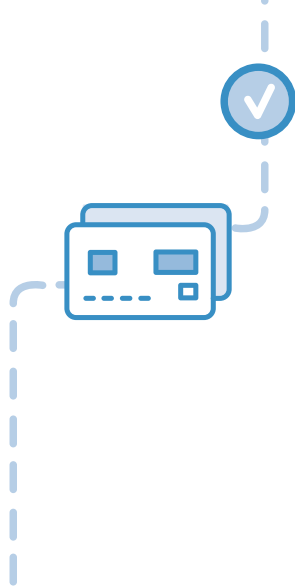
Over the past few years, central banks have carried out several experimental projects that explored how distributed ledger technology could be used in RTGS and securities settlement systems. The main benefits of applying distributed ledger technology to these systems include programmability and increased automation, transparency, and network resilience. More recently, the industry has been giving more thought to how integrating this technology with FPS or connecting FPS to existing distributed ledgers could facilitate programmable fast payments. In July 2020, five Spanish banks successfully completed a proof of concept for an interbank smart payment platform managed by Iberpay, the owner and operator of Spain's ACH and FPS. Iberpay connected a blockchain network to its existing payment system, which included the deployment of an interbank smart payment platform and a permissioned interbank blockchain network. The proof of concept entailed the automatic execution of SCT Inst payments triggered by business smart contracts running in the blockchain network and their settlement through connecting with the Spanish Retail Payment System.<sup>35</sup> This arrangement requires interoperable messaging between the blockchain network and Iberpay's FPS system to facilitate the automated execution of payments. Iberpay plays the role of system integrator between the blockchain network and the FPS.

As central banks continue to explore the development of CBDC (the People's Bank of China has already gone live with a pilot of its DCEP project, and the Swedish Riksbank has recently begun the second phase of its e-krona project), the interplay between CBDC and FPS is likely to receive further attention. A CBDC network and an fast payments network do not necessarily have to compete. One potential option in this space would be using a CBDC as a settlement currency for a fast payment system. This may be particularly attractive in a cross-border context, where settlement risk is high today due to slow and inefficient processes for cross-border payments.

**FIGURE 2** Proof of Concept for Interbank Smart Payments Platform: Iberpay



Source: European Payments Council



## 4 ENABLING FAST PAYMENT SYSTEM INTEROPERABILITY

FPS offer the potential for an expansion of interoperability across payment types. Many of the examples of interoperability mentioned in section 3 focus on interoperability between payment systems processing the same payment type—card-to-card interoperability or ACH-to-ACH interoperability. There are numerous reasons for this—most notably, that legacy payment systems tend to be older and built on a less flexible technical foundation, and that these systems have different operational guidelines. To take one example, two ACH systems may have different clearing windows, with one processing payment files five times daily and the other processing payment files twice daily. These ACH systems may have different operating hours as well. In contrast, FPS operate on a 24/7/365 basis, and end-to-end clearing of fast payments occurs within seconds.<sup>36</sup> This makes interoperability between FPS and closed-loop networks easier. It could also form the basis for interoperability with card networks and ACH systems.<sup>37</sup> In addition, many FPS use ISO 20022 for messaging. As use of ISO 20022 expands both domestically and cross-border, existing FPS that are ISO 20022 compliant may become an attractive option for linking between different payment systems and applications.

Enabling interoperability between payment systems requires more than just technical compatibility. As with the development of any new payment system, the first step in enabling interoperability comes is understanding the use cases and goals that interoperability seeks to achieve. These determine whether interoperability is the appropriate option. In general, technical solutions should be developed only after these strategic discussions are held between a wide variety

of stakeholders. Beyond technical issues, enabling interoperability will require an assessment of legal and regulatory frameworks and the potential adjustment or addition of new regulations. Lastly, successful interoperability will likely involve educational efforts for system participants and end users to boost usage of these interoperable links.

### 4.1. TECHNICAL

Enabling different systems to communicate and exchange messages is ultimately achieved through technical harmonization of platforms that translate between different payment systems. These technical connections are underpinned by scheme rules and commercial agreements between system participants. Technical connections do not require each system participant to use the same technology providers. Rather, they enable communication between different networks and subsystems operated by system operators and individual participants.

#### 4.1.1. Messaging

Payment messaging is a foundational piece of any payment system. As such, it is a crucial element in any effort to enable interoperability. Common messaging standards enable communication between payment systems and system participants. Different payment systems traditionally use different standards. ISO 8583 is widely used for card processing, while ACH payments typically use a variety of national proprietary standards. These standards are different not only across

different system types but also for similar payment system types in different jurisdictions. Incompatible messaging standards are key obstacles to payment system interoperability and greater efficiency in payment processing.

