Migrant Money

Technical Paper

Open Regulated Global Payments Inter-Network: Phase 1 – Proxy Addressing System Service (PASS)

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EXECUTIVE SUMMARY

To send an email, the sender only requires the recipient's email address. The sender doesn't need to know the recipient's internet service provider, or the email service provider—whether the email is received via Outlook or Gmail, or on their mobile or desktop. But for sending money across borders, the sending PSP (Payment Service Provider) doesn't just require an address. It needs a multitude of recipient payments information: for example, the recipient's bank identification code, their PSP and its physical address, in addition to their account number, sort code, etc. This information is required by the sending PSP or bank from the recipient at the time of initiating the transaction. This is hard to ascertain for the recipient, but if this payment information were to be linked to a registered Proxy, also known as an alias (that is, a common individual identifier such as a mobile number, email address, tax ID, financial ID or national ID), it would be far easier for the recipient to share it with the sender.

We have seen the evidence in mobile money—1.2 billion registered mobile money accounts using the mobile number as the Proxy—over the last 15 years across the world. The Unified Payments Interface (UPI), which was launched in India in 2016, has seen major uptake despite the underlying infrastructure—Immediate Payment Service (IMPS) being around since 2011, with limited uptake. Pix launched in late 2020 using Proxies in Brazil, and currently processes 2 billion transactions a month. Proxies are also used in China (Alipay, WeChat Pay), Pakistan (RAAST), Sweden (Swish), and in the United States (PayPal and Venmo).

Therefore, we believe that providing a Proxy for a cross-border payment will reduce friction, increase the adoption of digital remittances and, consequently, reduce the cost to consumers for similar transactions. Besides, using a Proxy will make cross-border payments safer, more accessible, and more efficient through fraud mitigation and improvements in payment addressing accuracy.

Proxy Lookup Service Operators (PLSOs) or Proxy directories in many parts of the world today use Proxies to support the exchange of payment addressing information. However, Proxy directories are highly fragmented and are not interoperable, since they were initially created within closed ecosystems to support specific use cases. Seeking to address this, the United Nations Capital Development Fund (UNCDF) aims to convene the payments industry towards creating a Proxy Addressing System Service (PASS). PASS aims to interconnect existing PLSOs to create a directory of directories, whilst ensuring the confidentiality of customers' personally identifiable information, which is only stored by the PLSO. PASS will only use existing directories' Proxies and will not create any new Proxy.

PASS would receive the recipient's full name, destination country, and Proxy from the sending PSP—the institution initiating the payment–and enable its validation via the network of Proxy directories. For example, once a request has been received, PASS sends this request to all the PLSOs, and one or more could respond with a match sending back additional payment information such as the recipient's PSP legal entity identifier (LEI) and the payment systems the recipient PSP is part of (for example, Swift). This provides the sending PSP with the requisite information to make a payment via the existing payment systems it is part of. PASS would also manage issues where there are no matches, or multiple matches are found, for a given look-up request and will store an audit trail for every look-up request and its response. The PSP will continue to perform the required compliance checks in adherence to current compliance procedures independent of the look-up by PASS.

1. OVERVIEW

1.1 BACKGROUND

Globally, an estimated 281 million people, or 3.6 percent of the world's population, live outside their countries of origin. Around 48 percent of international migrants are women.

In 2022, remittances to low- and middle-income countries (LMICs) were expected to increase by 4.9 percent to reach $626 billion. The strong growth rate is noteworthy, coming as it does after a surge of 10.2 percent in 2021. Although remittances to LMICs fell in 2020 by 1.7 percent (compared with the original prediction of 20 percent) due to the COVID-19 pandemic, their relative importance as a source of household finance and financial inclusion of migrants and their families continues to increase.

It is also worth noting that the remittance industry has its own set of unique challenges. One of these is interoperability amongst global payment systems, with the consequence that a user of one payment system may find it challenging to make payments to a user of another payment system. One reason for this is the difference in the user identification process used by each of these parties to identify the payee and payer. Some use Proxies or aliases such as national ID numbers, or mobile numbers, while others use customized and purpose-driven in-house identifiers. These differences lead to the need to implement complex conversion and translation mechanisms for payment data.

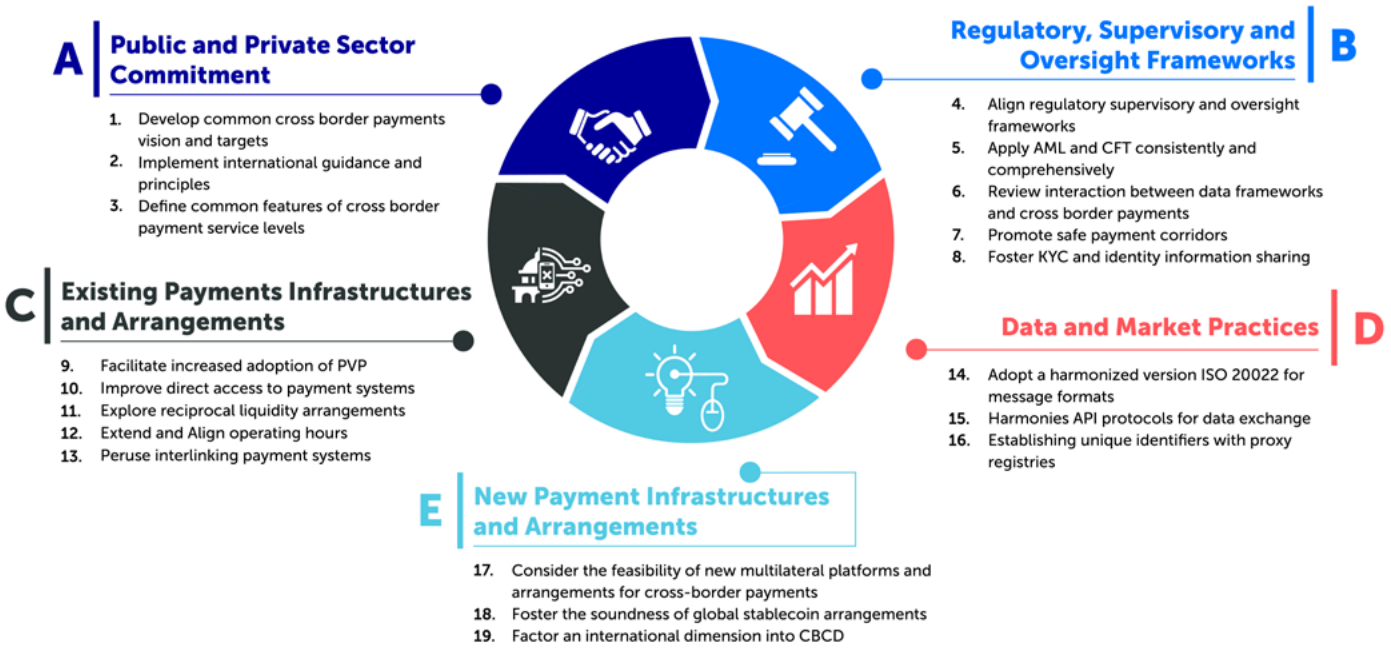
Additionally, for information and reference purposes, this paper also builds on the work of several key documents created by UNCDF, Better than Cash Alliance (BTCA), and the World Bank for guidance on the modernization of payments and remittance services, as well as standards and principles encapsulated by the Financial Stability Board (FSB), Bank of International Settlements Committee on Payments and Market Infrastructures (BIS CPMI), the BIS Innovation Hub, the World Bank and other standard-setting bodies on retail payment systems, cross-border remittances, and digital financial inclusion.

