

CELENT

A REAL-TIME HUB FOR A REAL-TIME EVERYTHING FUTURE

Gareth Lodge
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EXECUTIVE SUMMARY

The payments industry has gone through many changes in the last decade, from regulatory to technology and, not least, customer expectations. This is not going to abate in the next 10 years. Indeed, Celent would argue that it is likely to accelerate, and in part because some of these trends act as enablers for some of the other trends. For example, APIs will allow more innovative uses for real-time payments, which will drive their use. While both have value on their own, together they are even more powerful.

Real-time payments are one of the catalysts for this report. Just a short few years ago, based on the questions we were receiving from our clients, Celent wrote a series of reports that first described what a real-time payment was, and set out why they were not a localised, passing fad.

It is the speed and complexity of the changes since those reports that created the reason for this report. In particular, this report sets out to address three key research questions.

KEY RESEARCH QUESTIONS

- 1** *Is the real-time payments market continuing to develop?*
- 2** *Will APIs have an impact on real-time payments?*
- 3** *What are the implications for a payment services hub?*

The answer to the first question is very clear. November 2017 saw the first transactions for SEPA Inst in Europe, a pan-European real-time payment scheme, and the first transactions on The Clearing House RTP solution in the US. 2018 will be no quieter, with Australia's NPP going live in January 2018, and a range of other countries already working on plans. Yet that isn't the whole story. There are:

- Some countries planning on the basis that all payments will be real-time.
- Other countries, with existing systems, planning for massive growth in volumes in the next decade.
- Alternative technologies such as blockchain being utilised to deliver cross-border real-time solutions.

Furthermore, Celent has chosen to use the term real-time for this report to reflect that more and more of the bank is becoming real-time as well. The growth of APIs, particularly through Open Banking, is driving real-time payment volume growth, but also is subject to the same expectations as real-time payments, namely the "always on" instant responses.

This real-time requirement is leading an increasing number of banks to consider adopting a payment services hub. Most existing payment engines have a number of challenges in delivering real-time payments. First, they are generally batch-driven, rather than single message and instant, and so simply not suitable. The second, and less obvious reason, is that they require downtime for maintenance and upgrades, something that isn't allowed in a real-time payment solution. Many real-time payment schemes only have downtime over the year measured in seconds. Old technology simply wasn't designed to support that.

Payment services hubs aren't new, and do much of what is required as part of their core functionality. However, while Celent has previously highlighted four broad categories of hub that can be implemented, no two hub implementations are the same, not least because no two banks have exactly the same issues or starting points. Furthermore, it is important to distinguish between payment services hubs as technology and as bank projects. For example, there are a range of functions not typically supplied by a payment hub vendor but which might fall within a hub project, such as anti-money laundering (AML) and fraud checking. Indeed, the design of the hub, and what is (and isn't) included in the hub is where Celent spends much of its time with clients.

Celent believes the growth in real-time payments will require both more attention to the design of the hub than ever before and an increase in what has traditionally been included. There are some purely pragmatic reasons to consider this. Real-time payments require all the activity in the value chain to be carried out, typically in under a second, if not quicker. If all the processes are within the hub, they are easier to manage and coordinate. But as volumes increase, this becomes more and more essential. Furthermore, functions that sit within the hub will be subject to the same design requirements in terms of availability and maintenance.

There are some other reasons as well. The growth in APIs in many countries is being driven by Open Banking, with often payments at the heart of the requirements. The APIs are often then payment-related, and so are frequently connected to the payment systems. Indeed, they are often treated as a channel, and are just one of the channels managed by the channel integration hub. However, the APIs being delivered to clients will become increasingly more complex and rich, and will extend beyond payments. Here Celent believes that the payment services hub could act as an API integrator to other parts of the bank, effectively orchestrating all the calls required to deliver against the original API call.

The payment services hub, then, has the opportunity to be much broader and richer than a traditional hub implementation. In particular, it could support the aspirations of many banks to become digital banks. Digital banks will need to operate in the same way as real-time payments do, because increasingly the expectation is of always on, instant service. The hub could become the platform that a digital bank is built upon.

This report was commissioned by IBM, at whose request Celent developed this research. The analysis and conclusions are Celent's alone, and IBM had no editorial control over report contents.