International standards, such as ISO 20022 or ISO 8583, can help facilitate greater efficiency in both a domestic and cross-border context. ISO 8583 has been adopted in such major FPS as the UK's Faster Payments System in large part because the standard was already well integrated into many bank processes due to its ubiquity for card payments. Despite plans to move from ISO 8583 for FPS in markets such as the United Kingdom and South Africa, the standard can nevertheless facilitate interoperability between card systems and FPS or between FPS in different markets. Since ISO 20022 is still integrated in many bank systems today, ISO 8583 could be an attractive option for banks.

One of the key developments with the rise of fast payments is the widespread use of ISO 20022 for payment messaging. The reasons for using ISO 20022 for FPS differ for each jurisdiction. Some markets, such as SEPA, value the standard's political neutrality (compared to choosing one country's proprietary messaging standard), while other markets prize ISO 20022's rich data capabilities. ISO 20022 is increasingly being used for FPS<sup>38</sup> and also in other areas of financial services, such as securities and corporate-to-bank communication. ISO 20022 has many advantages that enable interoperability between FPS and between FPS and other payment systems, including the following:

- **Extensive data capabilities:** Unlike many legacy messaging standards, ISO 20022 does not limit the amount of data that can be included in a payment message. Many ISO 20022 deployments have set artificial limits to payment data (many limit the data to 140 characters to maintain compatibility with SWIFT MT standards), but these limits can be expanded or removed entirely over time.
- **Flexibility to add new payment messages to the ISO 20022 repository:** The ISO 20022 organization includes processes for adding new payment messages that can be used by others. When the United Kingdom developed its Current Account Switch Service, it applied to the ISO 20022 organization to add new message types for account switching. These message sets are now part of the ISO 20022 message repository and can be used by any other market. As use of ISO 20022-based payment systems expands, the potential to add new messages to the ISO 20022 repository makes the standard an attractive choice.
- **Universal translation language:** While most payment systems today do not use ISO 20022, many proprietary standards have been mapped to ISO 20022. This allows payments using different proprietary standards to use ISO 20022 as a universal translation language to map payment messages from different systems and jurisdictions and enable interoperability between systems.<sup>39</sup>
- **Global deployments of ISO 20022:** ISO 20022 is now live in more than 70 markets globally, and almost half of these deployments are for fast payments (either live or in development). While cross-border links between FPS remain rare, global interoperability is one of the key benefits of ISO 20022 cited by stakeholders across the world. Many expect cross-border interoperability to expand once more systems go live with systems based on ISO 20022.

#### 4.1.2. Application Programming Interfaces

APIs<sup>40</sup> are a key technical enabler for secure electronic communication between networks. The use of APIs in payments and financial services has expanded in recent years. A plethora of PSPs and technology vendors use APIs to enable connections to payment networks or elements of a bank's underlying core systems. In Europe, the revised Payment Services Directive (PSD2) mandates that banks open access to customer accounts to authorized third parties. While the PSD2 does not mandate the use of APIs, European stakeholders are developing API standards for the technical enablement of open-banking services under the PSD2.<sup>41</sup> APIs can enable community services or be offered by individual institutions to allow authorized third parties secure access to processes and information that would previously be available only to participants of a payment system or in a financial institution. Enabling interoperability between payment systems with APIs would require the development of open APIs that can be accessed by all participants in a system(s).<sup>42</sup>

APIs can enable interoperability between payment systems without the need to change the underlying technical infrastructures. Two payment systems could connect to a common API access layer or gateway that enables the exchange of payments or transactional information. This would occur on the application/services layer and may be complemented by changes in scheme rules to specify the operational requirements for transactions that go through the API gateway. In Nigeria, mobile-money operators can connect via APIs to the national central switch operated by NIBSS, the country's payment system operator for fast payments, ACH, and card payments.<sup>43</sup> For interbank payment systems, API gateways are often used in payment hubs



offered to banks to help them connect to multiple payment systems.<sup>44</sup> API gateways can also be deployed for an entire market to connect various payment systems and services. The Mojoloop Foundation has been active in deploying its API-based payment platform to spur financial inclusion.<sup>45</sup> Whether deployed by a market player or an entire payment community, API-based payment gateways can facilitate the exchange of payments between payment systems without the need to rework the underlying payment infrastructures. This concept could also be used to connect multiple domestic payment systems to ease cross-border payments.