Specifically, the Group of Twenty (G20) made enhancing cross-border payments a priority during the 2020 Saudi Arabian Presidency. The objective is to create faster, cheaper, more transparent, and more inclusive cross-border payment services that would deliver widespread benefits for citizens and economies worldwide, supporting fiscal growth, international trade, and financial inclusion. A Cross-border Payments Task Force was set up by the BIS CPMI to facilitate this process.

This Task Force and its associate international organizations and standard-setting bodies undertook a three-stage process to develop a global roadmap for enhancing cross-border payments:

- **Stage 1:** Set out the challenges and identify friction points in cross-border payments.
- **Stage 2:** Describe the necessary elements of a response in the form of a set of 19 building blocks.
- **Stage 3:** Provide the roadmap for a high-level plan which sets ambitious but achievable goals and milestones. UNCDF's exploratory paper on an Open Regulated Global Payments Inter-Network articulates the need for a global directory to resolve identifiers by allocating a unique digital signature to each service user, wherever she/he may be in the world. Such a vision is consistent with the G20 roadmap for enhancing cross-border payments.

Figure 1: G20 Roadmap: Payments Landscape and the 19 building blocks.



Specifically building block 16 advocates for establishing unique identifiers with proxy registries:

> Thus, the need for global structures to generate digital unique identifiers (UIs) for individuals and legal entities, and decentralized proxy registries linking them with the account information (in a standard format) of both the payer and the payee, is pressing. It is expected that this will reduce processing errors and the need for complex conversion and translation of payment data. The GLEIS (Global Legal Entity Identifier System) is one example of a global UI that enables unique local identifiers to be available and globally accessible. It is important to note that all LEI (Legal Entity Identifier) reference data is verified and validated (vLEI) by accredited issuers and provides interoperability across parallel identity platforms, making it eminently suitable for use as a global UI.
>
> Furthermore, using a globally standardized approach to support national schemes for identification could expand beyond payments to end-users and the wider economy if mass adoption was to occur throughout society. Case in point: Singapore's PayNow system. It uses an individual's national digital ID and a company's legal identifier as a proxy for payments. However, this would need to be balanced with potential drawbacks and delivered in a way that would avoid reinforcing existing inequities.[1]

1 *Enhancing cross-border payments: building blocks of a global roadmap*, Stage 2 report to the G20 (July 2020): https://www.bis.org/cpmi/publ/d194.pdf.

In February 2023, FSB outlined priority actions to meet the targets set in the G20 Roadmap for enhancing cross-border payments.

Specifically, priority action 10:

> **Exploring enhanced use of the LEI in cross-border payments.** ROC members, GLEIF and/or relevant SSBs, within their respective mandates and in line with the recommendations of the FSB July 2022 Report on LEI and cross-border payments, to:
>
> a) Explore further, with national regulators and others, the role the LEI might play in assisting entities with due diligence for KYC (consistent with existing FATF Recommendations), as well as other use cases.
>
> b) Set up pilot projects among relevant stakeholders regarding standards for including the LEI in payment messages (possibly including with regard to quality of LEI reference data) and provide examples to financial institutions on possible uses of the LEI when transmitted in payment messages.
>
> c) Consider issuing guidance and carrying out further outreach regarding sanctions, customer due diligence and wire transfers on how the LEI may be used as a standardized identifier for sanctions lists or as the primary means of identification of legal entity customers or beneficiaries (in line with suggestions made in the FATF Survey of October 2021 and consistent with existing FATF Recommendations).
>
> d) FSB to review progress in implementing the recommendations of its July 2022 report on LEI and cross-border payments, and publish a progress report.

This paper focuses on the G20 building block 16, elaborating on the concept of connecting decentralized proxy registries (directories) via a proxy addressing system service (PASS). The PASS is a lookup service that aims to resolve the recipient's Proxy through consultation with connected Proxy directories. In addition, this paper proposes to use the LEI to identify both the sending and receiving PSPs, and to include the LEI in the payment message.

To achieve this, UNCDF recommends setting up a pilot project among relevant stakeholders, an experimental proof of concept to test the feasibility of the lookup service and the enhanced use of the LEI in cross-border payments for recipient PSP identification.

