

# An Inflection Point for Global Payments: Industry Perspectives in 2023

A CBPN Special Supplement



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**CBPN**

# Contributors

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**Victoria Cumings**

Chief Legal & Regulatory Officer, RTGS.global

[LinkedIn](#)



**Jerry Fosker**

Head of Network Alliances EMEA, Discover® Global Network

[LinkedIn](#)



**Chad Harper**

Senior Fellow, Visa Economic Empowerment Institute

[LinkedIn](#)



**Daniel Heller**

Head of Regulatory Strategy, RTGS.global

[LinkedIn](#)



**Jonathan Mislér**

Head of Business Development, Unifits

[LinkedIn](#)



**Nasreen Quibria**

Senior Director, Head of Cross-border Policy Engagement, Visa

[LinkedIn](#)



**Joachim Samuelsson**

CEO, Crunchfish

[LinkedIn](#)



**Ritesh Shukla**

CEO, NPCI International Payments Limited (NIPL)

[LinkedIn](#)



**Jeffrey Stewart**

CBDC Advisor, ProgressSoft

[LinkedIn](#)



**Niels Van Duinen**

Head of Business Development, Asia-Pacific, StoneX Payments

[LinkedIn](#)



## Payment Applications Only Work When Everything Works



*by Joachim Samuelsson, CEO, Crunchfish*

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Although built on the internet protocol, payment applications of today are not as robust as they ought to be. They are designed for the happy flow, which only works when everything works. If the payer lacks internet access or if a backend server is not operational, the payment fails. Crunchfish fix this by augmenting payment applications with offline payments from an integrated Digital Cash Trusted Application in an app or on a chip. Consecutive offline payments between apps and chips are also supported.

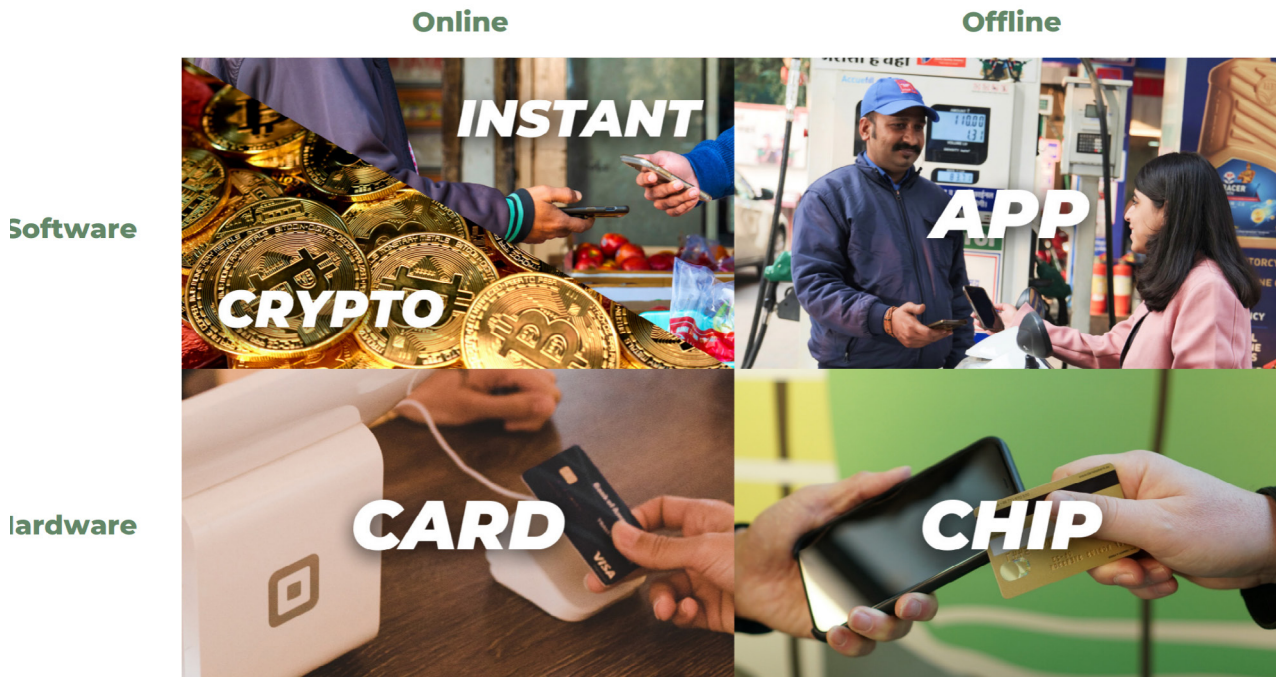


Figure 1 : Payment applications are dependent on online internet connectivity and backend servers running 24/7. To become robust, they must be redesigned from an offline perspective.

We have all experienced the inconvenience and sometimes embarrassment of not being able to pay. It could be that you do not have enough money in your bank account, but often it is due to other factors that the payer is not responsible for. For push payments, lack of internet connectivity is a common reason for not being able to pay, but it could also relate to a time-out as your bank is either congested or down. Pull payments used at POS terminals by the card schemes are also sensitive to bank server outages.

What if there was a solution that would make payment applications resilient? And what if this solution was available in software? Payers and merchants would no longer be dependent on the internet to make or receive payments, and payment providers would be relieved of the constant struggle to cope with the increasing volumes of instant payments. This would be great news for any private payment provider, but also for central banks that are aiming to complement cash with central bank digital currency (CBDC). A key differentiator would be that payers would no longer have to worry about internet connectivity.

Crunchfish Digital Cash is readily available and drives a design-shift from online to offline. Whereas an offline protocol enables an instant payment and settlement online, the reverse is not true. Online payments systems are only capable of handling online payments. Hence, the underlying protocol for payments should be designed from an offline perspective, as it supports both offline and online payments. The shift is not dramatic as you might think since the offline paradigm augments online schemes and can be introduced seamlessly and gradually.

For push payments to become robust the key is to enable the payer to authorize a payment and communicate with the backend without an internet connection. This is possible by installing trust and security into the payment application client to enable it to authorize a payment locally and then connect offline to send the intent to pay to the backend without an internet connection.

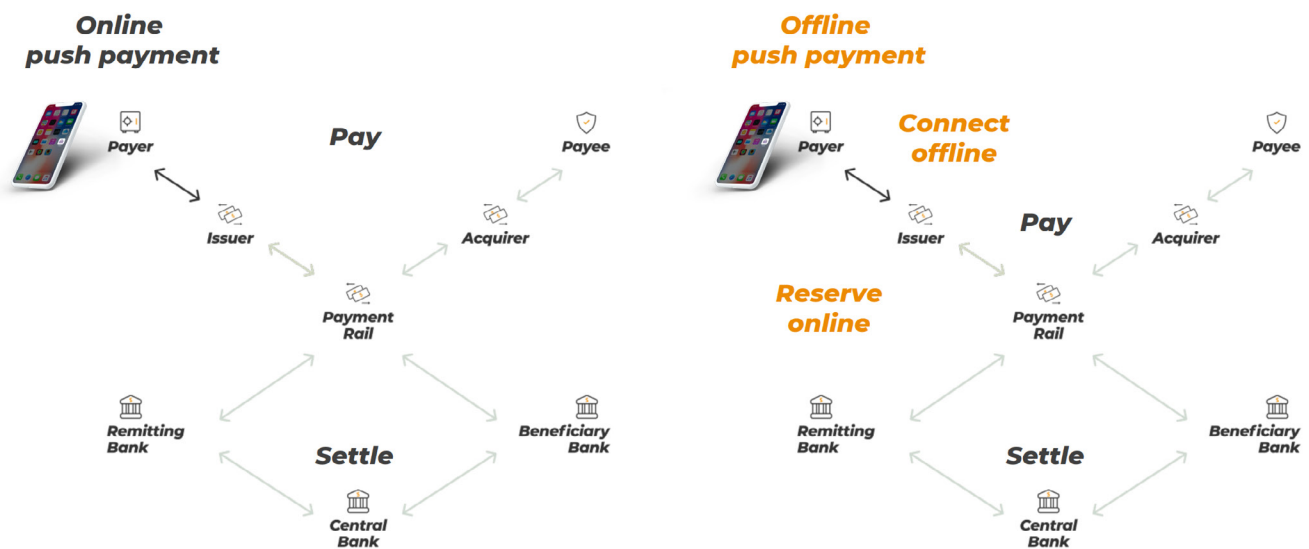


Figure 2: Push payments become robust by enabling the payer to connect offline to the backend to pay with or without an online reservation.

For push as well as pull payments it is important to isolate the remitting bank at the moment-of-payment from the payment flow. The core banking systems were designed a long time ago and were never designed to cope with the increasing volumes and instant payment systems of today. By reserving some money that could be represented and available either online, or alternatively offline in case the payment application client has been augmented with more trust and security, then it is possible to pay offline.

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Crunchfish Digital Cash is based on the same design principles as the internet and is destined to deliver for payment applications what the internet has for digital communications.

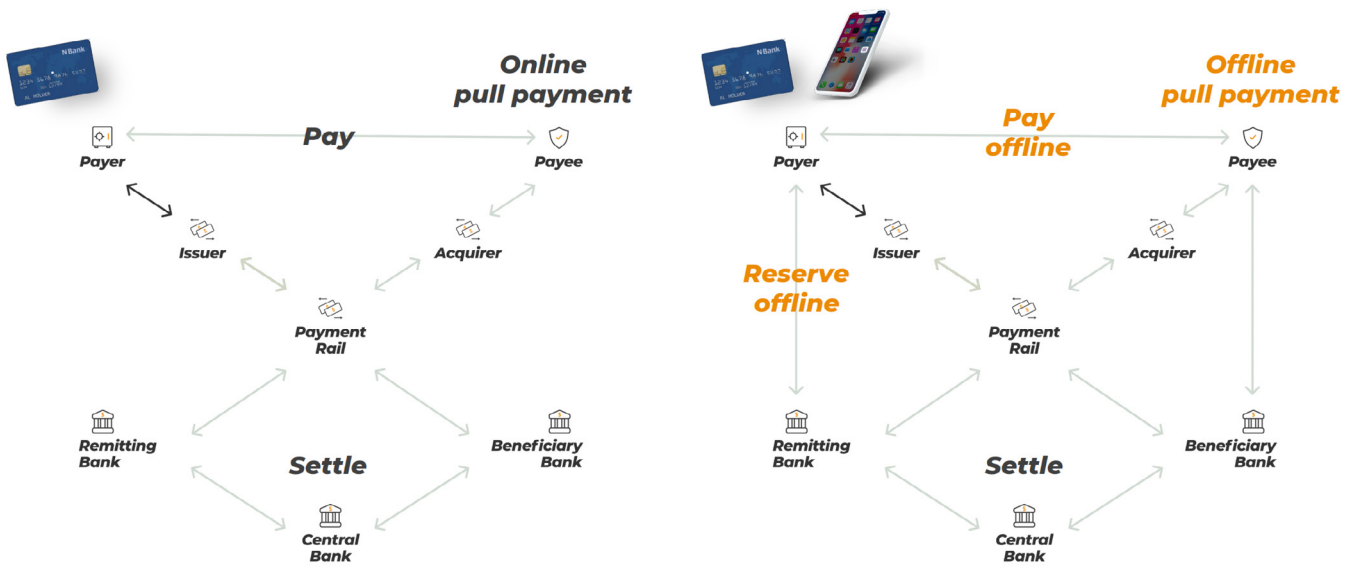


Figure 3: Pull payments become robust by enabling the payer to pay offline with an offline reservation.

Crunchfish Digital Cash makes push as well as pull payments robust. It is inspired by the design philosophies developed by the Defense Advanced Research Projects Agency (DARPA) in the 1970s and became the internet as we know it today. Crunchfish Digital Cash is based on the same design principles as the internet and is destined to deliver for payment applications what the internet has for digital communications.