#### 4.1.3. Payment Addressing

Proxy databases are a key tool for enabling interoperability of services between payment systems as well as providing added convenience and security for end users. Proxy databases enable end users to route payments according to a commonly remembered identifier (most commonly, a mobile-phone number or email address). A proxy database can be connected to one or more payment systems to execute clearing and settlement. FPS are tailor-made for proxy P2P and consumer-to-business payments. Prominent examples include UPI in India, Sweden's Swish network, and the Danish app MobilePay. All of these systems utilize each country's FPS infrastructure to clear and settle payments. In countries without a centralized proxy database, individual banks may manage their own proxy databases for their customers. In the United States, the Zelle network is a P2P proxy database that allows consumers from participating banks to send and receive payments using their mobile-phone number instead of a bank account number. Zelle currently utilizes the ACH network to settle transactions even though payments are cleared instantly between participants. In early 2021, the first Zelle banks began routing transactions through the country's FPS, RTP.<sup>46</sup>

Proxy databases are not limited to consumer payments. Account-masking services enable corporations to use a unique proxy identifier to send and receive payments. This identifier can be linked to one or more bank accounts, allowing businesses and their banks to manage their liquidity more flexibly. The Clearing House, which operates one of the two ACH networks in the United States, has developed the Universal Payment Identification Code, which businesses<sup>47</sup> can use to route payments to one or more bank accounts.<sup>48</sup> If a company changes its bank or wants to route payments to a different account, it can do this while continuing to use the same code.

The use of proxy databases is typically limited to a single payment system, but use of such databases can be connected to multiple infrastructures or payment schemes. This

would enable banks and other PSPs to offer multiple payment types using a single identifier standing in for a transaction account number, thereby facilitating interoperability of payment systems via a single application. This would not require significant changes to the underlying infrastructure and may require only minor additions to scheme rules.

#### 4.1.4. Payment System Architecture

As the development of FPS expands and new players become active in the payment services industry, some newer FPS have embedded the need for interoperable services in the system architecture itself. This involves developing an access layer to enable authorized third parties to leverage the underlying clearing and settlement infrastructure while providing payment services to all participants in the network. Australia's New Payments Platform includes an overlay-services mechanism intended to allow authorized overlay-service providers to offer customized payment services to any participant in the network. These overlay services are optional (that is, not a requirement for system participants) but are intended to add value for system participants and end users.<sup>49</sup>

This concept is being expanded with the development of new payment systems. The United Kingdom is currently developing the NPA, a payment system based on ISO 20022 that will consolidate legacy payment systems (ACH and FPS) into a single core clearing and settlement mechanism. System participants will access the underlying payment infrastructure through an access layer that will also include API-based overlay services. The NPA has interoperability in its DNA, as it separates the underlying payment infrastructure for bulk- and message-based payments into a single engine that participants access through a single access layer. Banks can route payments according to the functionality needed by end users and will no longer need to connect to separate payment systems for different payment types. The NPA will also see consolidation on the scheme level as well, as the Bacs (ACH), Cheque and Credit Clearing (check imaging), and Faster Payments (FPS) schemes are being subsumed under the new scheme body Pay.UK.

These systems point the way to a future in which the underlying payment "engine" (clearing and settlement infrastructure) is separated from the application layer. Enabling this requires collaboration on scheme rules and technical standards, as well as new authorization processes, particularly for non-bank PSPs. Whether consolidating multiple domestic payment systems into a single infrastructure or linking multiple domestic payment systems into a cross-border payment system, this new type of payment system architecture may be the most efficient way to enable

interoperability between payment systems and participants moving forward.<sup>50</sup>

#### 4.1.5. Integration with Merchant Payment Systems

Consumers typically have multiple options to pay merchants (particularly in an online context), and card payments dominate noncash merchant payments in most markets.<sup>51</sup> In recent years, both bank and non-bank payment providers have entered the merchant payment space with new options for consumers that do not rely on global card networks. One notable trend in this space is the rise of buy-now, pay-later schemes from third parties such as Klarna. These schemes allow consumers to buy items on credit from a buy-now, pay-later provider without using a credit card.<sup>52</sup> For banks, FPS represent the greatest potential to enable merchant payments without a debit or credit card, as FPS mobile-payment apps in Denmark<sup>53</sup> and Sweden<sup>54</sup> have seen increasing success in recent years. But this increase in merchant payment options also presents added complexity for banks and merchants, who have to manage separate payment streams and liquidity channels.

For merchants and their banks, the ability to accept any payment type used by consumers is paramount to ensuring convenience for their customers and to remaining competitive with other merchants offering similar products. For smaller merchants in particular, the lack of interoperability in payment types is a problem, as connecting to separate schemes can be an expensive and lengthy process.<sup>55</sup> Enabling merchants to manage this complexity is often done by third-party payment aggregators who help retailers connect to and process payments from multiple payment schemes.<sup>56</sup> The service provided by these third-party aggregators could also be enabled through interoperability between payment infrastructures and schemes—enabling merchants to access multiple payment types through a single connection. In markets with multiple closed-loop mobile-money services, this may be pursued through common operating standards that make it easier for merchants to accept payments from different services or schemes.<sup>57</sup> Interoperability between card networks and fast payment schemes is still in the early stages, although prominent examples—such as the cross-border link between India’s UPI FPS scheme and the Network for Electronic Transfers, Singapore’s debit card network—show that the barriers between payment systems are becoming easier to bridge.<sup>58</sup> Increased interoperability between networks for merchant payments can benefit all parties. Consumers gain convenience and flexibility; merchants may see increased volumes, lower merchant fees, and quicker access to funds; and payment system operators may see expanded revenue through increased transaction volumes.<sup>59</sup>