1.2 CURRENT STATE OF PLAY

More than 60 countries today enable frictionless domestic instant payments (within the country) by deploying Instant Payment Systems, however, this is not the case for international remittances. The slow, expensive, fragmented, and non-transparent nature of the current remittance systems is an unsatisfactory experience for all parties involved in a transaction. These issues are moving some users away from banks and money transfer agents towards financial technology (fintech) providers, who may be able to better meet their needs.

Ideal interoperable systems such as telephones or email can work with other systems

anywhere in the world without restriction. An interoperable payment system based on global standards will enable a frictionless environment creating a seamless experience for all ecosystem participants. This in turn will create a network effect that increases the usage of such systems, as has been seen in the case of M-Pesa in Kenya and Swish in Sweden, amongst others.

The current remittance systems are largely interconnected but not interoperable. Interconnection today requires bilateral agreements between the payment systems involved in the transaction, which are non-standardized ad-hoc implementations. Due to the lack of this interoperability, sending payments from one payment system to another is not always feasible.

On the consumer side, the senders today are required to provide extensive details of the recipient's payment information, which, as is often the case, the recipient isn't aware of. This creates additional obstacles to the adoption of digital remittances. These requirements are due to the AML/CFT policies and regulatory frameworks, which differ from country to country and contribute to the fragmentation of the ways in which payments are processed.

Payment systems have evolved over the years to enable such end-to-end transactions. These systems are tailored to address unique market requirements working in a closed-loop environment following their own payment rules and procedures. They use proprietary technology for mapping Proxy directories and have their own compliance management procedures. To achieve a broad reach, banks and PSPs must join multiple payment systems with customized implementations and rules for each, making such implementations resource-intensive and expensive. Additionally, for each transaction, the PSPs and banks need to find the best route or an optimal path via one or more payment systems to reach a destination beneficiary for carrying out the transaction with minimal overheads. This means connecting to several remittance aggregator services to find an optimal path to the endpoint.

There are several barriers to a payment system becoming truly interoperable. For example, connectivity (money cannot be sent from anywhere to anyone), standardization (payment addressing, messaging, etc.), compliance issues (duplication of checks due to localized requirements, compliance checks being non-transferable and the lack of trust amongst parties), and settlement issues (pre-funding requisites). PSPs and banks also must comply with jurisdictional legal and compliance requirements, maintaining an audit trail of transaction history, relevant actors, KYC details, etc.

1.3 WHAT IS A PROXY (ALIAS)

In many countries with instant payment systems (IPSs), payments can be addressed using "proxies" (or "aliases") in place of account numbers. A Proxy (or alias) is any string of text that is mapped to a specific bank account.

Commonly used examples include:

- Mobile phone numbers
- Email addresses
- National ID numbers
- Company incorporation numbers

Proxies are linked to existing accounts. Before a payment can be credited to the ultimate recipient, the proxy must be looked up in a database or directory that has mapped the proxy to a corresponding account number. Multiple proxies could link to one account, but ideally a

single unique proxy should only ever map to a single bank account.

1.4 PROBLEM STATEMENT

It is not always feasible for a sender to make cross-border payments. In some cases, the sender is not able to procure the recipient's precise payment information, or its transmission is error prone. In other cases, the sending PSPs, including banks, are not able to uniquely identify and validate the recipient and its bank or PSP as the sender's and the recipient's PSPs do not belong to the same payment system. Further, the most optimal and cost-effective path to reach the recipient through one or more payment systems isn't always clear for the sending PSP. Inadvertently, this adds to the complexity, burden, and cost of international remittances, making them inaccessible for remitters, particularly vulnerable migrants. This leaves a lot to be desired in terms of user experience.

1.5 OPPORTUNITY STATEMENT

In domestic payments, Proxies have played a critical role in reducing friction, proving in many cases to be extremely effective in enabling digital transfers. This is not, of course, to ignore the importance of other factors, such as a participation mandate from the domestic central banks and easy signup processes prominently displayed in banking apps.

There is an opportunity to expand the usage of these Proxies globally—to enable standardized frictionless international remittances by uniquely identifying individuals across payment systems supporting the enablement of cross-border payment system transactions in an interoperable manner.

In addition, the possibility of using existing Proxies and creating new ones for those who don't have them will reduce friction in the adoption of digital remittances.

1.6 SCOPE

This technical document builds on UNCDF's exploratory paper on an *Open Regulated Global Payments Inter-Network*, focusing on phase 1, the design of a Proxy Addressing System Service, a directory of Proxy directories to resolve payer and payee identification issues using a recognized Proxy, for example, mobile number, email ID, tax ID, national ID, financial ID etc. The paper attempts to articulate the key requirements, process definition, and a way forward for this implementation.

1.6.1 In Scope

This paper will address the following areas:

- Describe how a PASS can potentially solve the problem statement articulated in Section 1.3.
- Describe key requirements for designing a PASS to support international remittances.
- Describe the high-level concept of building a PASS.
- Describe the process followed to make international remittances, clearly articulating the touch points where such a PASS will be utilized and how.
- Clearly identify the challenges of implementing a PASS and suggest mitigation strategies where relevant.
- Provide a roadmap articulating the next steps and areas for further study.

1.6.2 Out of scope

This paper will not cover the following areas:

- In-depth analysis of different existing Proxy directories.
- Provide implementation-ready functional and technical specifications, system design, and latest security and encryption measures.
- Design and development of a functional PASS.

2. NEED FOR A PROXY ADDRESSING CAPABILITY

In the global financial payment systems for the remittances use case, there is a need for the creation of a Proxy Addressing System Service to uniquely identify individuals and/or entities, that ensure:

- that the information which a payer has about a beneficiary is sufficient to unambiguously identify a PSP which holds the beneficiary's account, and to identify the beneficiary's account at that PSP;
- that the beneficiary's PSP can be reached by the sending party's service providers through the use of Proxy directories, and
- that for each transaction, the sending PSP can find a route via one or more globally interoperable payments system(s) to the beneficiary's PSP.

