THE IMPERATIVE FOR LAYING NEW PAYMENT RAILS

Failure to keep pace may derail the future

CELENT

FIS View

The future of payments technology came several years early

The COVID-19 pandemic dramatically accelerated the demand for digital payments infrastructure, forcing banks to prioritize modernization and innovation. Unfortunately, national payment operators have not kept pace – and their legacy infrastructure could have damaging effects on the entire financial services industry.

Innovative payment services such as Paytm in India and Transfiya in Colombia would not have seen the light of day if their respective financial ecosystems hadn't been open for new players. It's difficult to foresee what the market will demand five years from now, and what will be possible thanks to rapid advancements in technology. But one thing is clear: if central banks and nations want to encourage healthy competition and partnerships, and foster innovation in payments, they need to design a future-proof central financial infrastructure.

Since launching a new payment infrastructure is a years-long process, payment system operators need to start planning and designing now. The payment rails of the future must be scalable, flexible and secure against new and emerging threats, as well as factoring in global standards and interoperability.

We present this report from Celent to help central banks and other stakeholders understand the challenges and opportunities of modernizing their payment rails. The report also delves into the needs of banks and their customers, from 24/7 service availability to cloud technology to new and innovative settlement mechanisms.

In the (very near) future, legacy payment rails will start to limit innovation and growth across the entire financial services ecosystem. Modernization will not only reduce risk and meet the needs of today's consumers, but it will provide the foundation for the next generation of payments innovation.

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Gone are the days when banks would buy a payment system and keep it for decades, leaving it as untouched as possible. So, why does that seem to be exactly what many national payment infrastructures are doing?

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THE IMPERATIVE FOR LAYING NEW PAYMENT RAILS

Failure to Keep Pace May Derail the Future

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29 October 2021

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INTRODUCTION

To say that the payments landscape has changed over the past few decades is an understatement. More accurately, it is practically unrecognizable. On top of this, many things changed even in the last two years in the wake of the COVID-19 pandemic. Digitalization across the globe has sped up rapidly, while the increased adoption of real-time payments has driven higher consumer expectations for instant and on-demand service. The emergence of fintechs has increased competition and innovation, and there now exists a plethora of highly customizable, low-cost, and convenient digital payment options at the fingertips of consumers. And the arrival of things such as digital currencies show that there is yet more change and disruption just around the corner, let alone further into the future.

Banks have been forced to adapt to the new normal in payments or have risked becoming irrelevant. It may not always have been through choice. Regulation has also been a constant theme in the last decade, with mandatory changes requiring more than just patching of systems. Regardless of the driver, banks have poured enormous resources into updating their core infrastructure, reassessing their traditional business models, and forging new partnerships. They have adopted new technologies and new outsourcing models to cut costs and develop new products. And while they are much better placed for changes that will inevitably come, they are far from done; banks and the industry are expected to accelerate their modernization efforts over the medium term.

In some sense, the future for payments has never looked brighter. Banks are much better equipped than ever before. But something has been largely missing from the industry's transformation, and that is the modernization of national payment rails, the glue that joins the banks. Indeed, most legacy payment rails have not kept up with the pace of change in the industry, with many of today's major Real-Time Gross Settlement (RTGS) and Automatic Clearing House (ACH) systems running on architecture built over 20 years ago. They simply were not designed to accommodate the scale of volumes and increased speed that they were already facing, and the pandemic has accelerated that growth that would have usually taken years to achieve. They do not have the adequate safeguards in place to meet today's increasingly sophisticated security threats, and they are not built flexibly to easily respond to changing market needs. Many of these systems don't meet the needs of today, let alone tomorrow.

Furthermore, if central banks and other payment system operators wait too long to modernize their infrastructure, they will lack the resiliency required of a systemically important system, which will lead to a build-up of risks. They will start to limit innovation and growth in their market rather than foster it. It is imperative that they begin the modernization process now, before it is too late. Put simply, central banks need to innovate themselves if they want innovation from others.