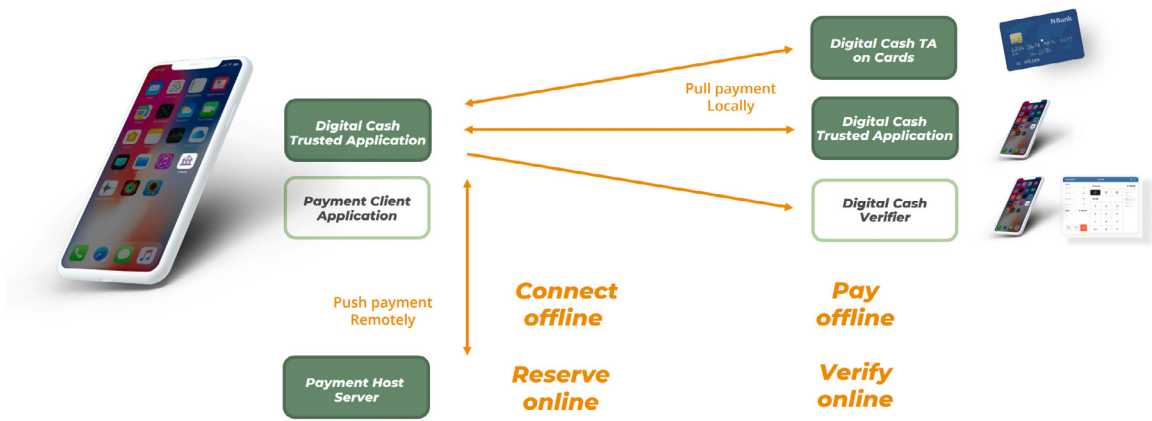


Figure 4: Crunchfish Digital Cash Trusted Application integrates with payment applications and makes them robust by connecting offline or paying offline. Consecutive offline payments between apps and chips are also supported.



[The Design Philosophy of the DARPA Internet Protocols](#), a paper published in 1988 by David D. Clark from the Massachusetts Institute of Technology, outlines that the internet is “a packet switched communication facility in which a number of distinguishable networks are connected together using packet communications processors called gateways which implement a store and forwarding algorithm” and that it delivers “survivability in the face of failure.”

In Clark’s paper there are also seven secondary design goals for TCP/IP, which have equivalents for what is required for payment applications to become robust and resilient. Crunchfish Digital Cash provides this by breaking up payments into three distinct steps — Reserve, Pay and Settle — and by augmenting payment applications with trust and security by integrating the Digital Cash Trusted Application in software-based or hardware-based Tamper Resistant Element (TRE) using an application and communication-network agnostic Trusted Application Protocol (TAP).

Secondary design goals TCP/IP		Crunchfish Digital Cash TAP equivalents
1	Internet communications must continue despite loss of networks or gateways.	Payments need to have survivability in the face of failure, essentially meaning that payments should work offline, regardless of internet connectivity and backend services.
2	The internet must support multiple types of communication services.	Digital Cash must support and be interoperable with multiple payment services.
3	The internet architecture must accommodate a variety of networks.	Digital Cash must be agnostic to the online payment rail and not constrain the type of payment rails that can be used.
4	The internet architecture must permit distributed management of its resources.	The front-end Digital Cash Trusted Application implemented in a Trusted Environment must be an independent payment ledger capable of keeping a balance, private keys used to sign out of transactions.
5	The internet architecture must be cost effective.	The front-end Digital Cash Trusted Application must primarily be implemented in software-based Trusted Environment on smartphones or on smartglasses in the not-too-distant future.
6	The internet architecture must permit host attachment with a low level of effort.	The front-end Digital Cash Trusted Application should be able to connect over long-distance using either internet protocols or SS7 signaling over telecom networks to top-up the balance, making offline payments or initiating settlement.
7	The resources used in the internet architecture must be accountable.	The front-end Digital Cash Trusted Application should bind the user to the wallet and the offline transaction. Depending on regulatory Know-Your-Customer requirements the user may be an anonymous alias able to make smaller transactions ensuring privacy balanced with tax evasion and Anti-Money Laundering requirements.

Figure 5: Crunchfish Digital Cash TAP equivalents to TCP/IP design goals.

TAP is a protocol that can be used by any application, across any platform and on any communication network. In addition to making applications robust, having a trusted and secure client is very useful for identification and authorization purposes, even in an offline mode. Payment applications become more robust by the

Trusted Application as it is possible to use alternative routes than the internet to connect to the remote server with end-to-end integrity, such as Digital Cash telecom. The patent pending Trusted Application Protocol also supports interaction with payments applications in proximity, such as Digital Cash offline.

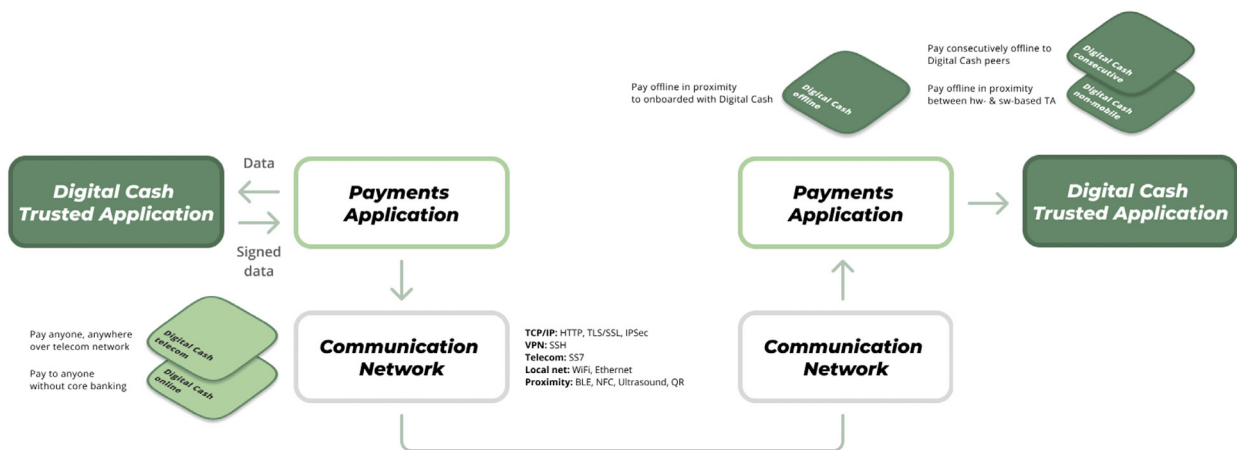


Figure 6: Crunchfish Digital Cash makes payment applications robust, trusted and more secure.

TAP is arguably the most important improvement in digital communications since the internet was introduced in the 90s. Whereas the internet TCP/IP protocol made digital communications more robust, it is of little use if the application cannot get online access. The TAP protocol provides robustness as well as trust to digital applications by providing alternative routes to the remote server. For what is the use of a robust internet if a user cannot get online access to the digital service?

# Practical Guides to Offline Payments

Crunchfish in partnership with Lipis Advisors provide practical guides to offline payments as whitepapers and webinars in the series, [Enabling Offline Payments in an Online World](#). The first whitepaper and webinar in January was focused on [design](#), with follow-ups on [security](#) in March and [privacy](#) in May. The plan is to offer six practical guides to offline payments in total during 2023. The three remaining whitepapers will focus on [interoperability](#) in June, sustainability in September and regulatory issues in November. These whitepapers and webinars are recommended to learn more about offline payments, as well as Crunchfish's article "[Central Banks Should Modernize Payments. Who Else Would?](#)" in the special supplement from Central Bank Payment News in May 2023.




Figure 7: Practical guides to offline payments in the Enabling Offline Payments in an Online World series.

# About Crunchfish

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Crunchfish are a deep tech company developing a Digital Cash platform for Banks, Payment Services and CBDC implementations and Gesture Interaction technology for AR/VR and the automotive industry. Crunchfish are listed on the Nasdaq First North Growth Market since 2016, with headquarters in Malmö, Sweden and a subsidiary in India.



“ The underlying protocol for payments should be designed from an offline perspective as it supports both offline and online payments. The shift is not dramatic as you might think, as the offline paradigm augments online schemes and can be introduced seamlessly and gradually.

# DISCOVER®

## Global Network

### Discover® Global Network: Our Role in Supporting Domestic Payments Schemes and Local Wallet Providers, Offering Benefits for Them and Their Members

*The opinions expressed in this publication are those of the author. They do not necessarily reflect the official policies or positions of Discover or other related entities.*



*By Jerry Fosker, Head of Network Alliances EMEA, Discover® Global Network*

For over a decade, Discover® Global Network has been a financial services pioneer and leader with an impressive record of accomplishment — forging new networks and alliances with many domestic payment schemes, networks and wallet providers worldwide. Supporting growth of domestic payment schemes, networks and wallet providers has been one of the core strategies, resulting in many of them choosing to work with Discover Global Network in recent years because we offer a different type of business relationship compared to other international payment schemes, a relationship that is of mutual benefit to both parties.

“ Discover currently has strategic alliances with 25+ domestic payment schemes and wallet providers that provide for international payments interoperability.



Discover Global Network provides “A New Option” for domestic payment schemes, leading us to form Alliance Partnerships that:

- Support domestic payment scheme, network and wallet provider growth through licensing Discover Global Network assets such as operating regulations, payments technologies and expertise sharing on scheme risk management and compliance program standards.
- Leverage our global experience in deploying innovative products and promoting the use of domestic and international payments products.
- Provide extensive experience in deploying Discover Global Network technologies with domestic schemes and networks around the world.
- Preserve domestic brand and control over their home market and ensure that domestic transactions remain on the domestic scheme’s network.
- Implement mutually beneficial solutions that can improve both parties’ industry relevance.

Discover Global Network has a decade of hands-on experience working with domestic payment schemes and wallet providers to build and strengthen their brands and domestic networks. Discover currently has strategic alliances with 25+ domestic payment schemes and wallet providers that provide for international payments interoperability and is currently providing its operating regulations, technology and international acceptance through the Discover Global Network to its Alliance Members.

## Examples:

- **Turkey** (BKM / Troy) licensed from Discover Global Network its contact/ contactless D-PAS EMV technology, its operating regulations and scheme risk management processes to help them set up and launch their domestic payments scheme, Troy. All Turkish banks now support acceptance of Troy's products, and the first Troy international cards (Troy Global Cards – cards that operate on the Discover Global Network outside of Turkey) were launched in October 2017. Since then, more than 1.7 million Troy Global Cards have been issued.
- **Republic of Korea** (BCcard – the largest payment network in Korea) licensed from Discover Global Network its D-PAS EMV technology and was provided with Discover Global Network IINs to issue “BCcard Global Cards” in South Korea. Implementation was completed in less than nine months, with over 90% of BCcard member's adoption. Almost 15 million BC Global Cards have been issued to date.
- **India** (NPCI / RuPay – part of the Reserve Bank of India) licensed from Discover Global Network its D-PAS EMV technology and was provided with Discover Global Network IINs to issue “RuPay” in India. NPCI has issued overall more than 156 million cards with D-PAS technology for use in the Indian market and abroad. Discover Global Network also supplied its operating regulations and scheme risk management processes to RuPay for use in its domestic scheme.
- **Brazil** (Elo – the largest debit and credit card brand in Brazil) uses Discover Global Network D-PAS technology and the Elo Global Card is issued on Discover Global Network IIN ranges for immediate global acceptance. Accepted across the country in over 4.3 million establishments, Elo has approximately 118 million overall cards issued in the Brazilian market with 41 million of those being Elo Global Cards.

Domestic payment schemes and wallet providers have chosen to work with Discover Global Network because of the different type of business relationship compared to other international payment schemes. Additionally, domestic wallet providers that traditionally operate in the P2P or QR code faster payments space have turned to Discover Global Network for assistance in expanding their wallet capabilities to obtain acceptance through NFC at merchants' points of sale, providing more functionality for their consumers.

Discover Global Network encourages the growth and development of national payment schemes and domestic wallet providers, retaining their brand, network, rules, pricing, volume and revenue within the national payment scheme and local wallet network. Through a partnership with Discover Global Network, domestic payment schemes and wallet providers can offer not just domestic products to its banks and consumers but also products that work outside of their network domestically and internationally, allowing the domestic schemes and wallet providers to offer their banks and consumers product options that enable them to truly compete with the other international payment schemes in their own market.