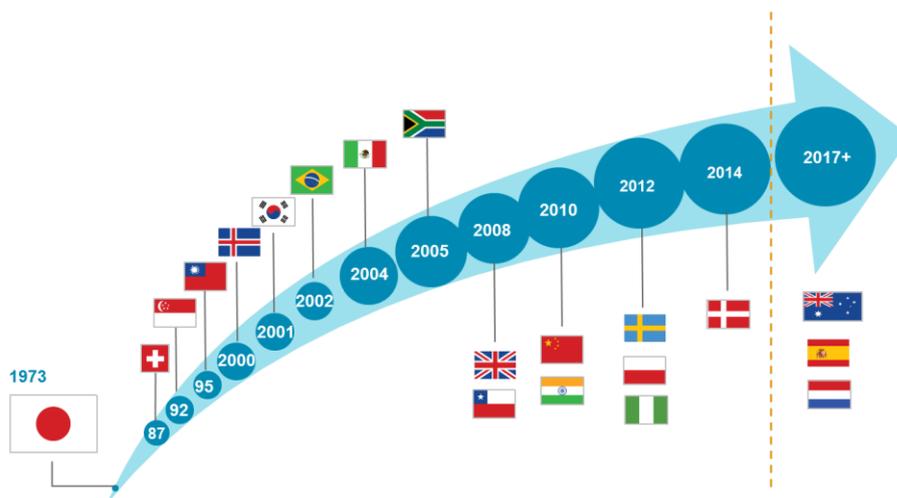
REAL-TIME PAYMENT ADOPTION CONTINUES TO ACCELERATE

November 2017 saw a number of important events in the payments arena, not least the first transactions for SEPA Inst in Europe and on The Clearing House RTP solution in the US. These mark just the latest real-time payment systems to launch, as highlighted in Figure 1. The actual numbers of live systems are difficult to determine, in part because of defining what should or shouldn't be counted. For example, because SEPA Inst isn't mandatory, should we include only those countries where the majority of banks are participating?

Figure 1 shows an acceleration in the numbers of countries implementing systems, with many more in process or being discussed. Perhaps more pertinently, the chart shows that many of the largest payment markets in the world are committed to real-time payments.

Real-time payments has moved past being an if to being a when.

Figure 1: The Adoption of Real-Time Payments Continues Apace Globally



Source: Celent

That isn't the whole story though. The newer countries have learned from those that have gone before them. This has meant two things of note. First, they have adopted the best practices, and in particular, the use of ISO20022. Indeed, it's hard to find systems implemented in the last decade that aren't based on this standard. Furthermore, they are joining groups that are working to harmonise how ISO20022 is used. That is, they are creating "standard standards" to ensure interoperability. Second, they are pushing the developments further, with things like overlays (value-added services built on top of the scheme, such as directories tying bank accounts to mobile phone numbers) being explicit design components rather than afterthoughts.

This then creates a need for the earlier countries to continue to develop their existing systems to keep pace with these developments. For example, Faster Payments in the UK was built on ISO8583, but there are plans to move to ISO20022.

There is also one further interesting development to note.

The adoption of real-time payments is such that a number of communities are looking to the future and making planning assumptions in which real-time payments is the dominant payment type going forward. When Rabobank went to tender for its real-time payment solution, a key criterion was the ability to handle all of its Dutch

payments traffic, not just what it was forecasting for SEPA Inst. Indeed, as Dutch SCTs already cleared in 30 minutes, it is understandable that they would migrate to all credit transfers being real-time. There are also widespread rumours about the aspiration to move as much as of the Dutch SDD to real-time as well. The SEPA Inst allows for Request for Pay, which would be, for many, a cheaper solution than the current Direct Debit solution and would be similar to how Finland operates.

Even countries with existing real-time infrastructure are looking to the future. In December 2017, the UK put out a Request for Interest to replace its existing payment platforms. This platform is radically different in architecture, and it is planned that all payment types will be processed across it, including real-time. There is one design requirement that is very notable. While in 2017 Faster Payments processed 1.3 billion payments, the new platform must be able to process 100 billion transactions by 2030. This growth is not just fueled by changing payment habits and migrating payment types, but by the assumption that developments such as the Internet of Things will spur many small real-time transactions.

The verdict is clear: the future is real-time payments.

