The “amplus” initiative – a modular approach to improving cross-border payments

This paper reflects the view of the authors and not necessarily the view of the Deutsche Bundesbank.

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1. Introduction

As the world becomes increasingly interconnected and digitalised, cross-border payments are taking on an ever more important role. Of late, the value of cross-border payments has grown to almost twice global nominal GDP (Al-Hamidy, 2019) and is still expanding at a rate of around 6% annually (BCG, 2019) – though the impact of the current pandemic still remains to be seen. The further increase in volumes, however, is not being matched by decreases in prices or improvements in convenience. This is why numerous initiatives have sprung up, most recently at the G20 with its roadmap to enhance cross-border payments, in an effort to improve the efficiency of cross-border payments.

Compared to domestic transactions, payments across currency areas are still relatively slow, costly and opaque (CPMI, 2018). Not just that: access to these cross-border payment services continues to be constrained. On the supply side, local payment service providers are seeing their correspondent relationships dwindle, while on the demand side, underbanked individuals and SMEs are either stuck in closed-loop solutions or are shut out of the payments market altogether.

Stage 1 of the three-stage process initiated by the G20 to enhance the efficiency of cross-border payments saw the FSB identify numerous frictions to be addressed by the roadmap. These frictions include fragmented and truncated data standards, complexities in meeting compliance requirements, limited operating hours, long transaction chains as well as outdated legacy technology platforms (FSB, 2020a).

While some private actors like PayPal and Western Union are looking to address these issues with closed-loop systems that are loosely connected to existing infrastructures, other players like Facebook have emerged with ideas for a stablecoin-based solution that could operate almost independently of current infrastructures. With the emergence of global stable coins, a number of potential issues have arisen. The potential lack of public control and its potential effects on monetary policy may have deeper implications for central banks and financial policy and are therefore viewed critically. These developments as well as the inadequacies of cross-border payments prompted the Bundesbank to address the cross-border frictions mentioned above with a proposal consisting of three separate modules, which will be described in detail in this paper. The focus is more on evolving and utilising existing payment rails than on breaking new ground. Together, these modules represent a solution that we have dubbed "amplus."[1]

The main idea behind amplus is to propose a set of interlocking modules that delivers a more efficient and secure framework for cross-border payments than the one that exists today. Furthermore, because the modules are based on pre-existing technologies, implementation promises to be fairly swift and based on tried-and-trusted components.

Since some solutions, like continuous linked settlement (CLS), already exist for large-value payments, the idea behind amplus is to improve the market for remittances. Remittances in this context are defined as person-to-person transfers without an underlying economic transaction (CPMI, 2018). While UN sustainable development goal 10.c states that by 2030, the global average transaction costs of remittances should be reduced to less than 3% of the amount remitted, with no single corridor having costs exceeding 5%,[2] global costs for remittances remain significantly higher than that. Currently, transaction costs of remittances average 6.51% globally, with some corridors far exceeding 10%, and banks remaining the most expensive option (World Bank, 2020).

However, a great many remittances are still being sent as cash, outside the regular channels (FSD, 2018), complicating the fight against illicit money flows and driving up costs and risks for both senders and beneficiaries of remittances. amplus aims to steer these flows into regulated and cost-efficient channels.

In the following paper, we will first outline the frictions that each module aims to address, then define the context in each case, and finally show how the proposed module intends to resolve the frictions by describing the module, its governance and its intended effects.

The first amplus module is an addressability service that seeks to include the unbanked in the financial system without the need for them to open a bank account, thereby boosting their access to cross-border payments specifically and to financial services in general. We propose to achieve this by creating a multilateral governance structure that defines

[1] Latin for wide, spacious, big.

[2] See also https://sdgs.un.org/goals/goal10

rules for providing individuals with identifiers that can be used to route information through the banking system.

While identifying the sender and beneficiary of a payment is an important first move towards enabling cross-border payments, the second, some would say more important, step is to ensure that a payment does not violate anti-money laundering rules and that applicable sanction regimes are respected. This is done by adding a second module alongside the addressability service: a KYC scheme that reuses elements from the governance scheme of the addressability service.

The third module is an international payment settlement infrastructure (IPSI) for settling small-value cross-border payments and remittances. This multilateral platform aims to shorten correspondent banking chains, thereby decreasing the costs and processing times of cross-border payments.

To illustrate the synergy effects that can be achieved when the three modules work in unison, the final section offers a detailed account of a payment flow that uses all three modules.

2. Solving the addressability problem

2.1. Current situation

Currently, around 1.7 billion adults remain unbanked, meaning they lack access to a financial institution or mobile money provider, with most of them living in developing economies that are also net recipients of remittances most of the time.[3] While some actors may have access to a closed-loop digital payment solution of some kind, they are excluded from any payment options not covered by that solution. For example, mPesa users from Kenya may be able to send and receive payments to and from other mPesa users, but they are unable to do the same with users in the international banking system and users of other solutions with a few exceptions.