A CHANGED PAYMENTS LANDSCAPE

The invention of the smartphone, the spike in e-commerce, and the explosion of digital wallet usage have all accelerated the pace of payments' digitalization. At the same time, the implementation of real-time payments globally has increasingly shifted customer expectations toward instant, 24/7/365 exchange of payments. Open banking has paved the way for new and innovative services and drawn in fierce competition from nontraditional players. Big tech companies such as Google, Apple, and Facebook have entered the space. Central bank digital currency (CBDC) has emerged as a mainstream topic among the world's major central banks, and yet there are many private digital money formats that are equally as disruptive. New security risks (e.g., cyber) have emerged at the same time that the regulatory landscape has become more challenging.

What is different about today's payment landscape?

- Acceleration in the pace of digitalization.
- Expectations for 24/7, on-demand, real-time service.
- Demand for highly customized user experience.
- Emergence of big tech.
- Greater availability of digital payment options.
- Emergence of new technologies (e.g., DLT/blockchain, AI/machine learning).
- Increased cybersecurity and fraud risks.
- Significant increase in choice of payment types and formats.
- Cross-border real-time payments.

The transformative changes in payments seen over the last couple decades has led many banks to reassess their underlying systems and technology, core business models, and traditional role in the banking value chain. As a result, most mid- to large-sized banks have undergone modernization and cost reduction efforts. Some banks have focused on simplifying and streamlining their core platforms and outsourcing at least some of their on-premise infrastructure to cloud providers. Others have adopted application programming interface (API) technology to facilitate connections with third parties, and they are investigating ways of utilizing machine learning and AI to improve fraud detection and prevention. Others still have contemplated new business models, such as white-label banking.

Cloud: The adoption of cloud technology to access cheaper data storage and maintenance, reduce internal siloes, and shorten the product development cycle. It also creates new delivery models, such as SaaS.

Open banking: Model under which banks enable licensed third parties to access customer account information and other services such as payments.

Banking-as-a-Service and white-label banking: Models in which banks provide third parties—whether banks or fintechs without a banking license—financial services directly to their customers or to consumers themselves.

The urgency for banks to modernize and transform has only increased given the recent events of the last year and a half. The COVID-19 pandemic highlighted the importance of enabling speedy and resilient systems and the need for consumers to have a plethora of low-cost and convenient digital payment options at their disposal. Indeed, recent research shows that banks only expect to need to accelerate their modernization efforts in order to keep pace with changing customer demands. *The State of the Nations for Payments Modernization*[1] is a recent Celent global survey of bank payment executives. When asked about each of the four main payment types (ACH, real-time payments, Swift and Wires), two-thirds of banks said that they were currently modernizing their payment system or had done so in the prior five years, with some regions even further ahead.

Nor do they believe they have reached their target state. Eighty percent of the respondents believe that the changes caused by COVID-19 were permanent and wouldn't revert. Furthermore, 83% believe that the pace of change of future changes will increase, despite a decade of change. As a result , 82% of banks believe the next five years will see a significant shift in deployment models, including migration to the cloud, managed services, and Payment as a Service.

The implications are clear. Gone are the days where banks buy a payment system and keep it for decades, leaving it as untouched as possible. Yet, that seems to be exactly what many national payment infrastructures are doing.

> 82% of banks believe the next five years will see a significant shift in deployment models, including migration to the cloud, managed services, and Payment as a Service

[1] *The State of the Nations for Payments Modernization*, Celent, August 30, 2021, https://www.celent.com/insights/980200299.