Creating such a directory of Proxy directories i.e., PASS will support the interoperability between multiple PLSOs (and individuals associated with them), bringing them together into a larger, global ecosystem, and enabling them to transact seamlessly amongst each other across heterogeneous payment systems.

Although such payments are feasible today, the overheads due to the non-compatibility of these payment systems add to the cost and make it burdensome for the end customers. Thus, a globally recognized and standard interface mechanism to resolve Proxies is foundational, and any initiative to put together such an infrastructure will lay the groundwork for a ubiquitous system where anyone can make cross-border payments at the click of a button whilst incurring minimal charges. As an analogy, it should be akin to sending an email with an email address.

The US FED has also identified the benefits of using a common payment alias directory or a directory of directories to improve efficiency and integrity in the US payments market.[2]

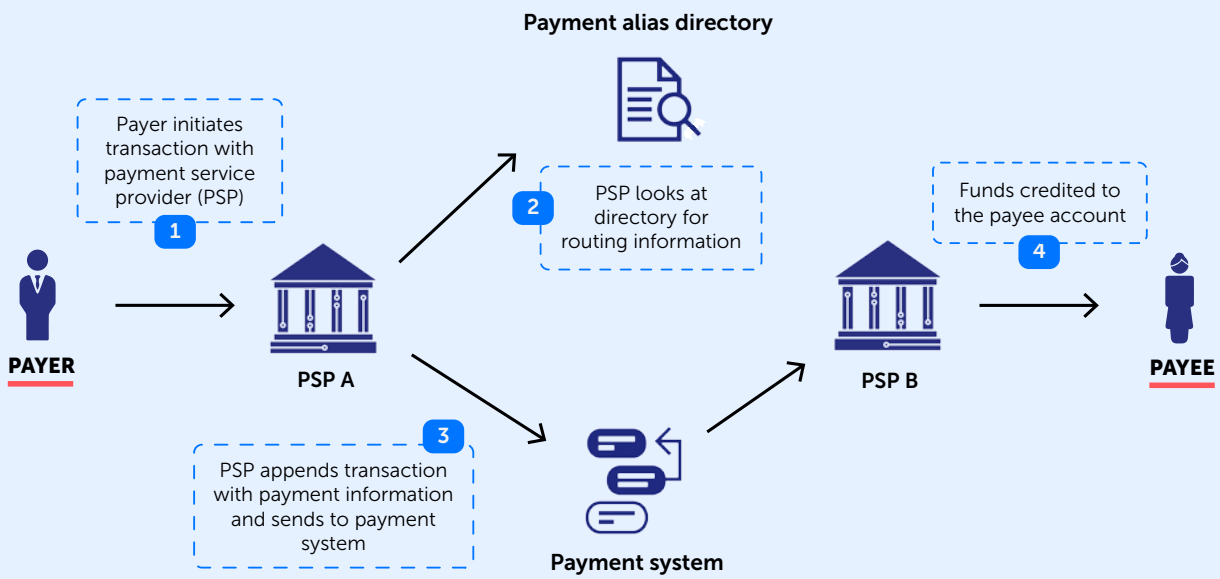
2 *FEDS Notes*, February 2022. Available at: https://www.federalreserve.gov/econres/notes/feds-notes/using-distributed-ledger-technology-for-payment-directories-20220203.html

Extract from US FEDS Notes on the use of Proxy directories

A common payment alias/proxy directory, or a directory of directories, could improve efficiency and integrity in the payments market. Payments made using alias information, for example, could avoid a situation where an individual or business does not have an individual's latest bank account information. Inaccurate bank account information could delay the receipt of a payment. In addition, a payment alias directory could enhance consumer choice by reducing the costs of switching payment service providers, including switching between banks. The use of an alias could eliminate the need to inform counterparties of service provider account changes.

Such a common directory, or directory of directories, could be built in several ways, depending on market objectives. Figure 1 outlines how a directory service could fit into the broader payments landscape. If a payer uses an alias of a payee in lieu of the person's banking information, the payer's bank or other payment service provider could retrieve the payee's banking information using the designated alias. A payment alias database could provide guidance on where to route the payment, which could include information on which payment system to use and the associated account numbers. Depending on the design, nonbank service providers could also be included to support alias interoperability between the bank and nonbank systems.

Figure 2: Stylized process flow for payment alias directory in a payment transaction



SWIFT has implemented a Payment pre-validation service using APIs for its own network to validate account information prior to sending a payment instruction. This helps reduce transaction costs by avoiding the need for manual intervention for non-STP (straight-through processing) transactions.

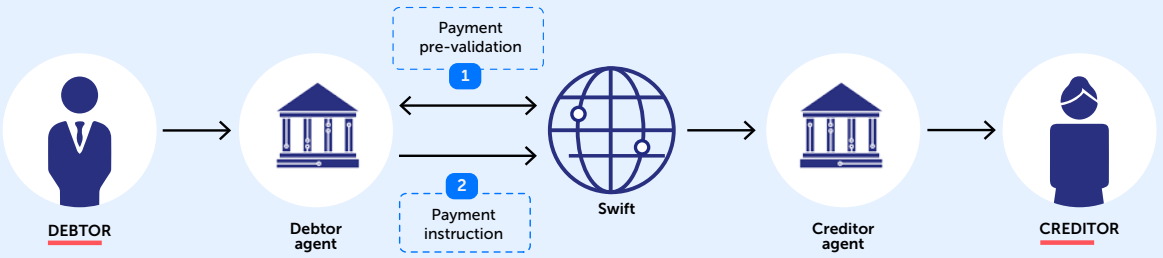
SWIFT: Payment pre-validation

The current reality is one of uncertainty. Will the creditor receive the funds without delays? Today, more than 5 percent of payment transactions are non-STP (straight-through processing), which means they require manual intervention. The cost to handle a single non-STP payment is in the order of EUR50-100 and this friction costs the industry around EUR2B annually, representing more than 35 million payment transactions.