Most people in net sending countries are financially included, with some jurisdictions guaranteeing some form of basic banking account (e.g. the Payments Account Directive in the EU) (CPMI, 2016), so this brings a dilemma to the fore: even if migrants in the sending countries have access to a bank account in their new home country, they are often unable to address family members in their country of origin with that bank account. There needs to be a solution that opens up the closed loops and facilitates interoperability between traditional channels, on the one hand, and other solutions like money transfer operators and other remittance providers, on the other. This solution

[3] For more detail, see https://globalfindex.worldbank.org/sites/globalfindex/files/chapters/2017%20Findex%20full%20report_chapter2.pdf

would allow us to increase choice, spur competition, and thus exert downward pressure on remittance prices.

2.2. Considerations

Enabling addressability with some form of identifier is an important step in the first mile of remittances. Before initiating a payment, the sender needs an identifier of some kind to ensure the payment is transmitted end to end. Additionally, it could be argued that enabling some form of digital identification has beneficial effects for economic growth (McKinsey Global Institute, 2019).

There is certainly no lack of possible identifiers. For the banked population, the IBAN can be used as an identifier to enable end-to-end routing within the banking system. For users of other solutions, other forms of ID are available, e.g. email addresses, phone numbers or devices such as QR codes. In Chile, the taxpayer ID RUT is used as an identifier, while India's Aadhaar system is based on biometric features (CPMI, 2016). However, these identifiers lack a common standard that allows interaction across solutions.

Besides facilitating payment routing, an identifier could also help standardise the collection of data for cross-border payments, help paint a clearer picture of cross-border payment flows, and – in combination with other KYC procedures – help automate compliance processes and improve transparency. These considerations were crucial in the decision to introduce a global standard for business customers, the legal entity identifier (LEI) (Cleland & Hartsink, 2019).

While the LEI is not designed to cater for the needs of natural persons, the distributed governance model used in the Global Legal Identifier System could be a basis for a global solution interlinking national IDs. LEIs are managed centrally by the Global Legal Identifier Foundation but issued by local operating units (LOUs), so the arrangement benefits from local expertise, regional knowledge and distributed management, while operating to a global standard.

Since being endorsed by the G20 in 2012, the LEI system has grown steadily to cover more than 1.5 million entities in over 200 countries (GLEIF, 2019), in a demonstration of the scalability and reach of the distributed management model. Regulations mandating the use of the LEI, such as EMIR and the Dodd-Frank Act, have also helped spur this growth.

As ISO 20022 is emerging as the global messaging standard for payments and will be harmonised further as part of the G20 roadmap to enhance the efficiency of cross-border payments (FSB, 2020b), it is important that addressability information can be exchanged via this standard.

However, as identity sharing across borders raises questions surrounding data protection, a global solution will need to address these issues in some way. Most jurisdictions have some kind of regulation in place that limits the use and storage of personal data. Jurisdictional differences in legislation present an additional challenge for any solution that seeks to share identity information across borders. Furthermore, risks stemming from data storage and usage must be properly addressed. Additionally, such a service will need to cover its costs – the LEI does so by charging a service fee. For remittance solutions, this may slow down acceptance.

2.3. The amplus addressability scheme

Remittance payments normally flow from developed countries with a banked population into underbanked recipient countries. As outlined at the beginning, the intention is to leverage existing payment rails as far as possible. Therefore, senders should be able to make use of foreign bank transfers as a tried-and-trusted payment instrument, where available. The next question is how to address the recipient, who is not fully unbanked but locked into a closed-loop local payments scheme like mPesa, which we call the customer payment solution (CPS).

The main goal of this proposal is to forge a partnership between the CPS and a local bank which, in this set-up, would provide the BIC for routing the international payment transfer. International messaging standard ISO 20022 already permits the use of a personal identifier other than the recipient's IBAN. In addition to the IBAN field, it supports the field "alternative identifier" which could be populated e.g. with a telephone number.

If the CPS collaborated with a local bank, a remittance transfer initiated within the sender country's banking system could be routed via the BIC to the receiving local bank, which would hand over the message and credit the funds to the CPS. The latter would then forward the message and the funds to the ultimate beneficiary within the closed-loop payment service. This set-up could also be used to initiate payment flows from previously closed-loop solutions into the banking system, thus contributing to financial inclusion.

Technically speaking, then, this is a feasible approach. However, it is not yet clear how the creation of local partnerships can be encouraged, and how international standardisation and governance might be achieved. The latter are crucially important as payments only work on the basis of standardised formats and business agreements.

To re-use a tried-and-tested approach, the proposed organisational structure aligns partly with the LEI governance framework. The LEI system relies on local operating units (LOUs), which are responsible for implementing and assigning identifiers. These LOUs are governed and overseen by a global management body, which ensures the consistency and integrity of the identifier at the global level (see Figure 1).