WHAT DO WE MEAN BY REAL-TIME PAYMENTS?

Real-time payments. (Or is it Real Time?) Faster Payments. Instant Payments. Immediate Payments. SEPA Inst. P2P.

Names for this speedier payment type seem to vary quite widely, which probably has helped to maintain some of the confusion. This is one reason why, in our 2014 report *Real-Time Payments: Dispelling the Myths*, we set out what we defined as a real-time payment. Figure 2 shows that definition. The definition distinguishes between many other types of payments. For example, we exclude Wire/RTGS because the values are typically much higher than a real-time payment — tens of millions versus hundreds or thousands — which then require a very different approach.

Figure 2: Simplified Celent Definition of What Qualifies as a Real-Time Payment

What do we actually mean by real-time?

A retail payment...	Real-time is not defined by the sender or recipient, but the value. However, most transactions typically have a consumer for at least one leg of the transaction.
...from one account to another account...	The accounts are typically are bank accounts, but don't need to be. However, most descriptions (including this one) exclude card-to-card transactions
...posted and confirmed to the sending bank...	A key distinguishing feature is when the customer is given value, <u>not</u> when the interbank settlement takes place
...in a “real-time” experience.	The most contentious piece of all. How fast is fast enough, and which bit is being measured? Most systems are below 30 seconds, with SLA's in place.

What we don't mean:

Wire/RTGS payments; manual transactions; alternative payment networks.

Source: Celent

Celent believes that these parameters provide a better guide than simply calling something real-time. For example, in some markets such as the Netherlands, the traditional credit transfer will be real-time.

We make the distinction for another reason. Many banks will turn to a payment services hub to process new and emerging payment types, including real-time, because older platforms won't meet the criteria above. When buying a hub, having a vision of the likely landscape in 5, 10, and 15 years is important because the systems being replaced are generally at least that old, if not older. Ensuring that the solution chosen will support not just all the payment types you expect, but also at the anticipated volume, is critical. As the Dutch example in the previous paragraph suggests, the Netherlands is going from no real-time payment capability to, potentially, the majority of all payments being real-time in less than five years. Almost all hubs can handle real-time payments, but it remains to be seen how many can handle them at that volume.

**Key
Research
Question**

1

How is the real-time payments market continuing to develop?

Not only are the numbers of real-time payment schemes accelerating; the types of real-time payment networks are expanding too.

There are further things to consider. When initially drafting these parameters, we were only considering domestic real-time solutions. The phrase “alternative payment networks” was shorthand for those systems such as PayPal that were effectively ledgers. That is, internal payments between PayPal accounts might be real-time, but it was a closed loop because the recipient was only able to use that money within that loop.

We are seeing a range of factors that mean that the definition may well change over time. Not least is the emergence of cross-border real-time systems. These are falling into three broad categories. First, there are growing plans to create interoperability between domestic real-time payment systems. Malaysia and Singapore are in active discussions, for example, as to how that would work in practical terms. Second, a number of multinational banks are looking at creating internal networks that allow real-time payments between different countries with a bank’s network. Third, and perhaps most important here, is the growing number of private real-time networks.

Ripple has emerged from being widely talked about to signing an increasing number of banks. Blockchain and distributed ledger technology (DLT) have matured rapidly to the point of seeing multiple proofs of concept running right across the transaction banking value chain. Indeed, PayCommerce now operates a cross-border real-time payments network utilizing private blockchain, and Visa has utilised technology from Chain.

Figure 3: Non-Bank Real-Time Blockchain-Based Cross-Border Payment Networks Now Exist

 Visa B2B Connect <ul style="list-style-type: none"> • Building Visa B2B Connect using Chain's Core blockchain infrastructure • Private blockchain • Near real-time transactions • Targeting high-value payments 	 <ul style="list-style-type: none"> • Cross-border payment platform • Private blockchain using proprietary digital currency (XRP) as a bridge currency • Real-time transactions • Registered money service business • Targeting low-value payments
 Payment Network <ul style="list-style-type: none"> • Cross-border payment network • Connects to domestic ACHs • Real-time transactions via Ripple • Registered money service business • Targeting low-value payments 	 <ul style="list-style-type: none"> • Cross-border payment network • Connects to correspondent banks • Clients include banks and corporates • Supports payments and acceptance • Real-time transactions via Federated Ledger • Targeting low-value payments

Source: Celent

A growing number of banks will start to offer at least one of these solutions to their clients. This leads to an important point: the US looks likely to have at least two real-time solutions (The Clearing Houses' RTP and Zelle) that banks will adopt, but they're completely different. Indeed, there are other US systems already available (e.g., Dwolla) and a further 30+ that went through the Federal Reserve Payments TaskForce process.