The Alliance Partnership concept supports domestic payment schemes rather than competing with them in their own market. It joins them together using interoperable technology, adding relevance, value and products with international acceptance to their member banks in a cost-effective and quick-to-market manner. This provides a choice and leverage for the domestic payments schemes' member banks against other international payment schemes:

- Through a Network Alliance with Discover Global Network, domestic payment schemes and wallet providers can leverage a wide range of internationally certified payments products, including: Tokenization capabilities allowing for digital wallet capabilities to bring x-pays to their network or, in the case of a domestic wallet, bridge the gap between P2P payments and access to NFC at POS via EMV technology solutions (D-PAS), and consumer authentication tools such as ProtectBuy (3DS) and SRC. Such a partnership ensures that the domestic payment scheme and wallet provider continue to receive a pipeline of technology enhancements and innovations as they are developed for Discover partners around the world. This ongoing pipeline of innovation reduces the costs necessary for domestic players to compete in their own market.
- Each domestic payment scheme and local wallet partnership benefits from global acceptance through Discover Global Network outside their network — at 70 mm point of sale locations and 1.8 mm ATMs globally as well as at ecommerce merchants. Use of the Discover Global Network globally certified technology provides a domestic payment scheme and wallet provider with instant interoperability with 25+ leading domestic schemes around the world, including Rupay in India, Discover in the US, ELO in Brazil, BCard in Korea, SIBS in Portugal, Troy in Turkey, MADA in Saudi Arabia and many others.
- A Discover Global Network partnership provides the domestic payment schemes and wallet providers with strong and highly competitive economics that it can pass on to its members. Unlike other international scheme partnerships, domestic payment schemes, wallet providers and their members will enjoy economic fees on cross-border transactions while retaining full control over their domestic scheme pricing, branding and development — enhancing the competitiveness of the overall product.



- Additionally, by a domestic payment scheme enabling acceptance through its network for inbound Discover Global Network payment products from around the world, the domestic payment scheme receives international acquiring volume and associated revenues from all the other Discover Global Network partners in our network.
- Such a strategic partnership provides domestic payment schemes and wallet providers with a simple, quick and cost-effective solution to their scheme and technology requirements and allows them to grow, stay ahead of payments innovation and compete more effectively domestically and on a global stage.
- Discover is a member and part owner of the EMV standards body – EMVCo®. The other EMVCo members are American Express, JCB, Mastercard, UnionPay and Visa. Along with Discover, each of these organizations owns an equal share of EMVCo and has representatives in the organization at the management and working group levels. Decisions are made on a consensus basis among the member organizations. Additionally, Discover is a member of the NFC Forum, MAOSCO (Multos Consortium) and Global Platform. This means that, where appropriate, all Discover Global Network technology is developed and certified to EMVCo standards.



## So How Does it Work?

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Under an Alliance Partnership, the contract is between the domestic payments scheme or wallet provider and Discover Global Network. Discover Global Network does not contract with each member issuer bank or acquirer.

This is a unique benefit because connectivity and transaction flows are between Discover Global Network and the domestic payments scheme or wallet provider.

Since Discover Global Network does not connect to each issuer bank or acquirer, that means all transactions for both Discover Global Network Partner cards spending in the domestic payments scheme's network and for the domestic payments scheme's or wallet providers' payment products using D-PAS and Discover Global Network IINs (Global Cards) spending abroad must flow through the domestic payments scheme's or wallet providers network, regardless of which network a cardholder chooses at point of sale.

The way this works is that the domestic payment scheme or wallet provider introduces the concept of a domestic payment scheme 'Global Card' (Local Card for international use) and a Domestic Scheme 'Foreign' Card (Discover Global Network cards) into its scheme rules and pricing alongside its own domestic scheme rules and pricing.

Discover Global Network scheme rules and pricing apply to the domestic payment schemes or wallet providers 'Global Card' transactions outside of their network, which as described above provide very competitive economics, meanwhile local scheme rules and pricing apply to their domestic transactions.

For Discover Global Network transactions spend in the domestic scheme's country, accepted by the domestic scheme's acquirers, Discover Global Network scheme rules and pricing would also apply, which again are very competitively priced.

For more information on the topic please, visit:

<https://www.businesswire.com/news/home/20210713005256/en/Discover-and-SIBS-MB-Establish-Strategic-Agreement-to-Increase-Payment-Acceptance>

<https://www.finextra.com/pressarticle/43476/discover-and-indias-npc-forge-reciprocal-alliance>

<https://www.finextra.com/pressarticle/71533/turkeys-troy-moves-overseas-with-discover-deal>

<https://www.discoverglobalnetwork.com/our-network/our-unique-network/>

## About Discover® Global Network

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The Alliance Partnership concept supports domestic payment schemes rather than competing with them in their own market, joining them together using interoperable technology, adding relevance, value and products with international acceptance to their member banks in a cost-effective and quick-to-market manner.

Discover® Global Network, the global payments brand of Discover Financial Services, processes millions of cardholder transactions each day. With industry expertise, innovative technology and a closed-loop infrastructure, Discover Global Network provides effective, customized solutions that evolve as needs change. Discover Global Network has alliances with 25+ payment networks and wallet providers around the world, and is led by three Discover businesses: Discover Network, with millions of retail and cash access locations; PULSE®, one of the leading ATM/debit networks in the U.S.; and Diners Club International®, a global payments network with acceptance in more than 200 countries and territories.

For more information, visit [DiscoverGlobalNetwork.com](https://DiscoverGlobalNetwork.com)



## India: The Journey of Digital Transformation



*By Ritesh Shukla, CEO, NPCI International*

The Republic of India is the seventh largest nation by area, the world's most populous country, and the largest democracy with a [population](#) of 1.4 billion citizens. With its stable government, progressive regulations and laws, young population, and smart use of technology, India has been able to establish itself as a power to reckon with globally. Sixty-five percent of the Indian population still resides in rural areas and the use of technology, investments in developing infrastructure (physical and digital), and focused public welfare have acted as a bridge and are vital catalysts fueling the growth of the economy.

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The country has been leading a digital transformation journey backed with [key credentials and enablers](#) mentioned below:

1. Over 80% of the population with access to banking services
2. Largest liberalised internet ecosystem, coupled with affordable data at USD \$0.17 per GB
3. India has about 1.2 billion mobile phone users, with 70% smartphones
4. Largest digital ID issuance under the Aadhar scheme with over 1.33 billion enrolments
5. Fifth largest economy in the world; poised to become third largest with GDP of USD \$5 trillion

Technology advancements in India have gained global acclaim and are considered one of the key growth drivers for the nation. In particular, India is seen as a significant service provider of technology products and innovations. The importance of using the country's strength in technology to drive its own growth has gained prominence over the last decade, where significant strides have been undertaken to enable better governance and drive public welfare.

## NPCI — Catalyst in Digital Payments

The [National Payments Corporation of India](#) (NPCI) — an umbrella organisation for operating retail payments and settlement systems in India — is an initiative of the Reserve Bank of India (RBI) and Indian Banks' Association (IBA) under the provisions of the Payment and Settlement Systems Act, 2007, for creating a robust payment & settlement infrastructure in India. Considering the utility nature of the objects of NPCI, it has been incorporated as a “not-for-profit” company with an intent to provide infrastructure to the entire

banking system in India for physical as well as electronic payment and settlement systems.

Along with the launch of other platforms, NPCI is most spoken about for launching the [Unified Payments Interface](#) (UPI) — India's own and globally largest real-time payments platform. UPI today has [scaled](#) to financial volumes in excess of 8.6 billion in March 2023, with value settled being in excess of USD \$170 billion (INR 1.4 trillion) in the same period.

NPCI has taken strides in the digital payments space and has been through the journey of creating and enabling digital payment landscapes, working closely with the Government of India and the Reserve Bank of India. It has also been a catalyst in creating and managing digital public infrastructure (DPI) — amongst which the Unified Payments Interface is the world's most renowned real-time payments platform. With UPI, NPCI has progressed from a product to platform approach, whilst also building not just a platform but also an independent payment scheme that has all the attributes of a payment scheme deeply embedded, along with many more functionalities, that are driving close to 55% of the monthly payments on UPI being pure merchant transactions.

“NPCI has been a catalyst in creating and managing digital public infrastructure (DPI) — amongst which the Unified Payments interface is the world's most renowned real-time payments platform.”

# NIPL: Driving Digital Public Good Globally

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NPCI International Payments Limited (NIPL) was incorporated in April 2020 as a wholly owned subsidiary of NPCI, with the objective to develop collaboration in international markets and enable the replication of the success NPCI has achieved in driving digital transformation in India. The fundamental pillar of the NIPL strategy includes forging partnerships in the areas of:

1. Infrastructure build
2. Interoperability build

## *Infrastructure*

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Currently, many nations are working towards creating their own sovereign payment ecosystems that can help drive digital transformation and be an enabler of the national agenda. These payment ecosystems can be powered using NPCI's indigenously built stack of real-time payments (UPI) and card scheme (RuPay). Backed by NPCI's best-in-class technology operating at great scale, NPCI International is engaging in global outreach, exploring collaboration with governments, central banks, and national digital payments infrastructure providers to help bolster the digital payment ecosystem in their respective nations in a sovereign manner. The envisaged objectives of such partnerships include:

- Financial Inclusion
- Cash Displacement
- Sovereign Solution
- Enable Open Banking
- Fintechs Incubation
- Multiplier of Economic Activity
- Cross-border Interoperability
- Enabler of National Agenda

## *Interoperability*

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Given the democratic setup, political stability, liberal policies, and demographic dividend in India, trade commerce and movement of individuals across multiple corridors of the world is rapidly growing. Be it students acquiring higher qualifications, a growing footprint of Indian businesses, or just seasonal getaways, Indians are increasingly seen to be global citizens. A large chunk of the Indian population is now preferring the use of their smartphones to make payments over cash and eagerly seek to do so even when they travel internationally. In order to facilitate that, creating a merchant acceptance footprint for UPI-powered apps and RuPay cards globally is a key agenda of NPCI International in the area of interoperability.

On the other hand, over 30 million Indians work globally and, apart from traveling frequently to India, they also regularly send money to their families back at home. India is currently the largest receiver of remittances globally and is expected to cross the USD \$100 billion cross-border remittances mark in 2022. The key concerns identified in cross-border remittances are the efficiency and economics of sending money across the globe. One of the G20 agenda items is to reduce time and drive cost efficiency to facilitate smooth cross-border remittances. UPI has resolved the domestic remittances concern for India and person-to-person (P2P) remittances have grown to be highly seamless. Replicating the same convenience for cross-border personal payments is another key agenda of NPCI International in the area of interoperability.

It is therefore of the essence that India works closely with other interested nations to help them build similar digital payment ecosystems, enabling them to create platforms for the digital public good of their citizens. This is also aligned with the current G20 theme of “[Vasudhaiv Kutumbakam](#)” (the whole world is one family) and is strategic for India during the term of its G20 Presidency.

## About NPCI International Payments Limited (NIPL)

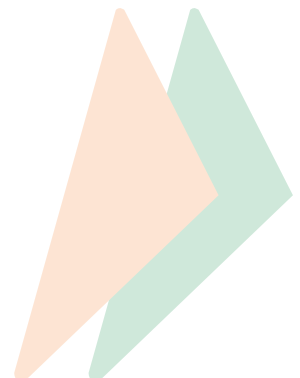
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NPCI International Payments Limited (NIPL), a wholly owned subsidiary of the National Payments Corporation of India (NPCI), is focused on transforming payments across the globe with the use of technology and innovation. After having successfully established partnerships with Discover Financial Services (DFS) USA, Japan Credit Bureau (JCB) Japan, Union Pay International (UPI) China, Royal Monetary Authority (RMA) of Bhutan, and Network for Electronic Transfers (NETS) Singapore, NPCI identified the need to expand its wings outside of India. NIPL is focused on transforming payments across the globe with use of technology and innovation. It will not only enable payments for Indians, but also uplift other countries by enhancing their payment capabilities through technological assistance, consulting, and infrastructure.

Backed by best-in-class technology, we want to collaborate globally, to drive a new era of payment modernisation.

“

UPI has resolved the domestic remittances concern for India and P2P remittances have grown to be highly seamless. Replicating the same convenience for cross-border personal payments is another key agenda of NPCI International.



## ISO 20022 Data Model Holds the Key to CBDC Interoperability



*by Jeffrey Stewart, CBDC Advisor, ProgressSoft.*

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Harmonization of data models, via international standardization efforts, is a necessary underpinning of effective interoperability.