If this concept were applied to the addressability scheme, it would be necessary to implement a scheme management unit (SMU) at the global level, which is a unique entity responsible for managing and developing the addressability scheme. At the local level, local competent authorities (LCAs) would be needed to appoint and oversee the partnerships between the CPS and banks.

The LCA should be a local authority with the robust legal framework needed to perform the necessary oversight activities. Traditionally, these are entities that already perform oversight tasks in the banking sector (e.g. finance ministries or central banks).

The SMU, meanwhile, should be a global organisation with expertise in cross-border payment and data flows, such as the IMF. As the SMU will have to oversee the local competent authorities, it is hard to imagine a private entity managing the scheme.

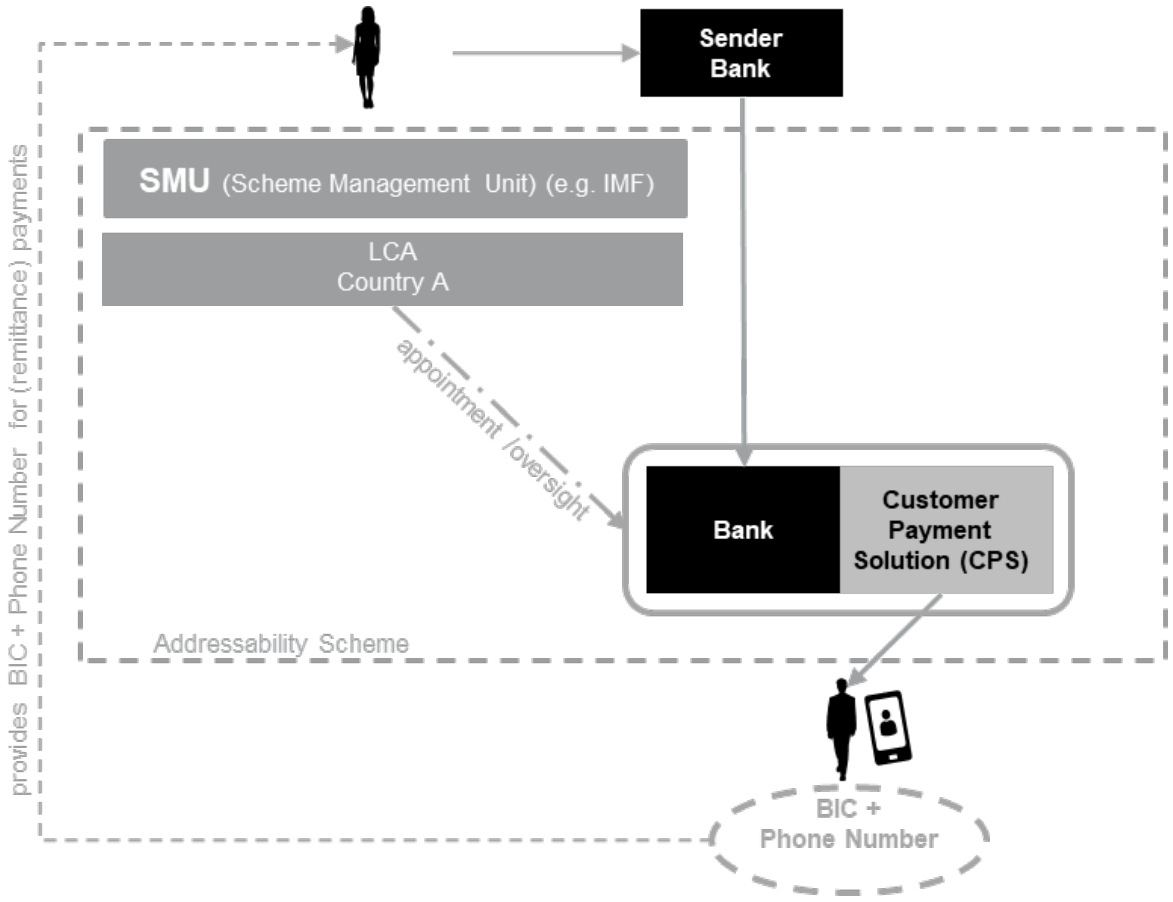

Figure 1: Overview of the addressability scheme

Needless to say, it would always be possible for a local CPS to collaborate with a bank, but the innovative element here is the combination with an internationally accepted addressability scheme, which would be developed and managed by the SMU. The scheme would comprise rules for:

- mandatory use of KYC identifiers, assuming such a construct is available;
- technical requirements: provision of basic personal data (e.g. name), international routing via BIC of bank and identification via personal identifier of the customer payment solution (e.g. phone number);
- business process flows;
- liability management (e.g. responsibility of bank for correctness of routing information);
- scheme oversight framework (e.g. reporting requirements, on-site inspections, sanction measures).

Such a scheme would ensure that identifiers are unique and improve payment flows by opening up closed-loop solutions and enabling users of previously closed-loop solutions to participate in the financial system. Further, the introduction of a KYC identifier, as outlined below, would add another strong element to the scheme, and the scheme management unit could mandate its use.