## 4.2. LEGAL AND REGULATORY FRAMEWORK

Beyond technical links and commercial agreements, interoperability can also be facilitated through new or revised legal and regulatory frameworks that either reduce legal obstacles to interoperability or mandate links between payment systems or PSPs. Interoperability can even help contribute to improved oversight or enforcement of regulations (for example, regulations around controlling or combating fraud). While legal and regulatory frameworks alone cannot ensure successful interoperability of payment systems, they can provide a foundation that facilitates the technical and commercial agreements necessary for interoperable payment systems.

### 4.2.1. Open-Banking Regulations

Open banking is a term that has gained wide relevance in the payment services industry in recent years. Open banking entails the use of APIs to enable third parties to develop products and services in collaboration with banks and other financial institutions. Open banking can be pursued on a bilateral basis (for example, a bank developing proprietary or open APIs that third parties can use to offer products and services to a bank) or on a community-wide basis (for example, the development of open APIs that are available to all market participants and allow for third-party services to be used by any system stakeholder). APIs can also be used to enable authorized third parties to offer products and services that leverage the underlying payment infrastructure for all system participants. Australia’s New Payments Platform uses APIs for its overlay-services platform, as does India’s UPI, which has developed a comprehensive set of API specifications for system participants.<sup>60</sup>

Some markets have chosen to facilitate open-banking services through new regulations. The most notable example here is the European Union’s PSD2. The PSD2 mandates that all banks provide access to customer accounts to any registered third party authorized to do so by its customers.<sup>61</sup> As a directive of the European Union, the PSD2 has to be transposed into national law by each member state of the European Union.<sup>62</sup> Each member state is at a different state of implementing the PSD2 into national law. Some major members, such as the Netherlands, have seen progress on the PSD2 stall after implementing the directive into national law.<sup>63</sup> The United Kingdom—which left the European Union in 2021 but was still a member state by the January 2018 PSD2 deadline—has taken the spirit of the PSD2 farther than perhaps any other European state. The payment industry in the United Kingdom has developed market-wide open APIs to facilitate open banking for a wide variety of banks, fin-

techs, and other third parties.<sup>64</sup> The open-banking initiative includes a centralized portal that offers a list of all regulated providers and more than 100 apps that can be accessed via open APIs.

The example of the United Kingdom shows that merely implementing new regulations is insufficient to ensure success in an effort such as open banking. While the PSD2 and the various national laws transposing the directive have been integral to enabling open banking, spurring adoption requires some level of market collaboration to ensure that new services have a chance at success. This collaboration requires not only bringing in the perspective of new players, such as fintechs, but also outlining the benefits to traditional players, such as banks.

#### 4.2.2. Authorization (Banks versus Non-Banks)

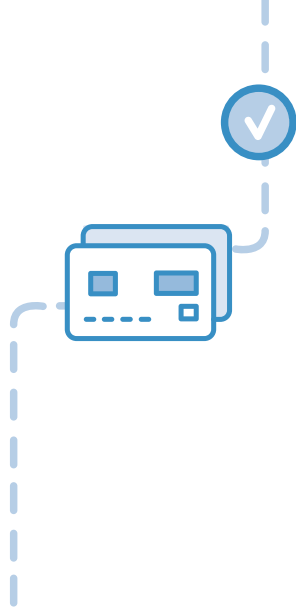
Authorizing access to bank accounts for registered third parties as envisioned in the PSD2 mandates access only to customer bank accounts; the PSD2 does not mandate access to an underlying payment system. The authorization of entities to join a payment system can occur either from a payment system regulation or as part of a system's scheme rules (which themselves must be in compliance with all relevant laws and regulations in that jurisdiction). This may facilitate interoperability between non-bank PSPs and banks in a given market. The United Kingdom's Faster Payments System (as well as the Bacs ACH system and check image-clearing system) allows for direct access by authorized non-banks (either with an e-money license or a payment institution license).<sup>65</sup> Providing direct access to a payment system for authorized non-banks can help improve service to end users and control risk (by making non-banks either open a settlement account at the central bank or use a settlement correspondent). In this case, authorizing non-banks does not by itself enable interoperability between payment systems. But if an authorized non-bank operates its own closed-loop

network, access to an FPS can provide a link between an interbank payment system and a closed-loop network.