This poses technology challenges for the bank in supporting them. These US systems are generally serving different segments, and therefore the purchasing point and integration within the bank may be different (that is, RTP for corporate clients, and Zelle for retail customers).

Elsewhere, such as in Europe, the situation is arguably more complex. Not only will many countries need to support at least two solutions (a domestic solution and a pan-European one), there will be multiple providers for the pan-European solution. Here the question then also becomes around interoperability between schemes and how to reach the intended destination. The latter is a big issue; how will a bank know who uses which scheme (if at all), and how will they decide what is the "best" route? Will they be more strategic in their choices and select partners based on specific attributes (e.g., best Asian reach, fastest payment and settlement for core markets, etc.)?

Now, to both solutions the bank supports, add cross-border payments. Banks will want to offer their clients the richest choice of payments going forward. However, to do so, they will have to understand the liquidity implications and the funding requirements associated with them. That creates a degree of complexity not all banks can necessarily manage today. Until recently, that perhaps meant banks choosing not to offer such services. However, there are a growing number of viable alternative solutions, which may result in a growth in banks offering such services if only because their peers do.

Until recently, most banks have only (and to be fair, only needed to) taken a narrow, short-term view of real-time payments. However, what this and the previous chapters should demonstrate is that the real-time payments picture is evolving rapidly, and that all solutions for payments, not just real-time, need to be considered with this change in mind. Yet there are further still influences on design to consider.

REAL-TIME EVERYTHING

The term real-time payments perhaps hides an obvious truth: in order to make the payment real-time, everything and anything that touches the payment, including fraud checking, balance checks, and the front end initiation system have also to be real-time. Furthermore, while not explicitly part of the simplified definition outlined in [Figure 2](#), it does mean that the systems have to work with single messages and increasingly be available 24 hours a day, seven days a week. In many real-time payment systems, the allowed downtime over a full year is only measured in a handful of minutes.

As consumers, we expect 24/7 availability of anything and everything, so increasingly clients we will expect “real-time everything.” Corporate customers will expect real-time liquidity monitoring and reporting; real-time alerts and repairs and real-time offers on products such as FX. As consumers, particularly with the advent of Open Banking, we will expect that everything we do is instant, and 24/7. After all, expectations are being set in all other aspects of their lives, with customers not only getting instant decisions on loans, but instant deposits of the capital too.

Open Banking in many countries is tightly tied to payments. Indeed, in Europe, under Payments Services Directive 2 (PSD2), it is almost entirely payments related. In particular it gives the ability to third parties, with the correct permissions, to initiate a payment directly from a customer’s account. While not explicit in the text of the regulation, most of these interactions are via APIs. These APIs are required to provide instant responses.

In the early days of payment services hubs, there was much discussion as to whether to build a single hub, or to use a payments framework, a form of payments-specific middleware, to connect the various parts of the existing payments value chain. In time, banks have generally chosen hubs that have channel integration layers, sometimes part of their hub solution, but often not as a way of insulating and decoupling the back office payments functions from the front end ones.

An increasing number of banks (there are no statistics available) are seeing their API gateways as a channel that feeds into their payments hub. They aren’t a new payment type in the same way as the cross-border blockchain systems described in the previous chapter are, but they are new types of messages associated with the payments. In effect, the channel integration later found in many hubs is being adapted into a “Fast Integration Layer.”

Key Research Question

2

Will APIs have an impact on real-time payments?

APIs allow real-time payments to be used in many interesting and valuable ways.

This is a trend we expect to see continue, and is discussed in more detail in the next chapter. However, more broadly, it shows that real-time payments and their processing are becoming the foundation for a digital bank. Payments are the one thing that unites all parts of the bank, and all their products. Today, they connect all the outward-facing parts of the bank to the heart of the bank. Increasingly, the

components of the payment processing platform are starting to connect to far more things than they have done before. They are becoming the connected heart of the digital bank.