Besides ensuring the addressability of previously unbanked or underbanked individuals, an arrangement along these lines could significantly improve the quality of cross-border payment data. As the identifier is a standardised end-to-end form of ID, it would be possible to identify sending and recipient countries for a wide range of payment flows, including those previously transmitted outside the banking system.

3. Ensuring compliance with KYC standards

3.1. Current situation

Combatting money laundering and terrorist financing is one of the main challenges in cross-border payments today. Based on the FATF Recommendations, countries have put regulations in place to prevent the illicit use of payment rails. However, these regulations may differ across countries, requiring actors in the cross-border payment chain to comply with at least two different legal frameworks (FSB, 2020a).

While necessary, know your customer (KYC) requirements have been increasing, driving up costs and processing times for cross-border payments. Currently, compliance costs make up a significant portion of cross-border payment costs and pose a major challenge for all the parties involved (CPMI, 2018), and they have been identified as one of the main frictions in the G20 assessment of the main barriers for cross-border payments (FSB, 2020a). The increase in costs has made cross-border payments

unprofitable for some banks, which have decided to step away from the business, therefore decreasing competition at the front end (Cenfri, 2018b).

Increased customer due diligence requirements have also impacted the back end of cross-border payments. De-risking has led to a steady decline in correspondent banking relationships, leading to decreased competition, higher concentration, and in some cases longer transaction chains, which further increase costs and decrease processing speeds (CPMI, 2016).

High compliance requirements and de-risking could drive informality in the remittance sector, steering remittance flows into channels where know your customer and anti-money laundering checks are absent (Cenfri, 2018a). It is estimated that between 35% and 75% of remittances are transmitted via informal channels (Freund & Spatafora, 2005), with other estimates suggesting that volumes in the informal sector may be up to 2.5 times the size of those in the formal sector (AFI, 2018). This development could lead to increased risk and opacity in the global financial system (FATF, 2014).

3.2. Considerations

As mentioned above, differences in national legislation on AML/CFT and also in sanction regimes have increased the complexity of cross-border payments and may have erected market barriers for smaller players wishing to enter the market, thereby stifling competition. Because every actor in the chain has to carry out customer due diligence checks, complexity and costs increase with every additional intermediary in the chain (FSB, 2020a). As the decrease in correspondent banking relationships might lead to longer transaction chains, this could create a vicious cycle of ever increasing costs and processing times.

While the risk-based approach of the FATF recommendations was initially designed to allow for flexibility and a more efficient allocation of resources (FATF, 2012-2020), this greater flexibility has led to the aforementioned different interpretations at the national level, with banks preferring to err on the side of caution when it comes to business relationships.

The question is whether this produces greater effectiveness in combatting illicit payment flows when a significant portion of payment flows remain in, or are shifted via, informal channels where criminal payments can be hidden among a number of other, harmless payments.

The complex processing of compliance costs was identified as a major friction in stage 1 of the G20's work to enhance cross-border payments (FSB, 2020a), and has therefore been addressed by multiple building blocks in the G20 Roadmap.

Building Block 4 aims to align regulatory, supervisory and oversight frameworks, while Building Block 5 centres around applying AML/CFT rules consistently and

comprehensively. Furthermore, Building Block 7 has the goal of identifying low-risk payment corridors and developing a “KYC-light” framework for corridor risk assessments, supporting the risk-based approach and Building Block 8 seeks to foster KYC and identity information sharing (FSB, 2020b).

Furthermore, unique digital identifiers (as proposed by Building Block 16 of the roadmap), combined with the digitalisation of KYC processes like in India’s Aadhaar system, could reduce transaction costs for all the parties involved (D'Silva, Filková, Packer, & Tiwari, 2019). The challenge now is to unlock the benefits offered by national solutions like Aadhaar on a global scale in a way that is consistent with national data protection regulations without introducing a wholly new scheme at the national level.

3.3. The amplus KYC governance model

The idea of a KYC identifier is not new, and it is already a reality in many countries at the national level. An approach even exists at the international level, in the shape of the LEI, though this is strictly limited to corporate entities. The challenge is to design a set-up that allows for the full inclusion of national solutions while at the same time ensuring a sufficient international minimum standard.

From a governance perspective, the best way forward would be to again use the governance structure already described in the section 2.3, with a global scheme management unit (SMU) and local competent authorities (LCAs) ensuring appropriate implementation. The SMU could add KYC scheme elements to the global scheme that has already been designed to provide the addressability service. The importance of global standardised rules is incomparably higher for the KYC scheme, however. The scheme rules and their implementation would build the foundation of trust needed for global acceptance of the KYC identifier. Only if sending banks can rely on the trustworthiness of the identifier and need not fear sanctions if they use it can the system deliver additional value.

Therefore, it is not only the global scheme that has to be convincing but above all its national implementation, which would again be done by local competent authorities, as in the case of the addressability scheme. LCAs would play a more prominent role here as both the gateway to the addressability database structure and the issuer of the KYC identifier.