#### 4.2.3. Merchant Routing Options

Interoperability can also be facilitated through legal decisions that give market stakeholders the flexibility to choose how they route certain payment types. The Reserve Bank of Australia has been active in monitoring least-cost routing for debit card transactions.<sup>66</sup> Australia has three debit card networks that merchants can use to route POS and e-commerce transactions: the eftpos domestic debit scheme and debit card networks operated by Visa and Mastercard. When customers provide their PIN for debit card transactions, they also choose the network to use. But when making a contactless card payment, the customer does not choose the network through which the payment is routed. Since the domestic eftpos network now has contactless capabilities, merchants can now choose to route contactless payment through their network of choice.

The principle of least-cost routing<sup>67</sup> could also be expanded to non-card networks as well. As FPS-based POS/e-commerce options continue to expand (typically using a mobile-payment app, as is done in Sweden and Denmark), merchants will have another option for routing payments. Merchants or their bank could then choose to route a contactless or mobile payment via the cheapest network or according to other priorities. For example, an FPS network would provide a merchant with instant access to funds, compared to the delayed access to funds when processed by a debit card network. From a consumer's perspective, the network in which payments are routed is usually unimportant. But a merchant may see real benefits to having the ability to route payments in the cheapest, faster, or most efficient network. In the long run, routing more POS/e-commerce payments via an FPS network can affect the pricing of payment services.



## 5 BEST PRACTICES FOR FAST PAYMENT SYSTEM INTEROPERABILITY

Increasing interoperability of FPS and fast payments-based services can help boost efficiency, grow network ubiquity, increase financial inclusion, and lead to more competition and innovation in the fast payment ecosystem. There are many potential approaches to FPS interoperability, but they will depend on the specific challenges or problems that need to be solved, the legal and regulatory context, and the stakeholders in the market(s), and they will be limited by inflexible technology and/or processes associated with legacy systems. Because any interoperability initiative will necessarily depend on these factors, there is no single blueprint to achieve interoperability. In some instances, it may make sense to focus on the application layer and leave the underlying payment infrastructure untouched. In other cases, interoperability may be enabled by using a common data standard or through common scheme rules. Other markets may have a plethora of closed-loop schemes (for example, mobile-money schemes) that result in a fragmented environment that requires new regulation to make it interoperable.

Regardless, best practices to consider when enabling interoperability of FPS with other payment systems include the following:

**1. Understand the key challenges facing the current payment ecosystem:** Such challenges may include a fragmented landscape of closed-loop payment options, a lack of fast payment adoption, or inefficient and costly payment processing among banks (particularly in a cross-border context).

**2. Identify existing systems with common use cases or operational similarities to FPS:** Assess existing legacy payment systems or closed-loop systems for overlaying use cases. P2P transactions are a clear overlapping use case, for example, between FPS and closed-loop systems. RTGS and FPS are operationally similar but may require different operating rules depending on the transaction value.

**3. Perform a cost-benefit analysis:** A key consideration should be how the costs of enabling interoperability with existing systems (for example, disrupting or changing existing systems) can be weighed vis-à-vis the benefits. Achieving interoperability on the scheme or application layer may be less disruptive than achieving interoperability between underlying systems (clearing and settlement mechanisms). Or it may be infeasible to require merchants to invest in a completely new card terminal or POS technology. It is also possible that this assessment may lead to the development of a new infrastructure or scheme, as the United Kingdom is currently pursuing with the NPA. Each market will have a different mix of payment systems and closed-loop networks, so determining the proper level(s) for interoperability will have to be led by a wide array of market stakeholders.

**4. Assess IT and business processes related to existing payment systems:** Building interoperability will be successful only with a detailed view of the technical infrastructure and business processes for each payment system that may require links. This will help determine

the type of interoperability that can/should be pursued. For example, if interoperability between two payment infrastructures or schemes with proprietary data standards and legacy technology is desired, perhaps it would make more sense to develop an application layer or API gateway to connect the two systems. If two payment infrastructures share a similar technological basis or data standard, more direct links between systems may be more appropriate.