REAL-TIME PAYMENTS: A PLATFORM FOR THE FUTURE

Real-time payments then are the vanguard of the digital bank. New banks, built from the ground up, do not need to give this a second thought, but for any other bank, the task of converting from the existing infrastructure is a huge task. For these banks, thinking “real-time” rather than digital arguably is more useful — which bits need to be real-time?

While many banks might get the need to invest in real-time payments, few will see the need to think more broadly. Celent believes that a bank with foresight will plan to at least provide the hooks for a broader “ecosystem.” This highlights that the ecosystem for payments is expanding.

THE NEED FOR A PAYMENT SERVICES HUB

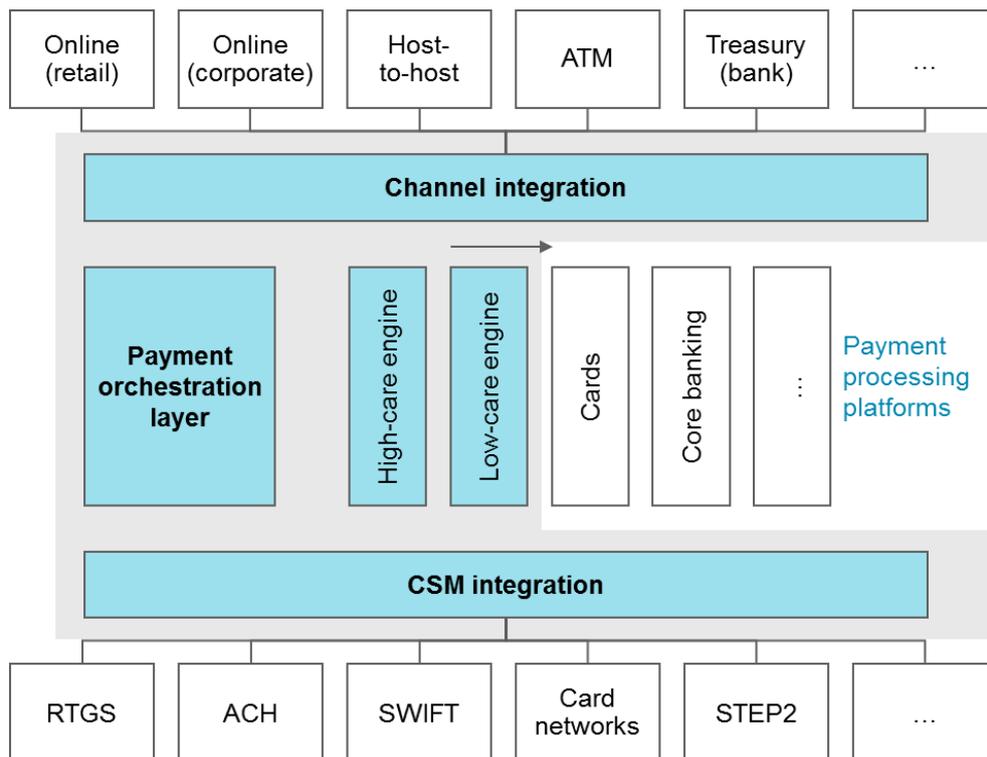
Celent has long been a proponent of the use of payment services hubs, having done much work in the space. Our view is a default assumption that, when upgrading or changing payment processing capabilities, a hub is likely to be the answer. After all, why replace old technology with old technology?

That said, Celent has also been clear that a “big bang” approach where everything is replaced by a single hub in one go is unlikely to be the optimal solution for the majority of banks, and for many reasons. Not least is the sheer cost and complexity of a project, making the business case complex to create.

Yet despite the challenges, many banks have or are starting their journey towards a payment hub. Our report *Defining a Payment Services Hub: Why Can't We Just All Agree?* (November 2010) has been widely used as the starting point for many discussions in the industry. The report does two specific things. First, it highlights that a hub isn't a laundry list of functions, but more a set of architectural principles. Second, given that while every bank does the same thing, no two banks do it the same way, each and every hub is likely to be unique.

The report identifies four broad groups of hubs that are most commonly found. Of those four models, Celent believed that the Vertical Integration Hub (Figure 4) was the target state for most hub developments. By replacing the myriad of connection points that payment processes had to the rest of the value chain, it allowed the simplification of the payments back office.