NATIONAL INFRASTRUCTURE IS LAGGING BEHIND

Although many banks have strived to modernize their systems in response to the rapidly changing payments landscape, national payment operators have lagged behind. Many of today's legacy payment rails run on increasingly outdated systems, particularly ACH and RTGS systems, many of which are as old as the systems that banks have now replaced. Some system operators have carried out small-scale modernization initiatives, such as the planned migration to ISO 20022 in several major USD and EUR-denominated large-scale settlement systems (e.g., FedWire, CHIPS, T2S, EURO1, etc.). Similarly, the SWIFT network has also announced that it will migrate to ISO 20022 by November 2022.[2]

But national payment systems are intended to act as the bedrock of the financial system and are often deemed "systemically important" financial market infrastructures by regulators. They need to be able to adequately support the changing needs of consumers and the market. The failure to keep up with the changed payments landscape has created several issues for central banks and national operators to contend with, namely:

1) **Reduced capacity:** The rise of P2P apps and digital wallets, technologies to ease digital payment initiation at point of sale (e.g., QR codes), and the rise in e-commerce have shown banks and payment service providers how quickly transaction volumes can scale up. With no signs of slowing, legacy payment rails need to be able to accommodate the accelerated pace of activity, and quickly. Failure to do so will result in not only reduced capacity but also a higher concentration of risks.

2) **Limited flexibility to add functionality:** Technical limitations of legacy payment rails limit the ability to easily implement new functionalities. For example, the migration of payment messaging to ISO 20022 has been a costly, multiyear process for many centralized payment infrastructures. Indeed, many of today's national payment rails have a limited ability to quickly test and deploy new features given system constraints.

3) **Hampered readiness:** The potential systemic impact of system failures has been further amplified in the context of today's payments landscape, particularly in markets that have seen rapid rates of digitalization. Central banks and private operators cannot afford to wait until there is a massive system failure to modernize. Such an event would not only impede the exchange of funds within a market but also undermine public confidence.

4) **Lack of adequate safeguards against new and emerging threats:** With increased digitalization has come increased fraud and more sophisticated types of financial crime and cyber threats, which are costing banks more

[2] https://www.swift.com/standards/is22o-20022/iso-20022-programme/timeline

and more every year. With access to a centralized data set, national payment operators stand in a unique position to help identify and stop potential threats. However, many legacy systems lack the necessary functionality to embed additional fraud protection and monitoring services as a value-added service.

5) **Readiness for global standards:** ISO 20022 is now clearly the future of payment messaging. Most banks' payment modernizations now process messages as ISO 20022, even if the message type is the domestic legacy format. That means increasingly the central infrastructure is lagging. The standard promises many things but especially the ability to carry extra data with the message, both structured and unstructured. This makes it impossible for the central infrastructure to implement a simple patch. For example, the UK ACH message standard is called Standard 18 because no field can manage more than 18 characters, and so every part of the process is designed around that limitation.

6) **Interoperability between rails:** Schemes involving ISO 20022 are increasingly the "lingua franca" of payments, and as a result, a growing number of infrastructures are looking at connecting to create cross-border payment solutions. For example, Malaysia and Singapore have linked their real-time payment systems. Yet, how many other systems—particularly older ones—actually manage to do this?

This isn't to say central banks have chosen to ignore these. Indeed, recent incidents have highlighted these very starkly and very publicly. Instead, it is the very challenge that banks faced—given the cost, complexity, and risk for modernizing, just when is the right time? It is why most modernizing programs have been driven by regulation. There is no better way to secure budget and resources than to say, "If we don't do this, we won't be allowed to be a bank!" But central banks and payment systems broadly don't have this imperative.

Instead, they should be posing some broad but important questions. These are far from the only or, indeed, right questions.

- Does the system serve the needs of its customers and their customers today and tomorrow?
- Would change reduce risk and ensure greater benefit to the economy?
- What is the cost to add new innovations like CBDCs?

The answer to most of these questions for banks is "yes" or "better than it was." For central banks, it is likely to be a "no" and "getting worse." That should concern central banks and banks too.