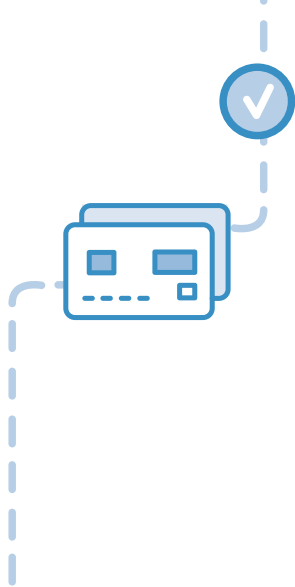
5. **Identify which layer(s) of payment system require harmonization (for example, infrastructure, scheme, or services):** Once an understanding of the IT and business processes in payment systems and related legal and regulatory frameworks is achieved, the next step is determining which level of interoperability is appropriate for the stated goals of the initiative. This may occur on (one or more of) the following three levels: (1) infrastructure, (2) scheme, and (3) applications.
6. **Review legal and regulatory frameworks:** Legal and regulatory frameworks may require updating to allow for interoperability between payment systems. For example, interoperability between an FPS and a closed-loop network offered by a third party may be legally difficult if only banks are allowed access to an FPS. Would interoperable links between an FPS and a closed-loop network be considered “access” to the FPS by the third-party PSP? In some cases, new laws or regulatory frameworks may be necessary. In other instances, legal clarifications on existing laws and regulations may be sufficient to determine the level of interoperability that is allowed in a given market. Additionally, interoperability between payment systems may require new regulations to ensure that data security and data privacy are ensured under the new arrangement, particularly in a cross-border context.
7. **Develop a framework for which entities can access interoperable connections:** One of the key outcomes of any interoperability initiative is expanding the reach of payment services. In many cases, this may involve the inclusion of third parties who either do not have legal access to interbank payment systems or choose not to access these systems for commercial reasons. If an interoperable connection merely connects two interbank payment systems (for example, ACH and FPS) without a change to access requirements, then this step may be unnecessary. But if interoperability expands access to new players, a change in scheme rules or business processes may be necessary. A major consideration here may be whether to allow authorized third parties direct access to the new interoperable payment arrangement, or to mandate that third parties partner with a financial institution that holds a settlement account at the central bank. This determination is one of many that each market will have to make when expanding interoperability between payment systems.
8. **Build technical and operational specifications and develop a request for proposal:** If a decision has been made to build a gateway or an access layer to link payment systems, the technical and operational specifications should be detailed at this stage and can be turned into a request for proposal for tender to the market. Even if this gateway is being built in-house (for example, by a central bank or payment system operator), the technical and operational specifications will be necessary at this stage. These design specifications will also assist in the crafting of new scheme rules or additions to existing scheme rules.
9. **Consult stakeholders, if going to market:** The consultation should assess the market need and readiness for participation in the interoperable infrastructure.
10. **Set a timeline and end date for when the interoperable connection will go live:** Once a decision has been reached on building a gateway to link payment systems, relevant stakeholders should set a timeline and a firm end date for the implementation of the gateway. Having a clear timetable and end date is crucial to provide guarantees to payment system stakeholders and system operators alike.
11. **Conduct testing:** Connecting two systems through standardization or API connectivity does not guarantee the smooth interoperability of payments. Stakeholders will need to test cross-system payments vigorously and be prepared to make additional changes once an interoperable link goes live.



## 6 CONCLUSION

Market stakeholders considering whether to increase interoperability between payment systems should understand that there is no single “best approach” to achieving interoperability. Some markets may see interoperability at the application layer as the best approach, while other markets may focus on enabling interoperability at the scheme or infrastructure level, due to common data standards and technology between payment systems. Having a firm understanding of the payment system’s current context and the goals or use cases that interoperability targets is always a vital first step in any successful interoperability initiative. FPS offer a unique opportunity to link payment systems that require speed or availability and can also be used to bridge interbank payment systems and their participants with closed-loop networks offered by non-banks. FPS interoperability also offers the possibility to shut down or replace legacy payment systems over time, provided that this is desired by market participants. This could be achieved by consolidating different payment types on a single technical platform or by migrating payment volumes from legacy networks to an FPS system (for example, moving all standing order payments from ACH to FPS).

Ultimately, the use of any payment system will depend on the applications and services that a system enables (or systems enable). Interoperability between payment systems has many potential benefits—expanded reach of payment networks, increased transparency for system participants and national authorities, increased efficiencies in domestic or cross-border payments, and increased competition that leads to more innovative products and services for end users. As electronic payment volumes expand and more consumers and businesses transact at home and across borders, more interoperability between payment systems can be expected. FPS in particular offer a foundation for innovative digital payments that can work with other payment systems and types. The actual level and type of interoperability pursued in any market or region will depend on local conditions, legal and regulatory frameworks, and the use cases and goals that such interoperability hopes to achieve.