Rejected payments typically have incorrect account details, identifiers, and codes. Additionally, debtor agent can be unaware of local market practices at the destination. However, quantitative analysis shows payment pre-validation could address 65 percent of rejection root causes.

Swift payment pre-validation service reduces non-STP payment transactions by more than half. This is done using a set of API services that originating banks (Debtor Agents) can use to help the customer making the payment (the Debtor) ensure that payment details include codes and information required for the target market, and a verified account number for the beneficiary (Creditor).

Figure 3: Payment pre-validation process flow



Swift is continuously looking to enhance the service by expanding the number of validators and improving the quality of the validation results.

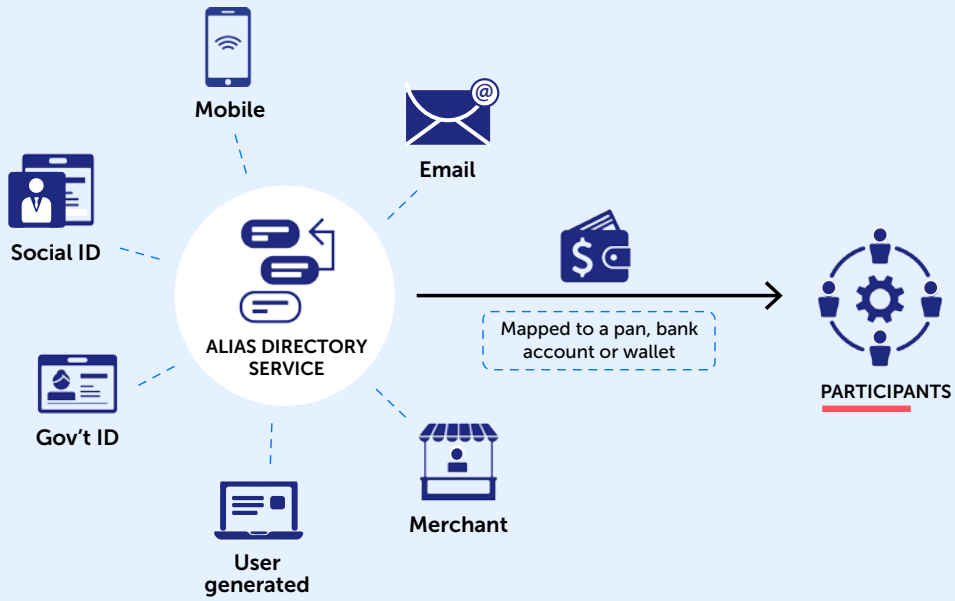
YellowPepper, a Visa solution: A proven, key component for a real-time system to thrive

An alias is a commonly known public identifier such as a mobile number or email address that is tied to:

- Payment credentials such as a card number, bank account, wallets, etc.
- PII data (Personally Identifiable Information)

Alias is a secure solution that simplifies the UX/UI and allows money movements (using a mobile number or email address) without the need to share sensitive details of the payment credential.

Figure 4: Different types of aliases



As payment infrastructures modernize, the need to build or replace alias directories arise to create necessary foundations for optimal use. YellowPepper provides a turnkey solution to build and manage an alias directory. It covers the full life cycle of an alias and improves user experience in money movement use cases.

By connecting to YellowPepper's Alias Directory Network Manager, originators can query remote directories to obtain payment credentials associated with an alias, which they may use to move money with an alias, both locally and internationally.

The YellowPepper technology will be used to power Visa+, a solution designed to solve interoperability issues among P2P payment providers. Visa+ is expected to launch for US consumers with select partners (Venmo and PayPal) in late 2023 with general availability planned for mid-2024 with additional partners such as DailyPay, i2c, TabaPay and Western Union.[3]

3 Visa website, May 2023. Available at: https://usa.visa.com/products/visa-plus.html

3. PROXY ADDRESSING SYSTEM SERVICE (PASS)

To solve the problems highlighted in the previous sections, this paper recommends the introduction of a Proxy Addressing System Service (PASS). PASS is defined as a directory of Proxy directories that connects multiple local, regional, and global PLSOs that store Proxies. This will help link participating payment systems globally in a standardized way, with the aim of reducing the friction when making payments from any part of the world to another.

Besides account addressing, PASS will also enable the sending PSPs to provision an optimal path by returning one or more payment systems the recipient's PSP is part of, for service fulfilment. This information will be used by sending PSPs to identify the most efficient path for routing these transactions towards the recipient PSP, based on their existing commercial agreements. The sending PSP will be responsible for initiating payment transactions through the payment system of their choice. PASS is solely an addressing system and will not be involved in the payment transaction itself.

The PASS will also maintain an audit trail of all Proxy lookups.

The key PASS benefits are:

- Interoperable directory of Proxy directories to exchange and resolve Proxies
- Enhanced user experience for all ecosystem participants
- Flexibility to use any directory's supported Proxy in a standardized way
- Best available information to the sender of the beneficiary's identification and capacity to receive funds
- Ability of the sender's PSP to receive information on the payment system(s) supported by the recipient's PSP, so it can select the preferred payment system to be used to route the transaction to the recipient

In a similar initiative, the BIS Innovation Hub's Project Nexus aims to connect national payment systems into a cross-border platform. In 2022 the BIS Innovation Hub worked with the Monetary Authority of Singapore, Bank of Italy, and Bank Negara in Malaysia to connect the payment systems of Singapore, Malaysia and the Euro area in an experimental proof of concept. In the next phase of work, the BIS Innovation Hub is collaborating with the central banks of Indonesia, Malaysia, the Philippines, Singapore and Thailand as they work towards connecting their domestic payment systems.