Requests for creation of a KYC ID would be channelled through the banking network, either directly via a bank, or via the bank in partnership with a CPS. In the latter case, the bank or CPS would be responsible for conducting the KYC check in accordance with the scheme rules; in the former, the bank would need to check all its customers according to the rules. They would then transmit the information to the LCA, which would issue the ID and save it in its database. LCAs would be responsible for

overseeing entities that are eligible to perform KYC checks and request IDs on a customer's behalf. Existing ID solutions could be integrated in the scheme as well.

The scheme includes rules for:

- incorporation and application of the FATF's "light" Recommendations (once these have been developed by FATF);
- technical requirements: identifier format, placement within the payment message, database design and content;
- business and technical processes: data submissions, data requests, data deletions, data status, data updates incl. validity, request process (e.g. U2A and/or A2A);
- scheme oversight framework (e.g. reporting requirements, on-site inspections, sanction measure

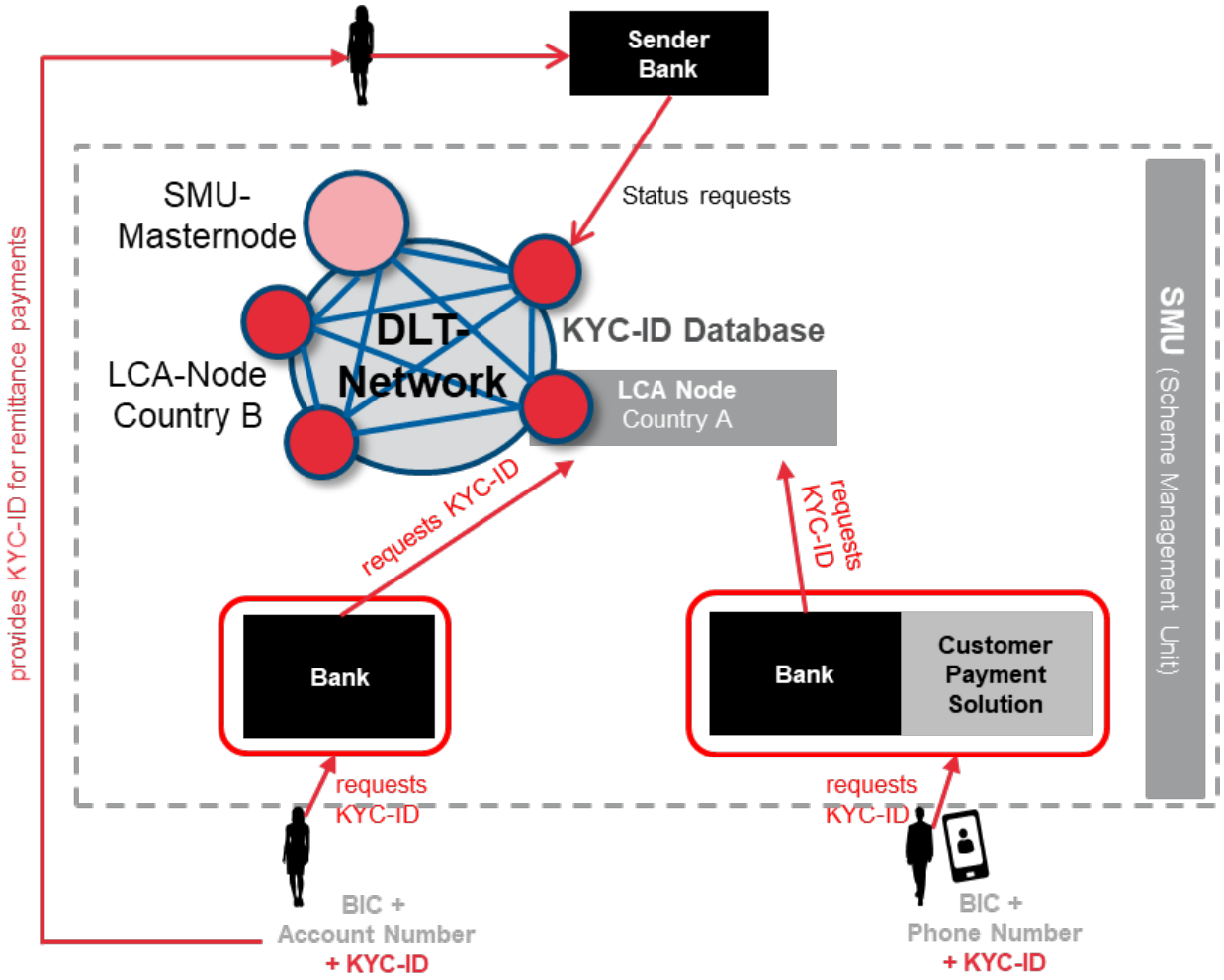

Figure 2: Overview of the KYC ID scheme

On a technical level, the KYC database could be a blockchain infrastructure where each LCA operates its own node and stores its national data. This way, it would be ensured that citizens' personal data do not have to leave the country. The SMU would have a master node within the network, with superordinate rights to ensure its oversight mandate, and also have the possibility to remove nodes as a last resort.