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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. Bank for International Settlements (BIS), “Glossary” (web page), <https://www.bis.org/cpmi/publ/d00b.htm?&selection=177&scope=CPMI&c=a&base=term>.
3. Committee on Payments and Market Infrastructures and World Bank Group, *Payment Aspects of Financial Inclusion* (BIS, April 2016), 34, <https://www.bis.org/cpmi/publ/d144.pdf>.
4. Committee on Payments and Market Infrastructures and World Bank Group, *Payment Aspects of Financial Inclusion* (BIS, April 2016), 34, <https://www.bis.org/cpmi/publ/d144.pdf>.
5. [https://saylordotorg.github.io/text\\_developing-new-products-and-services/s04-12-there-is-power-in-numbers-netw.html](https://saylordotorg.github.io/text_developing-new-products-and-services/s04-12-there-is-power-in-numbers-netw.html)
6. For more information on the topic of cross-border payments in the context of FPS, see the corresponding note that is part of the World Bank’s Fast Payments Toolkit.
7. The National Automated Clearing House Association mandates the use of its proprietary message standard for ACH transactions over the network, and it designs the required procedures for risk management, data security and handling, dispute management, and so on.
8. <https://www.europeanpaymentscouncil.eu/about-us/introducing-epc>
9. Committee on Payments and Market Infrastructures, *Cross-Border Retail Payments* (BIS, February 2018), 20.
10. Individual scheme participants can agree bilaterally or multilaterally on more ambitious targets regarding the maximum execution time and amount of an SCT Inst transaction.
11. [https://www.europeanpaymentscouncil.eu/sites/default/files/kb/file/2020-07/EPC090-16%20v4.0\\_QA\\_SCT%20Inst%20scheme\\_Updated%20July%202020.pdf](https://www.europeanpaymentscouncil.eu/sites/default/files/kb/file/2020-07/EPC090-16%20v4.0_QA_SCT%20Inst%20scheme_Updated%20July%202020.pdf)
12. <https://www.theclearinghouse.org/payment-systems/rtp/institution>
13. [https://www.federalreserve.gov/paymentsystems/fednow\\_faq.htm](https://www.federalreserve.gov/paymentsystems/fednow_faq.htm)
14. [https://www.bot.or.th/English/AboutBOT/Activities/Pages/JointPress\\_29042021.aspx](https://www.bot.or.th/English/AboutBOT/Activities/Pages/JointPress_29042021.aspx)
15. <https://www.vocalink.com/news-insights/case-studies/case-study-thailand-promptpay/>
16. <https://www.abs.org.sg/consumer-banking/pay-now>
17. <https://www.bis.org/review/r200807c.htm>
18. A closed-loop payment system involves a network that is developed by a single PSP and connects both parties to a transaction on an internal network. It is also known as an in-house or intragroup network. For more, see BIS, *BIS Quarterly Review*, March 2020, 33, [https://www.bis.org/publ/qtrpdf/r\\_qt2003.pdf](https://www.bis.org/publ/qtrpdf/r_qt2003.pdf).
19. Many markets that have high usage of closed-loop payment systems also see low bank-account penetration, making third-party closed-loop networks the only option for sending and receiving electronic payments for many.
20. <https://kenyanwallstreet.com/safaricom-airtel-telkom-set-to-launch-mobile-money-interoperability-in-kenya/>
21. <https://www.centralbank.go.ke/national-payments-system/>
22. <https://www.fpsconsole.hkicl.com.hk/pub/p1/FPSD2005.pdf>
23. <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>
24. In 2019, India received \$83.1 billion from inbound remittances. For more information, see <https://migrationdataportal.org/themes/remittances>
25. <https://news.xoom.com/s/article/paypal-s-xoom-adds-upi-payments-enabling-nris-and-pios-to-remit-money-to-india-in-real-time>
26. <https://ir.moneygram.com/news-releases/news-release-details/moneygram-launches-industrys-first-real-time-p2p-payment>
27. Swish was initially developed as a bank-owned P2P app that clears and settles payments using Sweden’s BiR/PRT FPS system. Swish has since expanded its scope to include consumer-to-business payments at the POS and online.
28. See the European Union’s Retail Payments Strategy at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0592&from=EN>.
29. <https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200702~214c52c76b.en.html>
30. The CoDi app allows banks to exchange low-value mobile payments up to Mex\$8,000 in value, with clearing and settlement occurring via SPEI. See <https://www.pymnts.com/news/banking/2021/how-mexicos-central-bank-plans-to-move-payments-to-digital/>.