Figure 4: Vertical Integration Hubs Are the Target State for Most Hubs



Source: Celent

Of course, these are simplifications of what hub looks like. Indeed, when advising clients, we spend a significant amount of time helping define what they mean by a hub, what the hub should — and shouldn't — include, to then build a detailed set of requirements. After all, to paraphrase Lewis Carroll, if you don't know where you are going, any road will get you there. It's also important to distinguish the difference between what a vendor calls payment services hub technology and the bank defines as a payments hub *project*. The former is probably part of the latter, but it is unlikely to be the entire project. Often elements related to payments have been kept in places other than the payments engine, such as direct mandates or pricing engines. Yet the construction of a new payments hub makes sense for it to be more closely managed within the hub.

We believe that the developments laid out in this paper change which elements are part of the hub domain significantly.

WHERE SHOULD A HUB START AND FINISH?

Celent believes that the traditional boundaries of a hub (that is, what is or isn't part of the hub domain) are going to change. Real-time payments are already proving a catalyst for this. Customer information files and fraud are two specific examples of functions that had traditionally sat outside the hub but are now better suited to be placed within the hub.

Many banks still run core banking systems that are over a decade old. The chances are that unless it has been replaced within the last five years, it is still a batch system. This poses immediate challenges — how to update the customer balance until the next batch, overnight run. A number of banks are trying to use card technology to replicate how they handle ATM and debit transactions. However, this adds a degree of complexity, and these systems do not have the full functionality required because they merely carry a running balance, rather than checking that the payor has not exceeded the limits imposed by the scheme. As a result, an increasing number of banks are creating shadow ledgers within the payment hub to track these transactions, as well as using that as a source for their liquidity engines. This has the benefit that, should the transaction be rejected (and this could happen up to two

hours after the payment left the sending bank in some schemes), reconciliation in the balances is significantly simpler.

Real-time payments are potentially more of a risk due to fraud for a few reasons. It isn't that they are more risky generally, but that, certainly in the early days, the lack of understanding and experience makes them an easier target. This is exacerbated by the speed of the payment; by the time you realise you have an issue with some part of the value chain, it may well be too late. For example, the fraud experienced in the early days of UK's real-time payments was due to the weakness in the security of online banking — real-time payments merely was use to exploit this.

THE NEW ARCHITECTURE FOR A HUB?

Key Research Question

3

What are the implications for a payment services hub?

Payments services hubs need to evolve to be much richer and broader in their design, becoming the key part of a bank's move to becoming a digital bank.

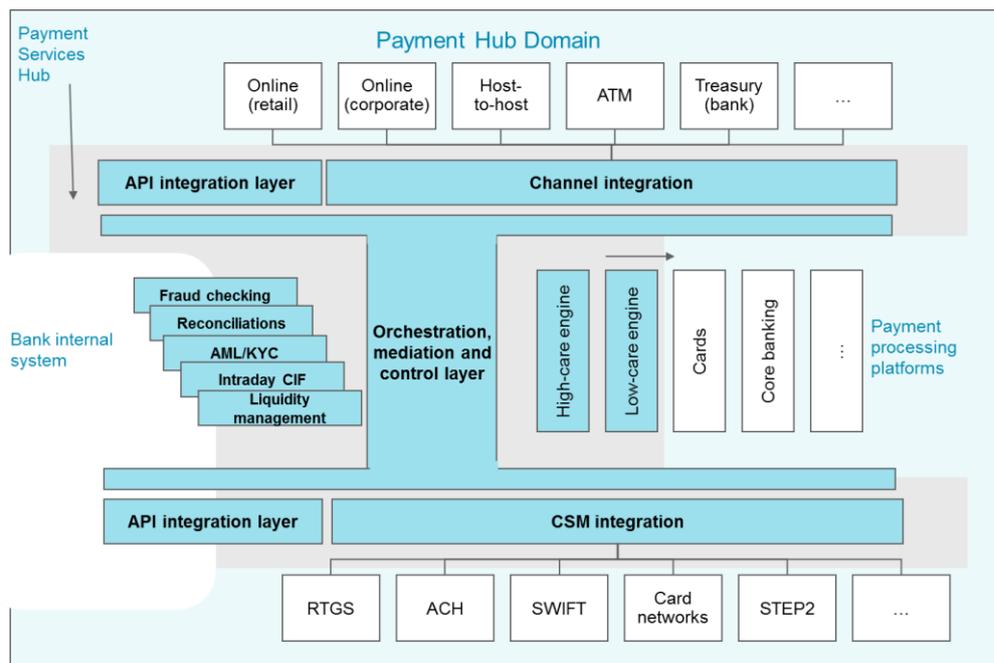
Celent believes increasingly a real-time payment engine needs to be within the payment hub domain. If we assume that an increasing amount of the volume will become real-time, from an operational point of view it makes sense. But increasingly it will also make sense from an NFR (non-functional requirement) point of view. In many ways it will serve to highlight that anything within the hub "walls" is subject to the same sort of NFRs. If the real-time payment system needs to be available, 24/7, so does the fraud system. This isn't just up about reliability and availability and response times, but much broader:

- If the system is always available, how do you do routine maintenance and testing?
- How do you add new functionality?
- How do you do software upgrades?

They may sound simple, but each one poses a significant issue. Having the function with the wall of the hub makes imposing and coordinating how this works much easier than if it is outside and potentially within a different team.

As a consequence, Celent is now seeing a much broader, richer payment services hub, with vendors either offering the components themselves, or at least ensuring they are easy to integrate with. These in turn sit within a much broader payment hub domain. [Figure 5](#) is an example of how that domain might look, though of course, no two hubs will be quite the same.

Figure 5: The Enhanced Vertical Payment Services Hub



Source: Celent

It's obviously a highly stylised view, but it aims to convey a number of the concepts discussed.

First, the light blue box demonstrates the broader payment hub domain, as distinct from the light grey, which illustrates a typical payment services hub installation. These will of course vary from bank to bank.

Second, the orchestration layer performs more of a function than just workflow management of a payment transaction. It acts for a much richer set of functions across the bank. If it wouldn't confuse things more, we'd describe this as the hub of the hub!

Third, the graphic shows that the API layer operates in a number of ways. First, it connects to the outside world as another channel, as Open Banking is promoting. Second, it connects to other systems within the bank. Third, and perhaps most importantly, the API layer works the opposite way as well — that is, it serves up information from the systems that are now part of the payment hub for them to be used by other workflows within the bank.

The APIs also pose other challenges. Will the third parties who are initiating the transactions also be able to choose which payment type, or even which payment rail, that the transaction travels over? This is perhaps straightforward when the bank is only a member of one low-volume domestic scheme. However, now consider the point raised earlier, where Celent points out that many banks will need to support multiple domestic and cross-border payment schemes, all of which differ, and all of which settle in different places. This requires a degree of sophistication that the existing technology will not be able to support. There is also the obvious point as well that there will need to be some logic which works out the optimum route for a payment, and what consequences that might have, such as the fee and SLA involved. Other rules in SEPA state that customers must be able to be informed of fees at the point of initiation. This therefore requires the business rules that determine the optimum path to generate a real-time response back to the sender before the message is sent.

All of this points to the increasing need to colocate and coordinate the services in real-time, and to think carefully as to where the boundaries of a payment services hub

should now lie. Furthermore, it highlights why Celent has chosen to describe the orchestration layer as something more than just orchestration. That is an important function of course, but will become far more complex than ever before. While all parts of the payment services hub are obviously important, the ability to work seamlessly with a growing number of disparate systems will shift the emphasis to ensuring this critical piece of the hub enables the success of the solution long term.

THE PATH FORWARD

Payments have undergone a transformation in the last decade, from back office utilities within banks, with old complex technologies, to modern, flexible platforms at the heart of the business. Indeed, in many banks payments have been transformed and seen as a key tool for revenue generation. That transformation is set to continue over the next decade.

In their drive to become digital banks, banks will need to take a bigger picture, longer-term view of what it actually means to be a digital bank, and they will need to start laying the foundations that support:

- A common interface for all real-time channels, increasingly using APIs.
- A platform that can support the volume and richness of data, and at the velocity needed for the increasing volumes required.
- A layer that acts as an interface for both internal and external interfaces (e.g., orchestration and open banking).

Banks may see the need to move to a digital bank, but they may be struggling to make the business case for investing in real-time payments. Yet there is a confluence of the digital banking trend with real-time payments, as they share many of the same attributes and indeed, that make it impossible for a digital bank to truly exist without it.