The Monetary Authority of Singapore linked Singapore's domestic payment system (FAST) to that of Thailand (PayNow) in 2021, and to Malaysia in 2022 and India in 2023. However, while connecting two systems to each other requires one connection and three systems to each other requires three connections, connecting 20 system to each other requires 190 connections. Project Nexus can connect 20 systems with 20 connections.

These initiatives are complementary to ongoing work in the G20, FSB, and CPMI, and showcase the feasibility of a standard globally recognized directory of Proxy directories, i.e., PASS.[4]

4 BIS Project Nexus: https://www.bis.org/about/bisih/topics/fmis/nexus.htm.

4. KEY REQUIREMENTS FOR PASS

Some of the key requirements to be considered to design a PASS supporting end-to-end transaction for an international remittance are:

- **Multiple Proxy support:** PASS will need to accommodate different types of existing and new Proxies supported by PLSOs i.e common individual identifiers such as mobile number, email address, tax ID, financial ID or national ID. These different types of Proxies will have different characteristics.

- **Resolve duplication of Proxies:** PASS must avoid duplicity, i.e., the same Proxy could be part of two or more Proxy directories. For instances where there is more than one directory at the national level, PASS will need to resolve duplication when the same Proxy is present on one or more directories. A mechanism to set a default account will have to be defined to resolve this. However, there are no easy solutions to identify which of the Proxies takes preference over the others.

- **Trusted PSPs:** Trust in the recipient entities and network participants must be ensured by PASS. PASS will define participant qualification procedures and governance rules for PSPs to ensure trust amongst all participants. For instance, Visa and Mastercard ensure trust amongst all participating parties within their ecosystem.

- **Implementation Costs:** The PASS development would require investment into the infrastructure. The funding model should be developed, evaluated and agreed upon by the participants.

- **Maintaining an Audit Trail:** Most regulators in different geographies require the service provider to retain transaction information for a certain period of time and in a specific manner. This implies that any look-ups or directory systems built to support payment processes must retain their own audit trail from origin to execution for each transaction to complement and adhere to such regulatory requirements. An important consideration is that PASS needs to have the ability to fix liability for the veracity of this attribute data and its storage location.

- **Standard data exchange formats:** The sending PSP will need to send their look-up request through the PASS in a standard data exchange format and, likewise, the response should be received in a standard format. Use of standard formats eases interoperability, implementation, and the adoption burden. The sending party will need to send relevant data to enable the payment to the recipient party. The data to be exchanged needs further evaluation of requirements of participating entities whilst adhering to the regulatory requirements. For example, ISO 20022: acmt.023/24 used by Project Nexus could be explored further.

- **System trust:** PASS should be secure, verifiable, and trustworthy and ensure that the sending party can trust the recipient operator and beneficiary.

- **Recipient payee and PSP validity:** PASS should be able to identify the recipient and the recipient PSP, confirming that the recipient is a valid beneficiary, and their institution is valid and can support this payment.

- **Use LEI as PSP legal identifiers:** PASS will use LEIs to identify sending and receiving PSPs. In addition, we will explore the possibility for vLEI to be used to sign the returning validations and include the LEI in the payment message at a later stage.

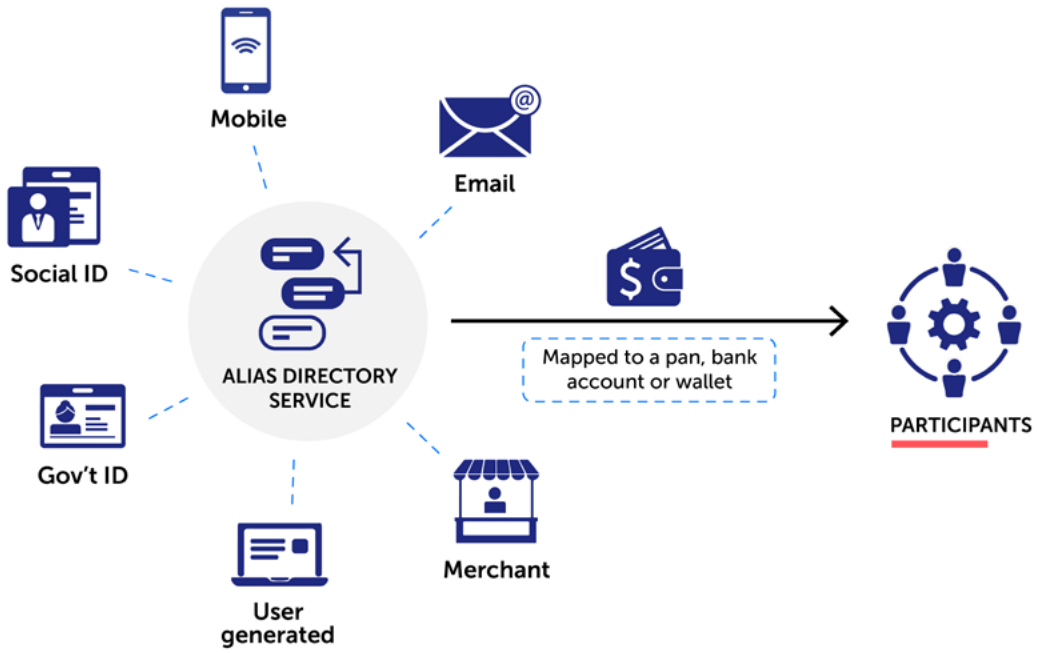
5. PASS ECOSYSTEM: PROXY DIRECTORIES AND TRANSACTION FLOW

5.1 PASS ECOSYSTEM: PROXY DIRECTORIES

A Proxy Addressing System Service or the PASS is defined as a directory of Proxy directories that connects multiple local, regional, and global Proxy directories that store Proxies by various PSPs and payments institutions. These directories store and cross-validate multiple Proxies that are the basis of PASS. They do this by resolving the Proxy passed against the directories linked to PASS to identify the recipient of the transaction and return the recipient's PSP details for enabling the given transaction. Although these directories can support multiple Proxies, PASS should be able to resolve or map these proxy identifiers to a single account within a given country. The directories need to provide the payment systems a PSP is part of so it can pass this information through the PASS to the sending PSP to execute the payment.