31. Retail payments in the United Kingdom have historically been processed using separate infrastructures— meaning that there has been a mix of rules, standards, and processes to follow. Bringing all of these payment systems together into one organization has created a historic opportunity to rebuild the core clearing and settlement infrastructure from the bottom up, simplifying requirements for PSPs through interoperability and catalyzing innovation. See <https://www.wearepay.uk/programmes/new-payments-architecture-programme/>.
32. Pay.UK is already developing two value-added services: confirmation to payee and request to pay. See <https://www.wearepay.uk/programmes/new-payments-architecture-programme/new-payments-architecture-core/>.
33. <https://www.finextra.com/newsarticle/34458/sibos-2019-the-adoption-of-swift-gpi-and-impact-on-global-payments>
34. <https://www.swift.com/news-events/news/swift-enables-instant-247-cross-border-payments>
35. <https://www.europeanpaymentscouncil.eu/news-insights/insight/programmable-instant-payments-dlt-networks-and-distribution-digital-money>
36. End-to-end processing times in different FPS may differ slightly, but this difference is measured in seconds, rather than hours or days, as with some ACH and card systems. Additionally, different FPS may have different settlement procedures. Some FPS settle payments in real time, while others settle payments on a deferred net basis.
37. Accomplishing this would require additional mechanisms to translate between message-based FPS and file-based (bulk) ACH and card networks. For example, sending payments between an ACH system and an FPS system would require a mechanism for translating between bulk payment files and individual payment messages. The United Kingdom's Faster Payments System has such a mechanism for allowing corporations to send bulk payment files directly to the FPS system. For more information, see <https://www.fasterpayments.org.uk/about-us/types-of-faster-payments>.
38. <https://www.iso20022.org/catalogue-messages/additional-content-messages/iso-20022-real-time-payments-group-rtpg>
39. <https://www.swift.com/our-solutions/mystandards/swift-translator>
40. APIs are sets of codes and protocols that decide how different software components should interact, allowing different applications, processes, and workflows to communicate with one another.
41. The European Banking Authority has developed regulatory technical standards for customer authentication under the PSD2 and chairs a working group on APIs. For more, see: <https://www.eba.europa.eu/regulation-and-policy/payment-services-and-electronic-money/eba-working-group-on-apis-under-psd2>.
42. This is in contrast to proprietary APIs, which are developed by a single institution to be used on a bi- or multilateral basis with its partners.
43. <https://www.cbn.gov.ng/out/2016/bpsd/approved%20guidelines%20on%20transaction%20switching%20in%20nigeria.pdf>
44. <https://www.finastra.com/viewpoints/blog/seven-characteristics-payment-api-enabled-hub-all-adding-multiple-benefits-along>
45. <https://mojaloop.io/how-it-works/>
46. <https://www.pymnts.com/digital-payments/2021/early-warning-services-tch-now-allow-zelle-payments-via-rtsp-network/>
47. Businesses have different needs for proxy identifiers than consumers do. After all, no business has just one phone number or email address.
48. <https://www.theclearinghouse.org/payment-systems/-/media/1b336b9932b24e1fadee79c3e11693d4.ashx>
49. <https://nppa.com.au/wp-content/uploads/2019/10/NPP-Process-for-assessing-overlay-services.pdf>
50. For more information on the topic of cross-border payments in the context of FPS, see the corresponding note that is part of the World Bank's Fast Payments Toolkit.
51. In the European Union, card payments make up over half of all noncash payments. Card payments are particularly strong for merchant payments. The European Central Bank and other authorities have been active in developing harmonized European card standards as well as pushing other noncash payment options, such as SCT Inst (FPS) payments and open-banking options via the PSD2. For more, see: [https://www.ecb.europa.eu/pub/pubbydate/2019/html/ecb.cardpaymentsineu\\_currentlandscapeandfutureprospects201904~30d4de2fc4.en.html](https://www.ecb.europa.eu/pub/pubbydate/2019/html/ecb.cardpaymentsineu_currentlandscapeandfutureprospects201904~30d4de2fc4.en.html).
52. <https://bankingblog.accenture.com/payment-innovation-extends-marketplace-for-credit-at-point-of-sale>
53. <https://mobilepay.dk/erhverv/fysiske-butikker/mobilepay-point-of-sale>
54. <https://docs.adyen.com/payment-methods/swish>
55. <https://www.cgap.org/research/publication/interoperability-why-and-how-providers-should-pursue-it>

56. <https://www.uschamber.com/co/run/finance/payment-aggregator-explained>
57. <https://www.cgap.org/blog/how-tanzania-established-mobile-money-interoperability>
58. [https://www.nets.com.sg/faqs/business/accept-foreign-cards-and-payments/#faq\\_group1](https://www.nets.com.sg/faqs/business/accept-foreign-cards-and-payments/#faq_group1)
59. <https://www.cgap.org/blog/interoperability-and-customer-value>
60. <https://www.mygov.in/digidhan/pages/pdf/sbi/NPCI%20Unified%20Payment%20Interface.pdf>
61. There are two types of authorized third party under the PSD2: account-information service providers, which are authorized to access a customer's bank account information, and payment-initiation service providers, which are authorized to initiate payments from a customer's bank account. Both service providers must register with a national authority (not a European Union-wide authority). For more information, see [https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/Banking/lu\\_psd2-payment-services-directive2.pdf](https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/Banking/lu_psd2-payment-services-directive2.pdf).
62. [https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366/implementation/implementation-eu-countries\\_en](https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366/implementation/implementation-eu-countries_en)
63. <https://www.computerweekly.com/news/252466212/Why-PSD2-adoption-in-the-Netherlands-is-lagging-behind>
64. <https://www.openbanking.org.uk/customers/what-is-open-banking/>
65. <https://www.bankofengland.co.uk/-/media/boe/files/markets/other-market-operations/accessfornonbankpaymentserviceproviders.pdf>
66. <https://www.rba.gov.au/payments-and-infrastructure/debit-cards/least-cost-routing.html>
67. Least-cost routing gives the merchant the ability to choose the debit card network with the lowest fees for contactless payments.