By leaving responsibility for data storage and provision at the national level, the system allows established national ID schemes to be included. These could either be integrated directly or mapped to the (probably smaller) international information set. For each KYC ID, the node would store the ID itself and a validation date. If a remittance-sending bank wants to check whether the recipient has been properly KYC checked, it would request the status of the KYC ID provided, via its national node, and the infrastructure would return a positive or negative. This information should be sufficient to execute the transfer if the feedback is positive.

While some jurisdictions do not require checking the information of the beneficiary, the KYC-scheme could help in jurisdictions, where KYCC (Know your customers' customer) is required or where certain company policies require a more profound beneficiary check. Furthermore, it may help with the automated processing for sanctions lists and may help to avoid the involuntary blocking of payments to beneficiaries with names similar to persons on the sanction list.

4. Enabling interoperability through a multilateral platform

4.1. Current situation

While the first two modules affect the first, middle and last mile of remittances, some challenges mainly concern the middle mile or back end of payments. As mentioned above, de-risking has led to a significant decline in correspondent banking relationships, which have fallen by more than 20% in the last few years. This in turn has caused has caused the number of active correspondent banking corridors to drop by roughly 10%,, driving up concentration levels and decreasing competition in the correspondent banking space (BIS, 2019).

While correspondent banking is still the most important channel for cross-border payments overall, a number of other arrangements exist for international transactions as well. Single-platform providers rely on in-house transfers to bridge two jurisdictions and need no further infrastructure to complete a transaction (FSB, 2020a). This model is used by a number of money transfer operators, such as Transferwise and azimo. However, some of these single-platform providers consist of a closed-loop model that impedes interoperability. This may exacerbate the concentration problem in cross-border payments, as network effects favour the formation of monopolies in the payments market.

Another possible way of building a cross-jurisdictional bridge is to interlink different domestic infrastructures bilaterally. Examples of this include the connection of different ACHs in SEPA's clearing layer, the connections facilitating settlement in real-time gross settlement systems (RTGS), and even full integration in a system such as TARGET2 for the Eurosystem. This enables RTGS participants in one country to reach participants in the interlinked RTGS without needing to participate in two systems (FSB, 2020a). However, these links are few and far between, as a lack of interoperability across back-end infrastructures is still a major obstacle to remittances (Cenfri, 2018b).

Peer-to-peer networks are another possibility for sending payments across borders, These enable payers to send payments directly to the payee without the use of an intermediary. The emergence of distributed ledger technology in particular has spurred interest in this model, with multiple crypto-assets and stablecoins being based on this architecture (FSB, 2020b).

4.2. Considerations

While a multitude of cross-border payment options exist, payment processing across borders suffers from a number of frictions.[4] Complex processing of payments data and fragmented and truncated data standards for payment messages make it harder to achieve straight-through processing of payments. This may necessitate manual interventions, which are costly and time-consuming.

Even though initiatives like SWIFT gpi may produce efficiency gains in data flows, some problems can be traced back to the underlying settlement infrastructure. Limited infrastructure operating hours limit overlap, pushing up processing times. High funding costs and long payment chains are other problems arising from the lack of interoperability across settlement systems.

It may be possible to address these problems by interlinking payment systems bilaterally. However, a global model based on bilateral interlinking may be more complicated to coordinate, as each payment system would have to connect to a multitude of other payments systems to avoid long payment chains. This in turn may lead to high coordination costs.

These frictions are being addressed by a number of building blocks in the roadmap to enhance cross-border payments. The aims of these building blocks include improving access to payment systems, extending operating hours, and interlinking payment systems (FSB, 2020b).

These frictions could furthermore be addressed by introducing a multilateral, multi-currency-capable payment system. While there are examples of regional systems, such as TIPS in the Eurosystem (which is scheduled to become multi-currency-capable with

[4] For the complete list of cross-border frictions, see (FSB, 2020a).

the introduction of the Swedish krona), the Arab regional payment system, and the SADC-RTGS in southern Africa,[5] so far there is no public alternative for the settlement of payments on a global scale.

4.3. IPSI – a global approach towards payment settlement

Many of the challenges we are facing at the back end of the payment infrastructure arise from one main issue: payment systems are designed to cater for domestic payments. What may be lacking is a retail payment system with a truly global focus. An international payment settlement infrastructure (IPSI) for remittances could help make cross-border payments more efficient.

The main advantage of a central infrastructure would be that platform participants could reach all other participants via a single link, instead of relying on a multitude of multilateral arrangements. Furthermore, transaction chains could be shortened, probably resulting in lower costs and shorter processing times as well as reduced funding costs because the liquidity could be held in a single platform.