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Over 100 countries, representing almost all global GDP,<sup>1</sup> are at some stage of evaluating or designing an everyday-use, or retail, central bank digital currency (CBDC). In the wholesale space, proofs-of-concept and prototypes have sprung up for DLT-based cross-border PVP<sup>2</sup> and DvP applications,<sup>3</sup> and have matured into demonstrations involving real money<sup>4</sup> and real regulators.<sup>5</sup> However, there is little insight into the data model<sup>6</sup> and associated messaging underlying these tests.

The lack of an explicit data model thus far is understandable. An ad-hoc data structure is fine for sandbox testing, where the information is sparse, and the limited number of implicated players all know what to expect. In the real world though, those chains will be longer, with more stops and less insight along the way. This is doubly true where CBDC systems — both retail and wholesale — will be expected to interoperate with existing payment rails and cross-border arrangements.



# The Interoperability Imperative

Interoperability has been identified as a “core feature” for retail CBDCs.<sup>7</sup> Broadly, interoperability may be defined as “...technical, semantic and business compatibility that enables a system to be used in conjunction with other systems.”<sup>8</sup> In more concrete terms, “interoperability allows PSPs from different CBDC systems to make payments across systems without participating in multiple systems.”<sup>9</sup>

These definitions may benefit from some delamination. Interoperability may occur “horizontally”<sup>10</sup> over multiple stops on its end-to-end journey along a given payment rail. An example might be a closed-loop CBDC payment between users, intermediated by PSPs. Alternatively, it may be “vertical,” or “cross-system,” where a payment begins or ends its journey as, say a CBDC, but hops rails mid-journey to morph into commercial bank or e-money and arrives at the end destination with data intact.

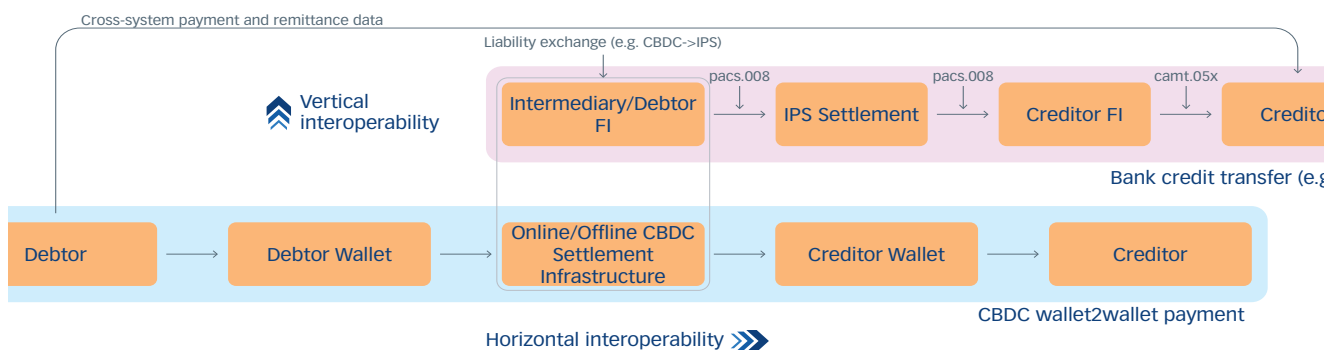


Figure 1. A simplified generic view of interoperability illustrating a payment initiated as a CBDC and delivered into a deposit account via an Instant Payment System (IPS). Interoperability may be horizontal or vertical in nature. Horizontal interoperability results in payments and remittances information being successfully propagated along a given payments rail from sender to receiver. Vertical interoperability occurs when the payment and remittance information “hop” rails and arrive at the end destination with all relevant data intact.

## Cross-System Interoperability

Cross-system interoperability is illustrated by essential CBDC use cases: a user loads a CBDC wallet from a bank account or cash; a consumer pays a merchant from a CBDC wallet using a POS card reader. Online and bill payments are also prominent consumer-to-business (C2B) examples; in the reverse flow, an employer pays a salary from a bank account to a CBDC wallet, or government similarly disburses targeted emergency relief funds.

The most prominent use case, however, is the cross-border one where the bulk of design thinking is taking place. The Bank for International Settlements (BIS) suggests that interoperability can be supported by three broad arrangements:<sup>11</sup>

- “Compatibility”: common standards, alignment of technical infrastructures, rulebooks and interfaces, etc.;
- “Interlinking”: shared technical interfaces or common clearing mechanisms, corridors, and atomic cross-platform transactions to reduce risk and facilitate FX;<sup>12</sup>
- “Integration”: a common platform, using a common governance and technical system.<sup>13</sup>

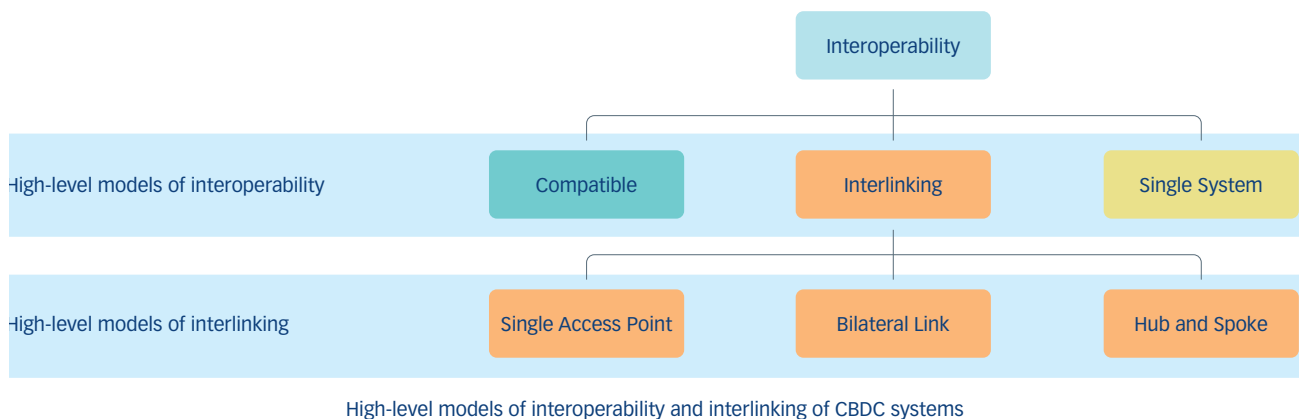


Figure 2: BIS models for cross-border interoperability.

Source: “Options for access to and interoperability of CBDCs for cross-border payments.” Report to the G20.<sup>38</sup>

Compatibility is a base requirement for interoperability and applies equally to the domestic case. At the core of compatibility is the data model and, subsequently, message alignment. Accordingly, the G20-approved roadmap<sup>14</sup> for enhancing cross-border payments, developed by the FSB and CPML,<sup>15</sup> features “data and market practices” as one of five focus areas, with its central building block focusing on “adopting a harmonized ISO 20022 version” and “harmonizing API protocols.” Other roadmap focus areas identify “the interaction between data frameworks” and “interlinking payment systems” as critical building blocks supporting alignment of regulation and existing infrastructures.

# The ISO 20022 Data Model

The high-value payment infrastructures of the world are finally migrating to messages developed using the ISO 20022 standard recipe.<sup>16</sup> Industry-powered “base” messages<sup>17</sup> created under the standard have been developed for the totality of the payments chain (see Figure 3). Along the way, the messages support queries, exception handling and hiving-off of pertinent information for regulatory and compliance authorities.

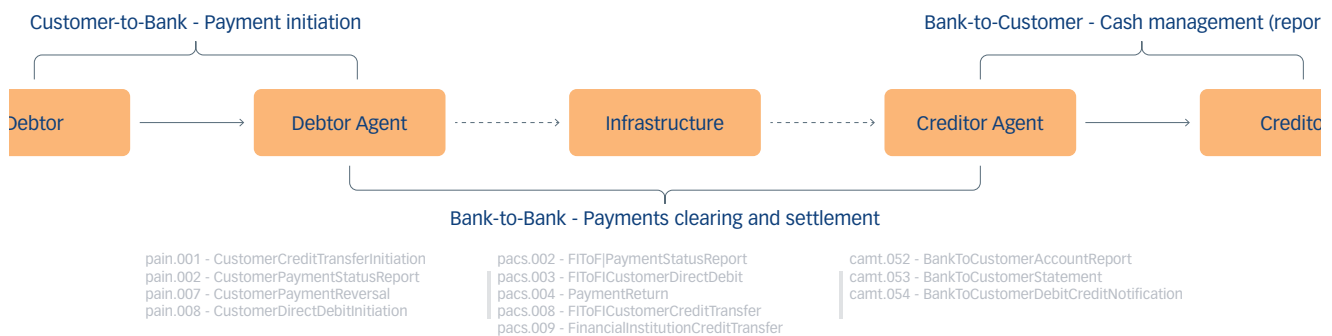


Figure 3: Key ISO 20022 messages across the payment chain.

Source: “ISO 20022 for Payments and Cash Management: A Business Perspective” courseware.

These base message definitions yield the data model to support a comprehensive range of transactions across different use cases. And the annual revision cycle and strict version adherence means that the messages can evolve to meet needs not covered in the existing data model, including the novel challenges that will accompany transacting with a CBDC.<sup>18</sup>

The base message definitions are just a starting point though: the messages can be tweaked and boiled down to serve specific use cases like cross-border payments,<sup>19</sup> high-value settlement,<sup>20</sup> or real-time payments.<sup>21</sup> These market practice usage guidelines can be tailored for implementation on payment infrastructures like the SWIFT system<sup>22</sup> or domestic high-value payment systems, such as the EU Target2<sup>23</sup> or US FedWire<sup>24</sup> systems.

# International Standardization and the CBDC Data Model

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The danger in moving too far with CBDC policy and design decisions without incorporating a global data model, is that CBDC messaging evolves in a way that is incompatible with cross-system straight-through-processing (STP). In a world of converging models and practices, this could be a fatal blow to implementation and adoption by end users as hiccups, extra steps, and delays become increasingly intolerable.

But can existing international standardization processes, like ISO 20022, handle the unique requirements of a CBDC? Work has begun to consider this question, as evidenced below.

## Bank of Japan

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Notably, the Bank of Japan (BoJ) has delved into the applicability of the broad ISO standardization process to CBDC design<sup>25</sup>. Their report suggests that the nature of financial transaction messaging,<sup>26</sup> which can be developed at the level of the business model, logical components (message model), or physical syntax, is robust to the challenge of incorporating CBDC business processes. This can be accommodated through its existing logic and change management/ version control, as well as the ability to represent data in formats that accord with APIs<sup>27</sup> and varying ledger architectures.<sup>28</sup> The report also details widely accepted ISO identifiers<sup>29</sup> for entities and transaction information that are aligned with ISO 20022 metadata. This accords with CPML harmonization work exploring the use of structured and limited-code elements for natural persons, legal entities, and financial institutions.<sup>30</sup>

## ISO/TC68 — Financial Services

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The ISO financial services technical committee has also weighed in on the role of ISO 20022 messaging for a retail CBDC, reasserting that “the suite of ISO 20022 standard financial messages for payments and card transactions is very comprehensive,”<sup>31</sup> and that “there is the ability for additional messages to be created, if required, using the ISO 20022 development and governance processes, to support any specific needs for CBDCs.” Indeed, this committee has formed an advisory group of experts to explore the role of ISO financial messaging standards in digital currencies.<sup>32</sup>

It should be noted that a key cross-system use case for CBDCs involves interoperability with card-based payments, which use ISO 8583-based messages. In this vein, the committee suggests that if “...CBDCs and commercial bank money are both used in card messages a further review of the ISO 8583 standard in relation to the ISO 4217 standard [currencies] would be required.”<sup>33</sup> As an example of this potential interoperability, Visa has proposed a “CBDC Payments Module” that interacts with a blockchain-based CBDC initiated through card infrastructure.<sup>34</sup>

## G20 Roadmap

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The G20 roadmap<sup>35</sup> also provides a setting for CBDC design and ISO 20022-based messaging to come together in service of better cross-border payments. A recent update<sup>36</sup> to progress on the CBDC building block<sup>37</sup> acknowledges that “insufficient technical standardisation in areas such as message formats, data elements, cryptographic algorithms and numbering and coding systems would cause frictions and inefficiencies when attempting to achieve interoperability.”<sup>38</sup> However, there is not much specificity about the process to align these messages.