DESIGNING PAYMENT RAILS FIT FOR THE FUTURE

While the national payment rails of the last few decades have stood the test of time as stable platforms, this is no longer enough. Central banks and other payment system operators must ensure that their infrastructure is an engine for innovation and growth and is future-proof, resilient, and safe. They should also have flexible architecture to allow new features and functions to be designed, tested, and added without impacting the existing systems. They should facilitate greater interoperability with not only existing rails but the rails of the future. More importantly, they should be resilient to emerging risks (cyber, fraud, etc.) and implement cutting-edge tools and technologies for managing them.

The payment system operator and system participants are obviously the key stakeholders in any payment system modernization effort. However, given the importance of payment rails to the economy, a modernization initiative should consider a wider group of stakeholders when considering design, reflecting not only the needs of banks but their customers as well. Stakeholders should consider the following key features in modernizing existing payment rails.

Flexible architecture

Having a flexible, modular architecture has the advantage of allowing new features and functions to be designed, tested, and added without impacting existing systems. Given the rapid pace of change in digital payments and financial services, the ability to add new functionality and features to the system quickly and cost-effectively is not just a benefit but a necessity.

Building for future technology

Canada: In September 2021, Canada replaced its Large Value Transfer System, which had been in place for the previous 20 years, with a new RTGS system, called Lynx. The system was specifically designed with the flexibility to support future technologies, including interfaces and APIs, and enhanced cybersecurity and resiliency capabilities.[3]

24/7 service availability

The move toward 24/7/365 instant payments has shifted customer expectations toward on-demand service in all areas of financial services. While many RTGS systems in recent years have extended operating hours, this may not be enough going forward, as more and more financial services move toward an "always-on" model. Looking further ahead, as cross-border payments shift increasingly toward real time, the need to synchronize operating hours with other major infrastructures globally will be greater. Therefore, the payment rails of the future should have at least the technical capability of operating 24/7/365.

[3] "Payments Canada Launches Lynx, Canada's New High-Value Payment System," Bloomberg, September 1, 2021, https://www.bloomberg.com/press-releases/2021-09-01/payments-canada-launches-lynx-canada-s-new-high-value-payment-system.

Using modern technology

The use of cloud technology is already widespread within banks and their customers, and, as described at the start, banks believe that their core payment systems will be on the cloud within the next five years. Cloud technology delivers not just the two requirements above but potentially so much more as well. One example is the ability to scale capacity up and down when required. Payments infrastructure has been traditionally built in anticipation of peak volumes plus "headroom". The downside of this approach is that up to 80% of that capacity sits idle for 80% of the time. That access to technology and capacity equally opens opportunities to things like AI and machine learning, which could be applied in many ways, from better risk and fraud management to improving STP. Yet few central banks seem currently be considering the use of cloud, despite many of the alternative payment rails being only cloud-based.

Expanded access

In today's payment landscape, national payment rails are critically important to promoting third party innovation. Many infrastructure operators have already opened up direct access to nonbanks, and clearly the payment rails of the future should be designed to support a greater number of system participants. But leveling the playing field does not only mean changing participation requirements. It also involves removing unnecessary operational barriers for nonbanks. Expanding system access therefore also means streamlining and simplifying how the system is accessed.

Maximizing the value of the modernization

United Kingdom: The Bank of England first published a blueprint for updating its RTGS system, with the goal of increasing resilience, widening access, promoting innovation, increasing interoperability, and improving user functions to develop a modernized RTGS system that is adapted to the rapidly changing payments landscape.[4] In 2021, it formally launched its RTGS Renewal Programme**.** The program is being carried out concurrently with the New Payments Architecture, an industry effort to consolidate the country's retail payments infrastructure into a single-core clearing and settlement platform.[5]

[4] "A Blueprint for a New RTGS Service for the United Kingdom," Bank of England, May 9, 2017, https://www.bankofengland.co.uk/paper/2017/a-blueprint-for-a-new-rtgs-service-for-the-uk.
[5] "New Payments Architecture Programme," Pay.UK, accessed October 25, 2021, https://www.wearepay.uk/programmes/new-payments-architecture-programme/.