However, such a platform must be designed carefully to properly address all the frictions while properly managing the risks arising from cross-border payments. First of all, for a global platform, 24/7/365 operations are a necessity to guarantee accessibility from all time zones at all times.

Furthermore, real-time processing based on purely pre-funded accounts without credit lines should go a very long way towards minimising risks and increasing the speed of cross-border payments. However, central banks may still be able to grant their indirect participants credit lines, but that is a matter for the individual direct participants.

The platform should be capable of processing multiple currencies. Because system complexity increases with the number of currencies, it may be prudent to start with a limited currency basket (e.g. the SDR basket) and gradually add new currencies. To keep the platform as simple as possible, currency conversion is not part of the system. It is left to the discretion of participating central banks whether they want to hold shadow accounts for different currencies for their indirect participants, they convert funds into local currency in their books, or they choose an alternative method for handling conversion at the receiving end for their participants.

As remittances have a number of positive external effects, it may not be profitable for a private entity to operate the platform. Therefore, an international public institution (like the Bank for International Settlements) could fill the role of operator, with central banks acting as direct platform participants. These central banks would act as interfaces to

[5] Southern African Development Community Real-Time Gross Settlement System.

their domestic payment systems as well, as most central banks are operators of, or participants in, their national infrastructures.

These central banks would be able to hold accounts in multiple currencies of their choice and would be the provider of liquidity in their national currency. This would ensure that central banks maintain control of money flows and may even help improve data quality of cross-border payments.

Regarding indirect access, the operator should define minimum standards. Within that framework, participating central banks could decide at their discretion who would be granted indirect access. KYC and AML procedures would be conducted by the indirect participants, which is why the framework needs to make sure that indirect participants are able to fulfil the regulatory requirements.

To ensure that no private market players are crowded out, the platform should be used for remittance payments only. This could be achieved by the platform operator defining a limit, which would possibly also reduce the risk of the platform being used for money laundering purposes. Another possible benefit is that this would ensure that no private solutions for wholesale payments are crowded out of the market. However, a remittance platform may face the risk of liquidity piling up in the receiving countries. Therefore, the platform should allow liquidity to be transferred between participating central banks when certain thresholds are reached.

From a technical perspective, it would be best if the platform operated with multiple sites in order to ensure 24/7 capability and improve technical resilience. Furthermore, it should make use of the state-of-the-art ISO 20022 messaging standard. IPSI could benefit greatly from the global ISO 20022 messaging standard as envisaged by Building Block 14 of the G20 roadmap. Regarding the account structure, central banks may choose their account model freely (e.g. technical accounts).

A global platform such as IPSI would need broad political support in order to start the project. However, this module could address many of the frictions at the back end of payments by significantly shortening payment chains, leading to a decrease in costs and processing times. Another advantage may be the reduction in the number of direct partners (as participating banks only have a business relationship with their central bank), which could substantially reduce compliance costs.

Furthermore, depending on the policy choices of participating central banks, it could also improve competition at the front end, as it may lower market entry barriers for cross-border payments. This could lead to improved choice for consumers, lower costs, and increased transparency.

To conclude, IPSI could contribute significantly towards closing the gap between domestic and cross-border payments, while forming a useful complement to existing payment solutions.

5. Conclusion

The inefficiencies in cross-border payments are widely known, leading to private entities entering the market (such as Facebook with its Diem system) and multiple initiatives to boost market efficiency, most recently the G20 roadmap to enhance cross-border payments. While all three modules described above can be implemented independently, operationalising all three modules together would create the most value and address a number of the frictions currently affecting cross-border payments.