Conversely, block 14 of the G20 roadmap does focus on message harmonization, but not specifically as it pertains to CBDC. A recent update concludes that “many of the inefficiencies that the financial industry and its end users face with cross-border payments are caused by interoperability issues that arise because of misaligned message flows and incompatible data models along the end-to-end payment chain.”<sup>39</sup> The joint task force responsible for this area published its harmonisation guidelines for broader industry consultation earlier this year and have suggested that “once a final version of the guidelines is published in 2023, their adoption will require a whole community effort that will potentially span several years.”<sup>40</sup>

## Closing the Gap

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This “whole community” effort must include central banks and other prominent thinkers in the CBDC space if the new currency is to achieve cross-system interoperability — both domestically and internationally.

This effort can manifest at various levels in the international standardization process. In the international space, the message harmonization work coming out of the roadmap is an obvious first step. Other initiatives, such as SWIFT’s efforts to “connect digital [CBDC] islands”<sup>41</sup> are important and also harness ISO 20022-based messaging for connector gateways but don’t specify the underlying CBDC data model used by participants.

Most importantly though, closer participation by CBDC designers in international standardization processes like ISO 20022 and its cross-border harmonization,<sup>42</sup> other market practice and implementation efforts,<sup>43</sup> and perhaps even the establishment of a CBDC ISO 20022 market practice group will be critical to achieving the data models that engender interoperability.

While CBDC systems need not use ISO 20022 messages — indeed other standards and payload representations (e.g., JSON) may be required for API access — they should at least adhere to the underlying data model to improve cross-system interoperability and meet user expectations.

## Conclusion

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The achievement of policy aims associated with a CBDC will require adoption by end users. The user value proposition relies in large part on frictionless satisfaction of key payments use cases. The associated CBDC transactions necessitate interoperability along — and most crucially between — payment rails. Harmonization of data models, via international standardization efforts, is a necessary underpinning of effective interoperability.

## About the Author

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This article is authored by Jeffrey Stewart, CBDC Advisor at ProgressSoft. Jeffrey is a payments system specialist focused on ISO 20022 training and implementation, CBDC design, and the regulatory landscape for digital financial innovation, and includes input and comments by Isak Penttila, a Payments Modernization Consultant and ISO 20022 Payments Standards Evaluation Group (PaySEG) co-convenor.

## About ProgressSoft Corporation

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ProgressSoft is a global provider of real-time payment and financial solutions since 1989, boasting a record of thousands of implementations in over 370 banks, central banks and financial institutions in 24 countries.

ProgressSoft officially launched its [Central Bank Digital Currency](#), an advanced, secure form of regulated national digital currency built on centralized or distributed ledger technology and authorized by the central bank.

In 2022, the solution was honored with the Advancement of Digital Currency in Interoperability award by the Digital Currency Advisory Committee in Washington D.C., owing to its capability to revolutionize the future of interoperability in cross-border financial ecosystems.



# ProgressSoft

www.progresssoft.com

# Notes:

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<sup>1</sup> See e.g. <https://www.atlanticcouncil.org/cbdctracker/>

<sup>2</sup> E.g. [Using CBDCs across borders: lessons from practical experiments](#). BIS Innovation Hub. June 2022.

PvP = Payment-versus-payment (i.e. atomic foreign exchange); DvP = Delivery-versus-payment (i.e. atomic payment for assets)

<sup>3</sup> ECB. [Demystifying wholesale central bank digital currency](#). Speech by Fabio Panetta. Sept 2022

<sup>4</sup> See [Project mBridge: Connecting economies through CBDC](#)

<sup>5</sup> See [Project Jura: cross-border settlement using wholesale CBDC](#)

<sup>6</sup> Data model here refers to meta-data architecture (i.e. elements and components) as opposed to other uses such as the representation of value (cf. [Technical design choices for a U.S. central bank digital currency system](#) p.26)

<sup>7</sup> BIS and Group of Central Banks. [Central bank digital currencies: system design and interoperability](#). Sept 2021

<sup>8</sup> Ibid. p. 5.

<sup>9</sup> BIS. [Interoperability between payment systems across borders](#). BIS Bulletin, no 49. Dec 2021

<sup>10</sup> E.g. [Central bank digital currencies: system design and interoperability](#)

<sup>11</sup> BIS. [Multi-CBDC arrangements and the future of cross-border payments](#). Mar 2021

<sup>12</sup> See e.g. [Project Nexus](#)

<sup>13</sup> See e.g. [Project Dunbar](#)

<sup>14</sup> CPMI, FSB. [G20 Roadmap for enhancing cross-border payments: Consolidated progress report for 2022](#). Oct 2022

<sup>15</sup> FSB = Financial Stability Board; CPMI = BIS Committee on Payments and Market Infrastructures

<sup>16</sup> See e.g. BIS CPMI. [Harmonisation of ISO 20022: partnering with industry for faster, cheaper, and more transparent cross-border payments](#). Sept 2022

<sup>17</sup> [ISO 20022 Message Definitions](#)

<sup>18</sup> See e.g. [ISO TC68 response](#) to US Federal Reserve paper: [Money and payments: The U.S. dollar in the age of digital transformation](#)

<sup>19</sup> [Mission and Scope of the PMPG](#)

<sup>20</sup> [High Value Payments Plus \(HVPS+\)](#)

<sup>21</sup> [ISO 20022 Real-Time Payments Group \(RTPG\); Domestic market infrastructures create new instant payment guidelines | SWIFT](#)

<sup>22</sup> <https://www.swift.com/iso20022readiness>

<sup>23</sup> See e.g. ECB. [Full implementation of ISO 20022](#). Sept 2021

<sup>24</sup> [Fedwire Funds Services ISO 20022 implementation frequently asked questions](#). Mar 2020

<sup>25</sup> BoJ. [Standardization in Information Technology related to Digital Currencies](#). June 2021

<sup>26</sup> Under the mandate of [ISO TC/68 SC9 - Information exchange for financial services](#)

<sup>27</sup> See e.g. BIS. [Project Rosalind: developing prototypes for an application programming interface to distribute retail CBDC](#)

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- <sup>28</sup> See e.g. Bank of Canada. [Archetypes for a retail CBDC – Bank of Canada](#). Oct 2022
- <sup>29</sup> Developed and/ or coordinated by [ISO/TC 68 SC8 – Reference data for financial services](#)
- <sup>30</sup> BIS CPML. [Harmonisation of ISO 20022: partnering with industry for faster, cheaper, and more transparent cross-border payments](#)
- <sup>31</sup> [ISO TC68 response](#) to US Federal Reserve paper: [Money and payments: The U.S. dollar in the age of digital transformation p. 2](#). May 2022
- <sup>32</sup> <https://committee.iso.org/sites/tc68/home/news/content-left-area/news-and-updates/iso-tc-68--ag-5-digital-currency.html>
- <sup>33</sup> Ibid.
- <sup>34</sup> Central Bank Payments News. [Visa: How CBDC Can Help Drive Digitization and Responsible Innovation](#). Nov 2022
- <sup>35</sup> CPML, FSB. [G20 Roadmap for enhancing cross-border payments: Consolidated progress report for 2022](#). Oct 2022
- <sup>36</sup> Building Block 19 under Focus Area E
- <sup>37</sup> Block 19: Factoring an international dimension into CBDC design. Under focus area E: New payments infrastructures and arrangements
- <sup>38</sup> BIS, IMF, World Bank. [Options for access to and interoperability of CBDCs for cross-border payments](#). p. 26. July 2022
- <sup>39</sup> BIS CPML. [Harmonisation of ISO 20022: partnering with industry for faster, cheaper, and more transparent cross-border payments](#). Sept 2022, p.6
- <sup>40</sup> See BIS (CPML): [ISO 20022 harmonisation requirements for enhancing cross-border payments](#). Mar 2023
- <sup>41</sup> SWIFT. [Connecting digital islands: CBDCs](#). Nov 2022
- <sup>42</sup> BIS CPML. [Harmonisation of ISO 20022: partnering with industry for faster, cheaper, and more transparent cross-border payments](#)
- <sup>43</sup> E.g. PMPG, HVPS+, IP+

“ This ‘whole community’ effort must include central banks and other prominent thinkers in the CBDC space if the new currency is to achieve cross-system interoperability — both domestically and internationally.





## Private Sector Cross-Border Payment Solutions Need Enabling Through Better Partnerships with Public Sector



*By Victoria Cumings, Chief Legal & Regulatory Officer, and Daniel Heller, Head of Regulatory Strategy, RTGS.global*

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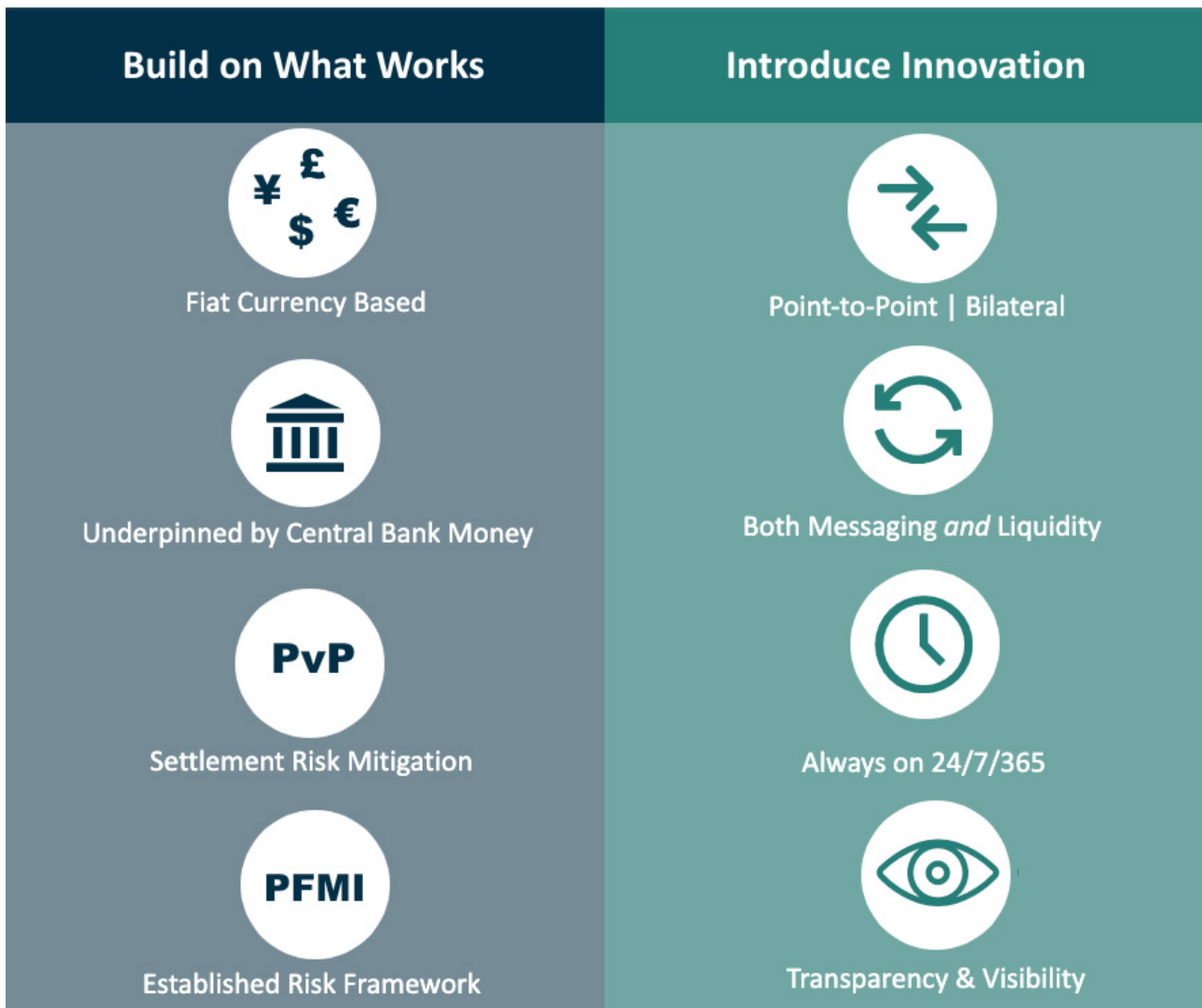
During his keynote address to the Monetary Authority of Singapore in February this year, Agustín Carstens, General Manager of the Bank for International Settlements (BIS), acknowledged the critical role private sector innovation can play in servicing the radical and long overdue transformation of money and payments during this decade.