5.2 TRANSACTION FLOW IN PASS

Figure 5: Transaction Flow in PASS



For a typical transaction where a sender uses a sending PSP to make a payment to a recipient through the recipient PSP, here are the steps for completing such a transaction.

- **Step 1:** Sender provides the sending PSP the details of the recipient to initiate a transaction. For example, the destination country, and Proxy. In addition, the recipient's full name could also be provided for payee validation.
- **Step 2:** Sending PSP uses the information provided by the sender to make a Proxy lookup through PASS.

- **Step 3:** PASS validates the information received in the addressing request through its network of connected directories, prioritizing lookup based on the destination country.
- **Step 4:** If there is no match, PASS returns 'no matches found' message to the sending PSP, which in turn informs the sender about it.
- **Step 5:** If there is a match, PASS returns the outcome of the validation process along with the recipient PSP's LEI and details. For example, PASS could return that the receiving PSP exists, it's legal entity identifier, recipient's Proxy is validated, and the list of payment systems supported by the recipient PSP.
- **Step 6:** The sending PSP uses the information received from PASS, including the payment systems supported, to send payment instructions through the payment system of their choice.
- **Step 7:** The payment from the sending PSP to the recipient PSP is completed, and the sending PSP informs the sender with a successful payment receipt message.

6. PASS IMPLEMENTATION CHALLENGES

The following challenges are foreseen in PASS implementation. Where known, relevant mitigation measures are proposed.

- **Proxies:** PASS will need to accommodate existing and new Proxies supported by Proxy directories. Furthermore, it will have to avoid any duplication, that is the same Proxy could be part of two or more Proxy directories. To resolve this, a mechanism to set a default account will have to be defined.

- **Routing challenges:** The PASS will return the payments system(s) the recipient's PSP belongs to. The sending PSP will need to select the preferred one to route the payment. The PASS does not route payments itself and the sending PSPs will need to complement PASS with their payment routing capabilities. Where sending and receiving PSPs are not part of the same payment system, PASS will not be able to offer alternatives. Where underlying payment details are required, sending PSPs could face an additional challenge to route such payments.

- **Proxy adoption:** For the PASS to use any Proxy, these must be adopted and supported by the industry. Likewise, individuals would be identified by their email IDs, mobile numbers or appropriate proxies as long as these are supported by their payment system, their corresponding Proxy directory and PASS. Having multiple possible identifiers for each individual helps to offer alternatives to resolve such a challenge.

- **Resolve duplication of Proxies:** For instances where there is more than one directory at the national level, PASS will need to resolve duplication when the same Proxy is present on one or more directories. However, there are no easy solutions to identify which of the Proxies takes preference over the others.

- **Regulatory challenges:** Data privacy is essential and complying with the necessary personal identity laws is an absolute requirement. There might also be limitations in the exchange of data in a cross-border scenario in certain geographies where the necessary legal and regulatory requirements will need to be well understood to support such an implementation. There is also the question of data localization and getting the necessary approvals to internationalize this data. Moreover, in some cases, the PSPs will require local regulatory approval to use PASS, and there would be a need to coordinate and rationalize

regulatory requirements globally and across geographies. All these challenges will need to be well understood, with the necessary measures put in place in the PASS to adhere to these requirements.

- **Liability arising from incorrect routing:** Such a system would introduce liability. For example, the proxy is routed incorrectly (e.g., to a wrong mobile number) due to a technical issue. Who the sender could hold liable or responsible for incorrect payments and how reversals of incorrectly routed payments be handled, need to be addressed.

- **Participation incentives:** Integrating with PASS will require requisite investments from all participating entities into this integration and development effort. It will be essential to ensure that all participants derive enough value from this implementation to justify their respective investments.

- **Achieving a Critical Mass:** For any scheme to be successful, a critical mass will need to be achieved for the benefits of PASS to be truly realized. At some point, it will need to be decided how a wider rollout and adoption would be achieved. Ensuring the availability of minimum viable participants to make the PASS useful and sustainable will be a critical milestone to attract all ecosystem players, particularly the big payment networks.

- **Data exchange:** The data exchange requirements must ensure that only the relevant data is exchanged, keeping the applicable regulatory purview in mind. The appropriate security protocols, adoption of common transaction standards, for example, ISO 20022 and common APIs, will require an extensive data interchange and exchange discussion.

- **Building PASS:** PASS will need to be developed and a neutral entity, acceptable to all parties, will need to be identified for developing such a system with due cooperation of all ecosystem participants. Besides this, some development effort would also be required by the sending and recipient PSPs to integrate with the PASS ecosystem.

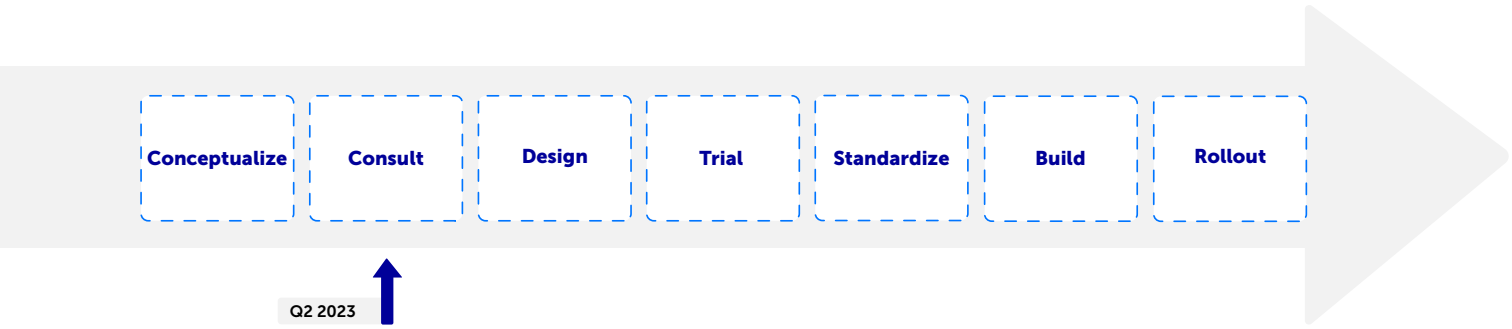
- **Sustainability:** Building PASS would require investing into infrastructure and incurring related implementation costs. To ensure long-term continuity and availability of the service, a sustainable business model will have to be developed.