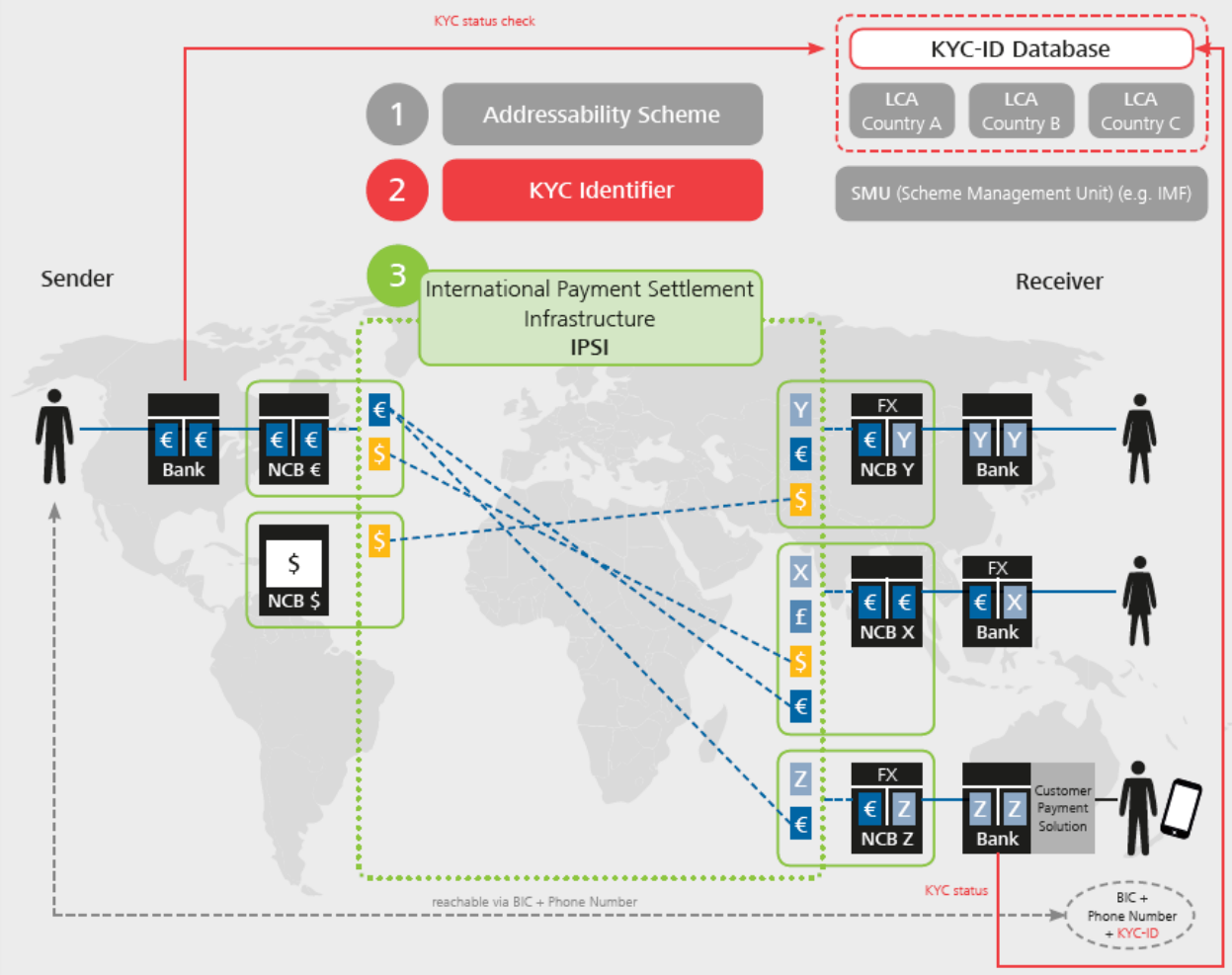

Figure 3: Complete payment flow with all modules implemented

In Figure 3, we show a payment flow given full implementation of all three modules. The sender gives a payment instruction to their bank, and identifies the recipient of the payment (who is a user of a mobile payment solution like mPesa) via the unique identifier stemming from the addressability scheme. This identifier is linked to a KYC ID in a local database, which reports to a central database whether the KYC ID is still valid or not. The sender's bank checks the status of the payee's KYC ID in this central database, and if

both parties have a valid KYC ID, the sender's bank forwards the payment to its central bank, which is a participant in IPSI. If the sender's bank has sufficient liquidity (or the central bank has granted a credit line), the payment is then settled in real time via IPSI in a currency in which both the sending and receiving bank hold an account. For reasons of simplicity, we assume that the sending central bank sends its currency (e.g. euro) and the receiving central bank holds a euro account.

The receiving central bank can then choose how it handles the currency transfer to its indirect participant (which is a bank partnering with a local customer payment solution). After receiving the amount, the receiving bank credits the account of its local customer payment solution, which then in turn credits (and optionally notifies) the recipient.

This example illustrates that if all modules are implemented together, amplus could enable end-to-end straight-through processing of cross-border payments. However, the modules could exist independently as well, even though the international payment platform would probably be most efficient if the first two modules were implemented beforehand – or any other solution were implemented for the harmonisation of KYC/AML checks and/or the enabling of addressability across borders and solutions.

Because remittance flows have positive external effects, such as their positive impact on consumption and the economy of receiving countries overall (Perez-Saiz, Dridi, Gursoy, & Bari, 2019), as well as poverty-mitigating and financial inclusion effects that go beyond the pure value of remittances (Gupta, Pattillo, & Wagh, 2009), an argument could be made for the public provision of the back-end infrastructure. As remittances might have a greater economic impact on developing countries than official development aid (Stojanov & Strielkowski, 2013), the costs of the project could in part be justified as a form of foreign aid.

However, public players should only provide the infrastructure running in the background, as represented by these three modules. Any decision on the provision of front-end services – that is, the applications facing end-users – will remain a matter for national players, which may decide to leave these to the market in order to boost competition.

Overall, amplus may seem a very ambitious proposal. Nevertheless, it may be just what the market for cross-border payments needs: a market-neutral alternative for identity management and clearing and settlement. Public players have managed the former for years, and central banks have provided the latter for years on a domestic scale. Now it is time to leverage the momentum created by the G20 roadmap to truly think global for cross-border payments.

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