*“For innovation to flourish it requires a stable and safe infrastructure that unleashes the private sector’s creativity and ingenuity,”* said Carstens.

Carstens also articulated an issue of growing concern for many private sector organisations seeking to establish and sustain operations in the payment services sector in this new era of global banking. He pointed to the need for clearer delineation between the respective roles of central banks and the private sector in delivering

on the *G20 Roadmap for Enhancing Cross-border Payments*, which was designated a key priority for global action by the G20 governments in 2020. *“In designing these new infrastructures,”* said Carstens, *“there has to be clear thinking on the respective roles of the central bank and the private sector.”*

The G20 Roadmap was developed by the Financial Stability Board (FSB) in conjunction with the Committee on Payments and Market Infrastructures (CPMI). It outlined a high-level plan with ambitious but achievable goals and milestones consolidated into five core focus areas and 19 building blocks for making cross-border payment services faster, cheaper, more transparent and more inclusive, whilst maintaining their safety and security.



From the outset, the FSB has indicated that the work required to improve cross-border payments would be dependent on the commitment of public authorities and the private sector working together to enhance existing arrangements and develop new solutions, and that it would necessitate global coordination and sustained political support. Key components would be taken forward by the most suitably qualified expert bodies, it was said, with the FSB coordinating and reporting annually on progress. The private sector would bring the blue-sky thinking and technological innovation needed to transform the payment industry, a competitive edge that would deliver services efficiently and cost-effectively for consumers, and the ability to respond meaningfully and at pace in a rapidly evolving business and technological landscape.

The initial two years of the G20 Roadmap involved a period of introspection and analysis, by way of a review and audit of the existing cross-border payment ecosystem, and its challenges, in order to understand what needed to change, as well as establishing the foundational principles for changes to be made. The role of the private sector in that exercise was inevitably going to be limited to input and information, as opposed to action.

Yet, during this period, various initiatives were also launched by central banks which began the process of actively exploring the technological and infrastructural changes required in detail.

The BIS Innovation Hubs, for example, have been working since the beginning of the decade to develop *“public goods in the technology space to support central banks and improve the functioning of the financial system,”* in the words of the BIS on its website. An expanding network of hubs in major international centres in Europe and in Pacific Asia, and a strategic partnership with the Federal Reserve Bank of New York, has so far completed five projects, with another 21 projects currently underway. These seek to explore six core themes, with the overall objective of encouraging greater collaboration amongst the central banking community, improving awareness and understanding of financial technology, and developing innovative solutions to benefit and enhance the financial system.

“ We urge the FSB and central banks to give their time and attention to the high-quality private sector solutions being developed to expand PvP settlement and enhance cross-border payments.

## RTGS.global's solution to eliminate the pain points in providing safe cross-border payments

In responding to the G20's call for ideas and action from the private sector to measurably improve cross-border payments, RTGS.global has been making the necessary investment to develop systems, processes and cutting-edge technology to develop a new model for tackling long-standing challenges in safe and efficient interbank cross-border payments.

RTGS.global uses cloud infrastructure with next-generation communications technology to enable fund movements to effect the safe, secure, instant and simultaneous bilateral 'atomic' (PvP) settlement of FX transactions 24 x 7 x 365 for participating banks. It uses ISO-20022-compatible messaging standards and has a significant advantage over payment arrangements where messaging and funds movement occur separately. With RTGS.global, payment information and the funds being transferred travel together, removing the risks involved in having banks rely on two separate service providers: one for messaging, one for settlement. The new technology means, effectively, that FX trade and settlement can happen on the same day.

Given many currency pairs do not currently have a PvP settlement option, RTGS.global is seeking to enable settlement between an expansive set of global currencies (subject to necessary regulatory approvals). These transfers will be made bilaterally point-to-point, without any need for RTGS.global — or any other third party — to act as a financial intermediary in the flow of funds between participants. This minimises cost, friction, and operational and counterparty risk for RTGS.global participants.

Settlement via RTGS.global can be effected in real-time, 24 hours a day, every day, without being contingent on time zones or constrained by central bank or payment system operating hours.

We are now at what the FSB's consolidated progress report for 2022 calls "*an inflection point*," which should see an increase in more practical initiatives and greater external engagement to achieve the targets set by the G20 Roadmap. The latest announcements from the FSB and other public authorities suggest that a move towards greater facilitation of private sector engagement with the G20 Roadmap is imminent. RTGS.global welcomes this approach and believes that cooperation and clear delineation of responsibilities between the private and public sectors will be key in delivering tangible improvements in cross-border payments.

One example of an ongoing threat to the stability of cross-border currency exchanges where public-private partnerships may provide effective solutions is in the area of reducing FX settlement risk. The risk that one party to a currency trade fails to deliver the currency owed upon settlement remains, since the collapse of Bank Herstatt in 1974, the most significant risk for deliverable FX transactions. Recent technological innovations which could facilitate wider adoption of PvP (Payment versus Payment) that are being developed by private sector companies, in tandem with operational changes being explored by central banks, could significantly reduce FX settlement risk, which currently puts settlement of more than one-third of deliverable FX turnover at risk (representing more than two trillion US dollars) daily.

The CPMI, in its March 2023 *Final Report – Facilitating Increased Adoption of Payment versus Payment*, outlined potential roles for private and public sector stakeholders to increase PvP adoption. RTGS.global is glad to hear that the CPMI plans to further engage with industry stakeholders and relevant authorities to explore practical actions to foster broader use of PvP, and looks forward to being involved in the ongoing industry engagement.

In February 2023, the FSB published a prioritisation plan and engagement model for taking the G20 Roadmap forward, identifying three priority areas: Payment system interoperability and extension; legal, regulatory, and supervisory frameworks; and data exchange and message standards. The plan acknowledges the importance of partnership between the public and private sectors: *“These actions reflect the levers available to the FSB, CPMI, and their partner organisations, who do not run payment systems and cannot make payments faster, cheaper, or more accessible and transparent on their own, which makes public and private sector partnership crucial.”*

This is a critical juncture for the G20 Roadmap, a point at which the FSB, CPMI and other stakeholders driving its implementation should facilitate closer integration between the efforts of central banks and the private sector.

We urge the FSB and central banks to give their time and attention to the high-quality private sector solutions being developed to expand PvP settlement and enhance cross-border payments. In order for the private sector to maintain its interest, energy and commitment to the cause, it must feel invested in the ongoing Roadmap efforts and initiatives, and that its contributions are welcomed.

The G20 Roadmap was perceived as a means to encourage and achieve success through public-private partnership, not for the different sectors to work on independent initiatives in silos. We are strongly in favour of a public-private partnership, together focused on realising the G20 Roadmap’s 19 building blocks to facilitate the delivery of an enhanced cross-border payment system that satisfies the complex technological and regulatory challenges of the modern world.

## About RTGS.global

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RTGS.global makes global cross-border settlement instantaneous, solving today's risk and liquidity issues with the flexibility to address whatever settlement requires next. Our Bi-Lateral Atomic Settlement technology is Financial Market Innovation, making settlement more effective, inclusive for financial markets and safer today, but also flexible enough to address the future challenges facing settlement. We're more than just innovation though, as our legal and operational framework and deep industry experience ensure we can deliver technology that fits within company and regulatory requirements, delivering a meaningful impact. RTGS.global — Built for Now, but Designed for What's Next.



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RTGS.global believes that cooperation and clear delineation of responsibilities between the private and public sectors will be key in delivering tangible improvements in cross-border payments.

# StoneX<sup>®</sup>

## Payments

### Global Decline in Correspondent Banks and Learnings from StoneX Payments



*By Niels Van Duinen, Head of Business Development, Asia-Pacific, StoneX Payments*

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According to the Financial Stability Board's (FSB) report on correspondent banking activities published in November 2021, there has been a decline in the number of active correspondent banking relationships since 2017, with a drop of approximately 7% in 2020 alone. The biggest contributing factor to this trend is that correspondent banking involves a high degree of risk, particularly with regards to money laundering and terrorism financing. As a result, regulatory authorities have been increasing their scrutiny on correspondent banking relationships, which has led to higher compliance costs for banks. In some cases, banks have decided to exit correspondent banking relationships altogether rather than bear the compliance burden.

This is a problem of serious consequences as the total volume of globally traded currencies is increasing almost exponentially. A report by the Bank for International Settlements (BIS) published in April 2022 states that the average daily turnover of foreign exchange (FX) markets reached \$7.5 trillion, up 14% from \$6.6 trillion in April 2019. The report also noted that the most actively traded currencies remained the US dollar, the Euro, the Japanese yen, and the British pound. However, the report indicated that there was an increase in trading of emerging market currencies, particularly the Chinese renminbi, which had risen to become the fifth most traded currency in the world. Other emerging market currencies that saw an increase in trading activity included the Indian rupee and the Mexican peso.

As a result, central banks and policymakers are closely monitoring the decline in correspondent banking and taking steps to mitigate its impact on financial stability and inclusion.

StoneX Payments has in the same time seen an increase in its network of correspondent banks. While the number of correspondent banks globally has declined since 2017, StoneX Payments has seen an increase of 15%, to a total of 375 today, in the number of correspondent banks in the same period. We see a lot of factors influencing correspondent bank relations globally, including AML / CTF concerns and compliance, an increasingly more high-risk customer base, and a decrease

in risk appetite and regulatory changes. These also have a wider impact on the global payment landscape. Technology is playing an important role; alternative ways to settle payments, such as blockchain and digital ledger technologies (DLTs) are becoming more popular. But also, central banks are also developing their own digital currencies and not to mention the emergence of real-time-payment (RTP) clearing systems.

Central banks and regulators are pushing for change by seeking standardization with ISO 20022, as well as accommodating alternative payment providers. These alternative providers are also transforming the payment landscape in the form of fintech companies, neo-banks, payment processors, and network providers

Customers are also seeking more efficiency, transparency, and consistency when it comes to payment services.

“By encouraging the use of local currencies, regulators aim to prevent predatory lending practices and ensure that consumers have access to fair and transparent financial services.



# History of StoneX in the Global Payments Ecosystem

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StoneX has been a specialist provider of cross-border payments since 1986. In that time, we have built up an impressive customer base that now includes many of the world's leading transaction and central banks, who use our expertise in the developing world to complement their own coverage in more developed markets. With the globalization of trade, we are witnessing explosive growth in the number of payments from the developed world to emerging markets. At the same time governments, regulators, and commercial actors are increasingly favoring payments being executed in local currency and discouraging the use of dollars to settle local obligations (in non-dollar countries).

So how can we help address these various challenges? Well firstly, unlike many other providers in the cross-border space, we run our own network of local correspondent banks across the world. Instead of relying on one or two global banks, we, StoneX Payments, transact in the local target market of the intended payment, engaging local banks, a specialist in that market, in order to secure a fixed, low-cost fee (as all payments travel across local clearing mechanisms, rather than arriving as cross-border) and guaranteed delivery times.

Central banks in emerging markets wish to bring liquidity onshore as far as possible for several reasons. For one, it helps to stabilize the domestic financial system by ensuring that banks have sufficient funds to meet the demand for loans and deposits. This, in turn, can help to promote economic growth and stability. Secondly, bringing liquidity onshore can help to reduce the reliance on foreign currency funding, which can be volatile and subject to sudden withdrawals. Thirdly, onshore liquidity can help to support the development of domestic financial markets

by providing a stable source of funding for banks and other financial institutions. This can also help to attract more investment to the domestic market and promote the growth of local businesses. Finally, central banks in emerging markets may wish to bring liquidity onshore in order to reduce their exposure to external shocks, such as changes in global interest rates or geopolitical tensions. By maintaining a stable source of onshore liquidity, central banks can better manage any potential risks to the domestic financial system.