Improved resiliency

Resiliency is one of the key aspects of any successful payment infrastructure. In improving legacy systems, all available resiliency capabilities should be employed. This could include limiting dependency on single providers or increased support for rotating data center operations. Establishing interoperability with other infrastructures in the event of an outage should also be considered.

Improving resilience

Philippines: In 2021, the Philippines went live with PhilPaSSplus, its new RTGS system. The system is based on the ISO 20022 messaging standard, has double the capacity of the previous system, and has enhanced resiliency, business continuity, and liquidity management.[6]

New and innovative settlement mechanisms

While most legacy large-value payment systems settle funds using RTGS, national payment operators should consider alternative settlement mechanisms in order to reduce liquidity costs for system participants (and thereby reducing barriers to accessing the system). There are several examples of large-value systems operated by private operators that utilize real-time net settlement, such as CHIPS in the US, Lynx in Canada, and EURO1 in the euro area. These systems use cutting-edge algorithms that match and offset bilateral and multilateral payments in real time, enabling huge liquidity efficiencies and savings for participants.[7] Considerations should also be given to potential future settlement functionality, such as synchronized settlement across multiple payment platforms and jurisdictions.

Revisiting settlement

New and innovative types of settlement functionality have emerged as a result of the exploration of DLT/blockchain technologies, which brought closer the reality of instantaneous, cross-border settlement of digital assets. One example of this is "synchronized settlement," which imagines cash movements in RTGS occurring simultaneously with the movement of cash or assets in other systems. The settlement of one payment is conditional on the simultaneous settlement of the other asset. This type of functionality has the potential to remove settlement risk and substantially reduce settlement costs.

[6] Lee C. Chipongian, "BSP's Real Time Settlement Platform to Ensure Safer Flow of Funds," *Manila Bulletin*, May 12, 2021, https://mb.com.ph/2021/05/12/bsps-real-time-settlement-platform-to-ensure-safer-flow-of-funds/.

[7] "CHIPS," The Clearing House, accessed October 25, 2021, https://www.theclearinghouse.org/payment-systems/chips.

Protection against new and existing security threats

While large consumer data breaches have become almost commonplace, the impact from a successful and sustained cyberattack on a national payment rail or one of its participants would likely be significant. Not only would such an event impair financial institutions' ability to exchange funds, but it would also have the potential to significantly undermine public confidence. The payment rails of the future should have built-in protection and controls against both internal and external cyber threats. Moreover, fraud has increasingly become a difficult issue for financial institutions to contend with as instant payments have grown in popularity and fraudsters have become increasingly sophisticated. National payment rails of the future should offer system participants enhanced fraud detection and protection capabilities.

Improving cybersecurity

South Africa: In June 2021, the South African Reserve Bank launched a payments system modernization initiative, which seeks to enhance payment services provisions for both the domestic and regional financial systems and includes the modernization of its RTGS system. The initiative aims to enable wider access by payment services providers, improvements to the adaptability and efficiency of the system, and enhanced security of the system to address cyber threats.[8]

Interoperability with existing and future payment rails

Adoption of the ISO 20022 messaging standard is undoubtedly a crucial step to achieving greater interoperability with today's domestic and cross-border payment systems. Its adoption has been helpful in technical cross-border linkages between domestic payment infrastructures. But what about allowing for interoperability with new payment instruments? Private digital currencies have been exploding, and CBDC is on the horizon in several major markets. The national payment rails of the future should be designed to be interoperable with these new forms of payments as well as the underlying technology that supports or accommodates them. For example, the BoE's renewed RTGS system will have the capacity to support a diverse range of settlement models, including systems operating on Distributed Ledger Technology (DLT).[9]