- **Governance:** This is a highly critical matter and any service that requires global coordination needs to ensure a strong governance model with representation from the key stakeholder groups and a commitment to work through the day-to-day governance challenges diligently and proactively.

7. ROADMAP

To avoid complexity at the beginning, it is recommended to start with the international remittance P2P use case. The roadmap (refer to Figure 3) steps could be undertaken to achieve this.

Figure 6: PASS Roadmap



- **Conceptualize:** Work on formalizing the PASS concept with key stakeholder involvement.
- **Consult:** Validate the PASS concept with key stakeholders that include, but is not limited to, private sector entities, regulators and central banks.
- **Design:** Elaborate the PASS concept with an appropriate technical design in consultation and agreement with the key stakeholder groups resulting in a scoping document.
- **Trial:** Coordinate a Proof of Concept and/or creation of an MVP (Minimal Viable Product) version of PASS for further testing, evangelism, and consultation. This PoC and/or MVP should be done with at least three different Proxy directories, across multiple remittance corridors.
- **Standardize:** Put in place the necessary global standards to enable the success of PASS.
- **Build:** Build the PASS based on the trial outcome learnings, industry requirements, and agreed standards.
- **Rollout:** To scale, consider phase-wise regional rollout of the PASS, depending on key stakeholder involvement and support.

8. FOR FURTHER STUDY

- Explore cross-border data transfer implications
- Agree scope of the transfer, preferably limit it to a specific use case (remittance P2P)
- Identify key use cases that account addressing intends to benefit

ANNEXURES

Annex 1 Abbreviations

Sr. No.	Acronym	Full Form
1.	**API**	Application Programming Interface
2.	**BIS CPMI**	Bank of International Settlements Committee on Payments and Market Infrastructures
3.	**BTCA**	Better than Cash Alliance
4.	**CPMI**	Committee on Payments and Market Infrastructures
5.	**FSB**	Financial Stability Board
6.	**G20**	Group of Twenty
7.	**GLEIS**	Global Legal Entity Identifier System
8.	**vLEI**	Verifiable Legal Entity Identifier
9.	**LEI**	Legal Entity Identifier
10.	**LMIC**	Low and Middle-Income Countries
11.	**ORGPIN**	Open Regulated Global Payments Inter-Network
12.	**PASS**	Proxy Addressing System Service
13.	**PSP**	Payment Service Provider
14.	**P2P**	Person to Person
15.	**STP**	Straight Through Processing
16.	**UNCDF**	United Nations Capital Development Fund
17.	**SWIFT**	Society for Worldwide Interbank Financial Telecommunication

Annex 2 Definitions

Sr. No.	Term	Definition
1.	**Legal Entity Identifier**	A 20-character, alpha-numeric code based on the ISO 17442 standard developed by ISO. It connects to key reference information that enables clear and unique identification of legal entities participating in financial transactions.
2.	**Payment System**	System used to settle financial transactions through the transfer of monetary value. This includes the institutions, instruments, people, rules, procedures, standards, and technologies that make its exchange possible.
3.	**Proxy**	Customer identifier that has been linked by the customer to a payment account (i.e., recipient's PSP wallet, or bank account) within a payment system and a Proxy directory. This can also be referred to as an alias. For example: a mobile number, email address, tax ID, financial ID or national ID, etc.
4.	**Proxy Addressing**	Mechanism to resolve and validate the recipient's Proxy when received from the sender through PASS. It can also be referred to as Proxy lookup.
5.	**Proxy Directory**	A local proxy directory (or alias addressing table) that stores a Proxy and, its link to customer's account information (i.e., customer identifier and corresponding account details).
6.	**Proxy Addressing System Service**	A directory of Proxy directories that connects multiple local, regional, and global Proxy directories that store Proxies
7.	**Payment System Providers**	Payment System Providers are any payment institutions that can make or receive a payment. Below is a non-exhaustive list of such players: Regulated Remittance Services Providers (RSPs), including Banks, Mobile Money Providers, Money Transfer Operators (MTOs), Digital Financial Service Providers (DFSPs), Fintechs, Payment networks (Visa, Mastercard, etc.), and Instant Payment System providers (IPSPs).
8.	**Financial ID**	Some countries are contemplating introducing financial ID to counter challenges facing national IDs such as resemblance of names.

About The United Nations Capital Development Fund

The UN Capital Development Fund assists developing countries in the development of their economies by supplementing existing sources of capital assistance by means of grants, loans and guarantees, first and foremost for the least developed among the developing countries.

As a Flagship Catalytic Blended Financing platform of the UN, UNCDF utilizes its unique capability to crowd-in finance for the scaling of development impact where the needs are greatest—a capability rooted in UNCDF's unique investment mandate—to support the achievement of the 2030 Agenda for Sustainable Development and the realization of the Doha Programme of Action for the least developed countries, 2022–2031.

About Migration and Remittances

UNCDF aims to improve the functioning of remittance markets by improving the financial resilience of men and women in migrant workers' families while supporting economic development in countries of origin and destination. To strengthen the global evidence, UNCDF collects, analyses, and disseminates reliable and comparable remittance transactions as well as survey data. UNCDF engages with public and private sector stakeholders to strengthen the capacity of regulators to contribute to the design of migrant-centred financial products and services such as savings, credit, insurance, payment services, remittances, pensions, and investments.

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