With StoneX Payments, not only can this onshore liquidity be achieved, but there are other benefits to central banks in emerging markets. Firstly, it removes ambiguities and pricing difficulties for both remitters and beneficiaries when carrying out cross-border payments. The impediments and challenges of complying with anti-money laundering regulations can most easily be solved through an established cross-border payment network such as ours. StoneX's clients are in total 75 banks, including central banks, large commercial transaction banks, and more regional players.

Making cross-border payments using StoneX ensures that the full accurate amount arrives with the beneficiary, and all bank fees are absorbed by StoneX Payments. That's because we have an extensive network of 350+ correspondent banks worldwide, allowing payments to be made more efficiently, quickly, and securely. This means payments are received without any unexpected deductions. Clients have total transparency on the payment process and receive status updates.

## StoneX's Contribution to The Ecosystem

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StoneX Payments connects banks and the technology necessary to complete the full payment workflow between sender, beneficiary, and intermediary banks. We are responsible for a large market share of all global transactions in local currency worldwide. Our platform serves as a messaging hub that is compliant in sending transaction orders, data, and messages in a manner that is compliant with international regulations such as ISO 20022. We also provide migration support in helping local banks with connectivity options to SWIFT.

In recent years, we have seen a growing trend in e-commerce and online marketplaces moving away from accepting USD payments globally and instead pushing for local currency payments. This shift is not only being driven by online marketplaces but also by local regulators, favoring payments being executed in local currency and the rise of remittances. One of the key reasons for this shift is that accepting USD payments often results in foreign exchange risks and fees for merchants and consumers, especially in countries that do not use USD as a base currency.

By accepting local currency payments, merchants can reduce their exposure to foreign exchange risk and offer a more transparent pricing structure for their customers. Moreover, local regulators are pushing for local currency payments to promote financial inclusion and protect consumers. By encouraging the use of local currencies, regulators aim to prevent predatory lending practices and ensure that consumers have access to fair and transparent financial services.

## Implications for Policy Makers

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The trend towards local currency payments is driven by the desire to reduce transaction costs and foreign exchange risks. With more international trade being conducted in local currencies, it is likely that policymakers will need to consider the impact of currency fluctuations on their domestic economies. This may require central banks to be more proactive in managing their currency exchange rates to ensure stability and minimize economic disruption.

The trend towards onshore liquidity demand by central banks in emerging markets is driven by the need to support domestic economic growth and provide adequate liquidity to financial institutions. This trend may require policymakers to explore new approaches to managing their monetary policies, including developing new tools to manage liquidity and promote financial stability.

Overall, these two trends highlight the growing interconnectedness of the global economy and the need for policymakers to be more strategic in managing their monetary policies. As such, it is important for central banks to closely monitor these trends and adjust their policies accordingly to ensure continued economic growth and stability.

## How to Stay One Step Ahead

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If you'd like to learn more about the aforementioned points or what we do, please stop by our booth at the Central Bank Payments Conference in Cape Town between June 26th to 28th, and speak to the StoneX Team.

# About StoneX Payments

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[StoneX Payments](#) is a product of the StoneX Group and specializes in cross-border payments. We offer tailor-made foreign exchange and payment services for corporates, NGOs, and financial institutions worldwide.

Our global network of 350+ correspondent banks helps us deliver transparent, secure, and guaranteed payments in more than 140 currencies across 180+ countries.

Clients are able to gain access to our services through a highly-scalable, efficient, and advanced payment platform that is easy to use.

StoneX Group Inc. and its subsidiaries are a leading provider of execution, risk management, advisory, market information, and clearing services for various asset classes and markets worldwide.

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Making cross-border payments using StoneX ensures that the full accurate amount arrives with the beneficiary, and all bank fees are absorbed by StoneX Payments. That's because we have an extensive network of 350+ correspondent banks worldwide, allowing payments to be made more efficiently, quickly, and securely.

# StoneX®



## Best-Practice Testing Approach for FMs Boosts Quality and Efficiency



*By Jonathan Mislér, Head of Business Development, Unifits*

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The Unifits Onboarding Platform helps FMs improve participant experience, reduce risk and errors, and ensure messaging standards compliance, resulting in a more efficient, effective, and profitable business.

## Background and Challenge

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Financial market infrastructures (FMIs) face numerous challenges, such as modernising their payment infrastructures and IT systems to support real-time payment processing while ensuring security, scalability, and compliance. (Central bank) digital currencies, the increasing demand for cross-border interoperability between payment systems, and the migration of existing infrastructures to ISO 20022 are further examples of challenges that all require the same thing:

**massive changes in the IT landscape.**

Reliability and resilience are crucial aspects for FMs in order to maintain the stability and efficiency of payment systems. This requires a considerable amount of testing to ensure the quality and interoperability of the systems involved and thus the reliability and resilience of the entire infrastructure.

## Best Practice Approach

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[Unifits](#) effortlessly extends FMs with test automation for both the central infrastructure as well as for the connected participants: a game changer for the implementation, maintenance, and further development of financial market infrastructures. The best practice testing approach for FMs is characterised by the fact that three complementary solutions offered by one full-service provider perfectly cover the transaction testing needs of all parties involved. Unifits' solutions have been used by banks, central banks, and clearing houses for many years and now ensure quality and efficiency in the implementation and ongoing operation of financial market infrastructures on three continents.

These three complementary solutions from Unifits, detailed in full below, cover all transaction testing needs within FMs:

### 1. Bank Onboarding Platform – Industry-leading financial transaction testing in the cloud

The Unifits Bank Onboarding Platform greatly simplifies financial transaction testing by supporting not only validation but also the creation of all messages in accordance with the guidelines of a specific financial market infrastructure. While traditional validation portals allow for the validation of self-generated outbound messages, the Unifits Onboarding Platform also enables the creation of all kinds of inbound messages in a user-friendly manner. Furthermore, comprehensive statistics and reporting functions, a sample message library, and various registration options, including self-registration, are available.

There are many benefits of providing an Onboarding Platform to FMI participants. The Unifits Onboarding Platform helps FMs improve participant experience, reduce risk and errors, and ensure messaging standards compliance, resulting in a more efficient, effective, and profitable business.

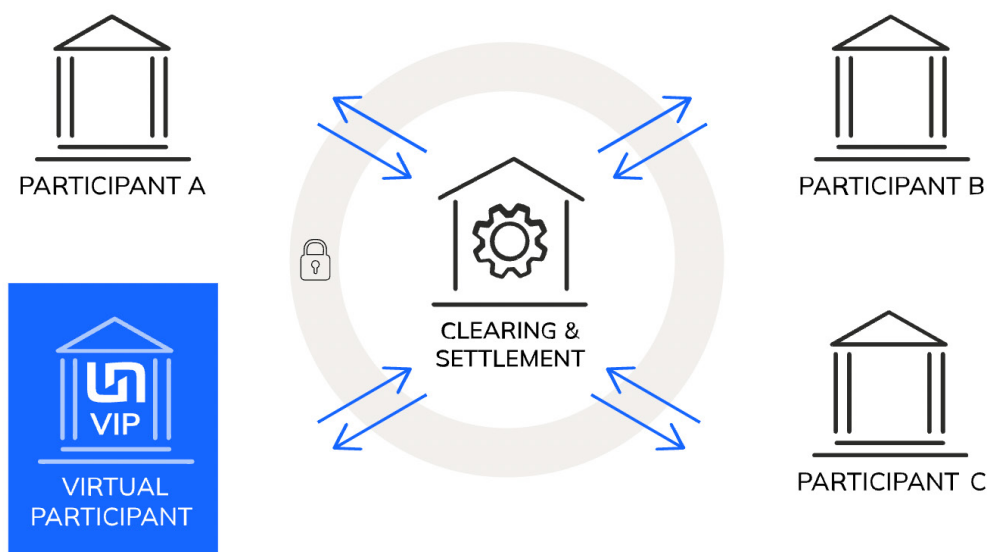
#### **Benefits:**

- Streamlining the onboarding process: A self-service onboarding portal supports participant testing, saving FMI staff time and effort in manually managing this process.

- Improving the participant experience: FMI provides a more user-friendly experience through a self-service portal, allowing participants to complete the technical onboarding process on their own time and with less reliance on third parties.
- Ensuring standard compliance: Using the Onboarding Platform consistently helps participants implement messaging standards correctly from the outset.
- Reduced risks and errors: By providing an onboarding portal, the FMI assists participants in identifying and resolving issues before going live.
- Increasing service adoption: The FMI increases its own appeal to participants by providing a streamlined and user-friendly onboarding experience.

## 2. Virtual Participant – 24/7 test counterpart

The Unifits Virtual Participant (VIP) is available 24/7 to any real participant in the test environment of a given market infrastructure and acts as their test partner. Either controlled by parameterised messages or through an intuitive graphical user interface, the VIP can effortlessly create and send any message, thus greatly simplifying industry testing for FMIs.



The use of validation portals to ensure that messages are properly structured is now widespread. This facilitates participants' initial testing of outbound messages as they connect to a clearing infrastructure. However, as soon as there is a need to simulate incoming messages or a participant's system is connected to the clearing test infrastructure and interoperability testing starts, utilising a validation portal is no longer the right approach.

This is exactly where the Unifits Virtual Participant comes in! The VIP is available to every real participant as a test counterpart to receive, process, generate, and send any type of payment message. This helps participants enormously, especially in inbound testing, as there are no longer any dependencies on other participants' ability to send.

### Benefits:

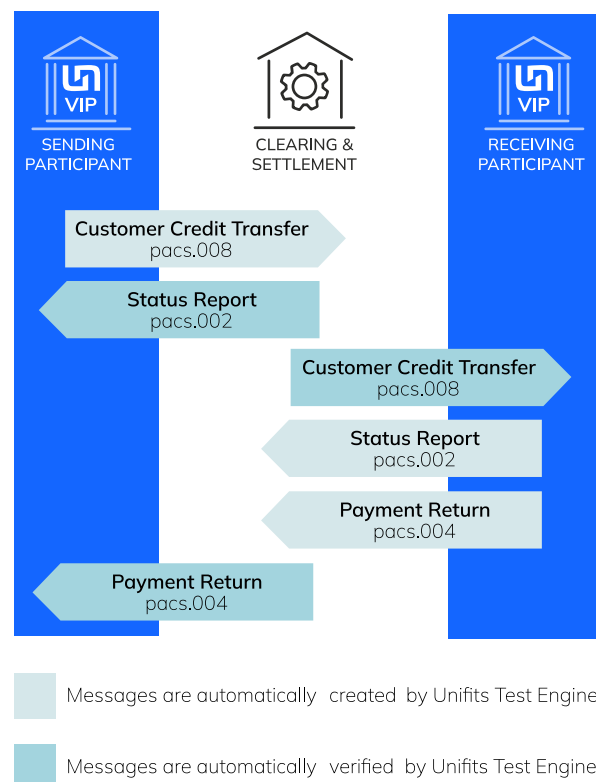
- participants can independently test all outbound and inbound message flows
- no alignment with any third party required
- participants are not bound to fixed times to conduct their testing
- no extra effort, as the VIP is connected with the existing test infrastructure
- easy to utilise, no training required
- full transparency about the participants' testing progress

### 3. Test Engine – Test automation for clearing and settlement systems

The Unifits Test Engine is used to validate a financial market infrastructure's central clearing system. All message flows can be run automatically and independently because sending and receiving participants are simulated.

The Unifits Test Engine automates end-to-end test flow execution by controlling sending and receiving virtual participants, simulating both the Debtor and Creditor Agent's behavior.

The illustration depicts a payment (Customer Credit Transfer) initiated by the Debtor Agent, followed by a payment return initiated by the Creditor Agent.



Automated testing ensures greater test coverage, which is particularly important for ISO 20022 implementations with their diverse message types and process flows.



**Benefits:**

- **Faster test cycles:** Automated testing enables faster and more frequent test cycles, reducing the overall time required to test clearing and settlement systems. This is especially important for ISO 20022, which can be very complex and requires a lot of testing.
- **Improved accuracy:** Automated tests are less prone to error than manual tests. In addition, automated tests can be more consistent because they ensure that tests are run in the same way every time.
- **Cost savings:** When compared to manual testing, automated testing will reduce costs such as the need for dedicated resources and the rework required by errors being detected late.
- **Increased test coverage:** Automated testing allows for many more scenarios and use cases in much less time than manual testing. This ensures greater test coverage, which is particularly important for ISO 20022 implementations with their diverse message types and process flows.