Development of value-added services

The growth of value-added services (e.g., request to pay, confirmation of payee, etc.) has been a key driver of real-time payment adoption globally. However, the system architecture of many legacy payment rails does not allow for the development of these services. Such services could be offered to system participants via an API gateway, for example. There is also the possibility of developing centralized value-added services via the infrastructure itself, similar to the centralized overlay layer Osko, which sits on top of the New Payments Platform in Australia.[10] New RTGS infrastructure, for example, could also be built

[8] "RTGS Renewal Programme," The South African Reserve Bank, accessed October 25, 2021, https://www.resbank.co.za/en/home/what-we-do/payments-and-settlements/Real-time_Gross_Settlement_System_Renewal_Programme.

[9] "Functionality of the New RTGS Service," Bank of England, accessed October 25, 2021, https://www.bankofengland.co.uk/payment-and-settlement/rtgs-renewal-programme/functionality-of-the-new-rtgs-service.

[10] Osko, https://osko.com.au/home.

to support an application layer in which third parties can leverage underlying clearing and settlement infrastructure to develop new services.

Planning for Future Change

Not every system will want or need every one of the items outlined above, at least in the first iteration. More they should act as guides as to what is possible and, more importantly, what can be implemented in other systems around the world. While individual country-level systems do not compete with themselves or with other countries, it is more than simply pride that leads them to consider how they might implement these in the future. There are two further clear reasons for implementing, in addition to those already highlighted (and many others exist too).

First, the Bank of International Settlements regularly review what is best practice. In particular, their Committee on Payments and Market Infrastructures (CPMI) recently published a work program for 2021–22, which has two core themes:

- Shaping the future of payments will include enhancing cross-border payments and addressing policy issues arising from digital innovations in payments (such as central bank digital currencies and stablecoins) while monitoring changing trends in payments.
- Evaluating and addressing risks in financial market infrastructures will work on issues related to central clearing and others that emerged or were accentuated over the course of the COVID-19 pandemic.

These may well result in things that central banks will simply *have* to address.

The second reason for implementing, relates to both of the above bullets. It feels like every central bank and payments operator is currently working on CBDCs and real-time cross-border payments. In the case of cross-border payments, there have been a swathe of announcements outlining how a number of them are working together. While not excluded from also working with others, the reality is that a number of systems just simply aren't capable of also taking part, highlighting a clear advantage those others now have.

THE PATH FORWARD

Central banks and national payment operators cannot afford to wait to modernize legacy payment rails until it's too late. They can't wait until there is a massive system outage or cybersecurity event. They can't wait until the entire financial services ecosystem has already moved to a 24/7/365 operating model. And they can't wait until the system itself is a financial stability risk.

Launching a new payment infrastructure takes time, which is another reason why central banks and payment system operators can't afford to wait. Besides designing and building the new system, launching such a system requires stakeholder engagement and input, changes to governance frameworks and scheme rules, and onboarding system participants. This underscores the importance of starting the process sooner rather than later; starting today will mean that the system will likely not go live until at least three years from now.

While there are many issues for central banks and private operators to consider in thinking about how to approach modernizing legacy payment rails, certain core principles are clear. The payment rails of the future should be flexible, scalable, resilient to new threats, and interoperable with existing and future payment rails. As central banks and private operators launch modernization programs, they should consider the following questions:

- What are the key challenges that system participants face regarding the legacy payment system?
- What new design features should be implemented? What technology choices would best support them?
- Who are the right stakeholders to engage (e.g., industry, public sector), and how will they be consulted throughout the process?
- How can interoperability with other domestic/international payment rails be best achieved?
- How will the system incorporate new technologies? How can it be future-proofed to support forward-looking technologies?
- What governance frameworks or scheme rules will need to be updated alongside technical changes to the system?
- How can the development of value-added services be best achieved?

There are no easy answers to these questions. All in all, central banks and private operators will need to consider a holistic design that is best tailored to the local market while still applying international best practices and standards.

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