Banks therefore need to look at the core elements of their digital bank aspirations, and a payment services hubs that can address the elements highlighted above is likely to be a core component. Rather than “just” processing payments, the payment hub becomes the connection and enabler for digital banking. If a core banking platform is the guts of a bank, then this enriched payment services hub becomes the heart of the bank, orchestrating how the bank works, and connecting together all the vital elements.

Was this report useful to you? Please send any comments, questions, or suggestions for upcoming research topics to info@celent.com.

LEVERAGING CELENT'S EXPERTISE

If you found this report valuable, you might consider engaging with Celent for custom analysis and research. Our collective experience and the knowledge we gained while working on this report can help you streamline the creation, refinement, or execution of your strategies.

SUPPORT FOR FINANCIAL INSTITUTIONS

Typical projects we support related to payments include:

Vendor short listing and selection. We perform discovery specific to you and your business to better understand your unique needs. We then create and administer a custom RFI to selected vendors to assist you in making rapid and accurate vendor choices.

Business practice evaluations. We spend time evaluating your business processes. Based on our knowledge of the market, we identify potential process or technology constraints and provide clear insights that will help you implement industry best practices.

IT and business strategy creation. We collect perspectives from your executive team, your front line business and IT staff, and your customers. We then analyze your current position, institutional capabilities, and technology against your goals. If necessary, we help you reformulate your technology and business plans to address short-term and long-term needs.

SUPPORT FOR VENDORS

We provide services that help you refine your product and service offerings. Examples include:

Product and service strategy evaluation. We help you assess your market position in terms of functionality, technology, and services. Our strategy workshops will help you target the right customers and map your offerings to their needs.

Market messaging and collateral review. Based on our extensive experience with your potential clients, we assess your marketing and sales materials — including your website and any collateral.

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For more information please contact info@celent.com or:

Gareth Lodge

glodge@celent.com

AMERICAS

USA

200 Clarendon Street, 12th Floor
Boston, MA 02116

Tel.: +1.617.262.3120
Fax: +1.617.262.3121

USA

1166 Avenue of the Americas
New York, NY 10036

Tel.: +1.212.541.8100
Fax: +1.212.541.8957

USA

Four Embarcadero Center, Suite 1100
San Francisco, CA 94111

Tel.: +1.415.743.7900
Fax: +1.415.743.7950

Brazil

Av. Doutor Chucri Zaidan, 920 –
4º andar
Market Place Tower I
São Paulo SP 04578-903

Tel.: +55.11.5501.1100
Fax: +55.11.5501.1110

Canada

1981 McGill College Avenue
Montréal, Québec H3A 3T5

Tel.: +1.514.499.0461

EUROPE

France

28, avenue Victor Hugo
Paris Cedex 16
75783

Tel.: +33.1.73.04.46.20
Fax: +33.1.45.02.30.01

United Kingdom

55 Baker Street
London W1U 8EW

Tel.: +44.20.7333.8333
Fax: +44.20.7333.8334

Italy

Galleria San Babila 4B
Milan 20122

Tel.: +39.02.305.771
Fax: +39.02.303.040.44

Spain

Paseo de la Castellana 216
Pl. 13
Madrid 28046

Tel.: +34.91.531.79.00
Fax: +34.91.531.79.09

Switzerland

Tessinerplatz 5
Zurich 8027

Tel.: +41.44.5533.333

ASIA

Japan

The Imperial Hotel Tower, 13th Floor
1-1-1 Uchisaiwai-cho
Chiyoda-ku, Tokyo 100-0011

Tel: +81.3.3500.3023
Fax: +81.3.3500.3059

China

Beijing Kerry Centre
South Tower, 15th Floor
1 Guanghua Road
Chaoyang, Beijing 100022

Tel: +86.10.8520.0350
Fax: +86.10.8520.0349

Singapore

8 Marina View #09-07
Asia Square Tower 1
Singapore 018960

Tel.: +65.9168.3998
Fax: +65.6327.5406

South Korea

Youngpoong Building, 22nd Floor
33 Seorin-dong, Jongno-gu
Seoul 110-752

Tel.: +82.10.3019.1417
Fax: +82.2.399.5534