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Unifits' solutions have been used by banks, central banks, and clearing houses for many years and now ensure quality and efficiency in the implementation and ongoing operation of financial market infrastructures on three continents.

Unifits

## About Unifits

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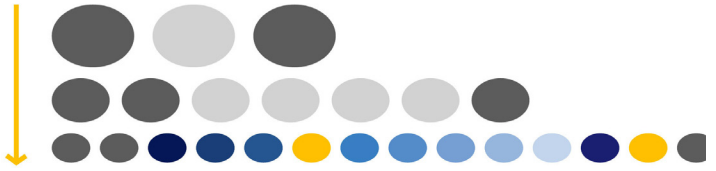
“Reliability and resilience are crucial aspects for FMs in order to maintain the stability and efficiency of payment systems.”

Based in Munich, Germany, Unifits was founded in 2010 to simplify financial transaction testing. Unifits has made it its mission to let software handle complex, tedious, and frequently recurring testing tasks to ensure interoperability and operational resilience within FMs. Unifits' solutions have been used by banks, central banks, and clearing houses for many years and now ensure quality and efficiency in the implementation and ongoing operation of financial market infrastructures on three continents.



# VISA

## Let's Get Granular



### End User Needs for Cross-Border Payments Vary Depending on the Use Case—And This Matters



By Chad Harper, Senior Fellow, Visa Economic Empowerment Institute (VEEI), and Nasreen Quibria, Senior Director, Head of Cross-border Policy Engagement, Visa

In late February, the Financial Stability Board (FSB) [published an update](#) to the G20 Roadmap for Enhancing Cross-border Payments which details three priority areas for ongoing work: payment system interoperability and extension; legal, regulatory and supervisory frameworks; and data exchange and message standards. The FSB and the Committee on Payments and Market Infrastructures (CPMI) will convene two industry taskforces to cover these priority themes. As this cross-border payments program continues, we believe there is an opportunity to give a voice to end users<sup>1</sup> and their varying needs. The value in understanding end user needs across a broader set of attributes (beyond cost, speed, access, and transparency) and a more granular set of use cases is in understanding how payments policy initiatives will affect real people, real businesses, and the real economy.

<sup>1</sup> We use “end users” broadly to encompass stakeholders such as consumers, businesses, and migrant workers sending remittances, among others.

Assessing how well cross-border payment solutions are meeting those end user needs can then inform how both the public and private sectors should prioritize, implement, and monitor improvements.

As the FSB and CPML stand up their respective taskforces, policymakers need to think more granularly about attributes and use cases.

## There are more attributes than we commonly discuss, and they matter a lot

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The cross-border policy dialogue has focused predominantly on cost, speed, access, and transparency. However, end user needs extend beyond these attributes. We believe that end users may be more interested in optimizing these goals to trade off among cost, speed, transparency, and access between themselves and in favor of other attributes, such as geographic reach and revocability/returns, depending on the use case.

We propose that there are at least **15 payment** attributes and **7 product** attributes in a cross-border transaction that drive value for the end user (see figure on page 48). Payment attributes are elements of the money movement part of the transaction. These attributes are largely influenced by payment infrastructure providers. Product attributes focus on the user experience and journey and are disproportionately influenced by the front-end providers that own the end customer relationship.

We believe the payment attributes fall into two further categories:

- **Foundational:** payment attributes that are essential to end users across all use cases; these are “non-negotiable” attributes for which expectations should always be high
- **Differentiators:** payment attributes that drive unique value to end users for a specific use case and/or context

“ The cross-border dialogue will need to go beyond the four common attributes of speed, cost, access, and transparency to address the improvement areas most valuable for end customers.

There is a range of end user needs for each attribute. For example, end user needs for speed of funds availability could range from instantaneous to 1-2 days, depending on the use case and context. And cost, we believe, reflects the combination of payment and product attributes that deliver value across the payments journey, ultimately to the benefit of the end user in meeting their unique needs.

This short article explores business-to-business (B2B) use cases for micro, small, and medium enterprises (MSMEs), consumer-to-consumer (C2C) payments in the context of remittances, and consumer-to-business (C2B) transactions for e-commerce and education. We also draw attention to how payer and payee needs often vary within a use case.

## End user needs across attributes differ by use case

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End users include both payers and payees. Let's first consider how payer needs differ between business and consumer use cases, while keeping in mind the foundational nature of **security**, **integrity**, and **resilience**.

- In the B2B MSME use case, the payer prioritizes the **reach** attribute to send payments across a wide range of corridors and transact large ticket sizes for a large inventory. The payer also places high value on **transparency**, **predictability**, and **speed of clearing** and **funds availability**, given speed and timing of payment may impact the transfer of goods that may be critical to business operations. In addition, the payer values **information and data** to aid with invoice reconciliation.
- In comparison, in the C2C (remittance) use case, the payer prioritizes **speed of funds availability** to ensure funds reach their family quickly (ideally the same day) and accessibility across users so that they may use their payment method of choice. The payer also values **reach** to send funds across their desired corridor, and **transparency** and **predictability** of fees (including FX) to know upfront how much to expect to pay and when their funds may reach their family.

Even *within* a business or consumer use case, the end user needs can differ. For example, let's consider how payer needs differ between two sub-use cases within C2B cross-border payments: e-commerce and education payments.

- In the e-commerce use case, the payer prioritizes **speed of authorization** to have confirmation of payment as soon as they make their purchase. The payer highly values **returns** so that they may potentially revoke payment should there be any issue with the goods purchased. The payer also values 24x7 **service availability** to make purchases at any time, **transparency** of FX, and **accessibility across users** (including unbanked users) to use their local payment method of choice. In specific cases, payers may also value **speed of settlement** to ensure timing and certainty of their returns on a product.
- In the vertical use case for education, the payer prioritizes product attributes such as **convenience** and **value-added services** like alerts and notifications, and choosing purpose for the payment. The payer also values payment attributes such as **accessibility** to pay using local payment methods, **transparency**, and **predictability of fees and timing**.

In both cases, end user needs extend beyond just speed, access, and transparency.

To get even more granular, we believe payee needs vary slightly from payer needs in most use cases. (C2C remittances are an exception where needs can be more interlinked). For example:

- B2B MSME use case: the B2B supplier, as another business, has similar priorities to the MSME payer, but may value **transparency and predictability of funds** along with **speed of funds availability** even more, given that they may lose control of goods after transaction and require immediate authorization of funds.
- C2B e-commerce use case: the e-commerce merchant values the ability to offer multiple payment methods, **predictability of fees and timing**, and desires a much higher degree of **security and error tolerance** of the service to avoid losing money and payers and ensure payer satisfaction.
- C2B vertical (education) payment sub-use case: the education institution would prioritize product attributes to **support end user convenience**, including accessibility across local payment methods and integration with their back-end systems to support easy reconciliation.

Additionally, there may be further nuances by corridor. For example, accessibility across users may be more important for payees in an underbanked corridor. Therefore, improving cross-border payments requires a granular consideration of end user needs across attributes, use cases, and even corridors.

## Let's look forward to a more granular dialogue on cross-border payments

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The use cases in this article (and there are many more!) highlight the heterogeneity of the cross-border payments space and the challenges inherent in a standard set of targets across disparate use cases. In light of what we have discussed, we propose that:

### **Improvements to cross-border payments should be determined according to granular use-case:**

The cross-border dialogue will need to go beyond the four common attributes of speed, cost, access, and transparency to address the improvement areas most valuable for end customers (e.g., decline rates and refunds for C2B e-commerce payments; data and information to support reconciliation for B2B payments). We believe the FSB and CPML taskforces would do well to keep these attributes and needs in mind as they embark on the next phase of their work.

### **Focus should be on the value of capabilities provided to meet end user needs:**

We must ensure that the dialogue around measuring progress on the aggregate retail cost target focuses on the capabilities required to deliver value to end users—beyond just the basic money movement. These capabilities further vary across solutions, corridors, and the business model of the provider. [There are three main models](#) in the market today: closed-loop systems, multilateral platforms (of which global networks are a notable example), and correspondent banking. Other models are nascent. These main solutions can be differentiated through their approach to end user experience, rules and processes, and infrastructure—the three layers of a cross-border solution. The role of the rules and processes layer—employed by global networks like Visa to provide a seamless experience and value to end users—should not be overlooked. Focusing on value is critical to avoid a one-size-fits-all approach that views cross-border payments through a lens of uniformity. An overly rigid application of targets that were published as aggregate and aspirational runs the risk of disincentivizing continued private sector investment and innovation to meet end user needs or of reducing the level of service for attributes that drive most of the value for end users.

**More than twenty payment and product attributes deliver value to end users**

<b>Payment attributes</b>	<b>Foundational</b>	• Security - Level of security required, including level of compliance across either developed or most geographies, and fraud detection
		• Integrity / failure rate - Consistency with which product/service meets promised functions and service levels without errors (e.g., payment error rate)
		• Resilience - Ability to avoid, withstand, and recover from failure, disruptions, and outages (e.g., up-time)
	<b>Differentiators</b>	• Speed of clearing - Timing of authorization for card payments (i.e., bank guaranteeing funds) and frequency of clearing for account-based payments (i.e., bank exchange of payment information)
		• Speed of settlement - Frequency by which transactions are settled between banks
		• Speed of funds availability - Time between transaction execution and when funds are debited from the payer and made available to the payee
		• System availability - Degree to which payment transaction can occur (e.g., 24/7 vs 9-5, weekends vs weekdays)
		• Transparency - Transparency on fees (including FX), expected delivery time, and tracking of payment status for both payer and payee
		• Predictability of fees and timing - Extent to which payments are completed as communicated on fees and timing of payment completed
		• Ubiquity - Accessibility across users - Ease of access to the solution across end users (e.g., fully identified, or all consumers, including unbanked) with the ability to use different payment methods (e.g., card, cash) - Reach - Ability to reach any geography (i.e., corridor, currency) with a payment - Transaction liquidity - Ability of system to handle sending/receiving of any ticket size - Scale - Ability of system to handle low value payments at scale
• Returns - Ability to cancel the payment and seek refund in case of any challenges		
• Information and data - Ability to exchange critical payment information along with the payment instruction either in structured or unstructured fashion		
<b>Product attributes</b>	• Trusted brand	
	• Rewards	
	• Convenience including ease of use	
	• Customer support and servicing (e.g., personal account management, documentation to support payment nuances, self service portal)	
	• Integration with related processes	
	• Access to value added services and features (e.g., access to wide range of products such as options, forwards, conditional payments based on exchange rates)	
• Protection of end user data		

Cost reflects the combination of payment and product attributes that deliver value across the payments journey

Source: VEEI analysis

# About the Authors

Chad Harper is Senior Fellow in the Visa Economic Empowerment Institute, where he focuses on global payments issues. He previously spent nearly 20 years at the Federal Reserve Banks of San Francisco, Chicago, and Richmond in cash, financial services, and payments outreach and analysis.

Nasreen Qubria is Senior Director, Head of Cross-border Policy Engagement at Visa. A recognized payments industry authority with over 17 years in the space, she's held senior positions at organizations such as the Federal Reserve Bank of Boston, the Independent Community Bankers Association (ICBA), and the Association for Financial Professionals (AFP).



## About VEEI

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Economic empowerment is about removing the structural barriers and systemic biases that have made it difficult for all individuals to take part in the global payments ecosystem. [The Visa Economic Empowerment Institute](#) (VEEI) provides a platform for the international exchange of policy ideas that can advance economic empowerment.

VEEI brings together experts in the fields of payments, economic policy, technology, security, international trade and economic development to advance VEEI's mission. These experts share a common purpose: the development of strategies that can eliminate the obstacles to economic success for people and businesses everywhere.

“ Focusing on value is critical to avoid a one-size-fits-all approach that views cross-border payments through a lens of uniformity.

# VISA



Since 2018, Central Bank Payments News has been dedicated to keeping the global central bank payments & market infrastructure community up to date with the most relevant payments issues impacting the central bank today.

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