KPMG
cutting through complexity

# UK Payments Infrastructure: Exploring Opportunities

31 August 2014

www.kpmg.co.uk

# Table of figures

# Contents

# Notice: about this report

This report has been prepared by KPMG LLP, the UK member firm ('KPMG' or 'we') for the Financial Conduct Authority (the 'FCA') on the basis of confidential terms agreed in writing with the FCA, in order to support the FCA in establishing a new regulator for payment systems in the UK (the 'Payment Systems Regulator' – the 'PSR').

Nothing in this report constitutes a valuation or legal advice.

We believe that the information contained in this report is an accurate summary of the information received from those third parties who had meetings with us. Where it is reasonable for us to do so, we have assumed that information received from third parties has been provided to us in good faith.

This report is for the FCA and the PSR and has not been designed to be of benefit to anyone else. In preparing this report we have not taken into account the interests, needs or circumstances of anyone apart from the FCA and the PSR to the extent relevant in the context of the FCA's establishment of a fully operational new regulator for payment systems in the UK, even though we may have been aware that others might read this report.

Without in any way or on any basis adding to or extending to impose on KPMG any duties and responsibilities beyond those that we have agreed in writing with the FCA, we acknowledge that the FCA intends independently of KPMG to publish this report.

This report is not suitable to be relied on by any party wishing to acquire rights against KPMG (other than the FCA) for any purpose, or in any context. Any party other than the FCA that obtains access to this report, or a copy (under the Freedom of Information Act 2000, the Freedom of Information (Scotland) Act 2002, through the FCA's Publication Scheme or otherwise) and chooses to rely on this report, (or any part of it) does so at its own risk. To the fullest extent permitted by law, KPMG does not assume any responsibility and will not accept any liability in respect of this report to any party other than the FCA and the PSR.

In particular, and without limiting the general statement above, this report has not been prepared for the benefit of any other regulator of payment systems nor for any other person or organisation who might have an interest in the matters discussed in this report, including for example banks or other finance providers or those who work in the financial sector or those who provide goods or services to those who operate in the financial sector.

Any views expressed are those of KPMG and do not represent the views of the FCA or PSR.

# 1 Executive summary

The UK payments infrastructure is highly regarded globally for good security across operations, relatively low fraud levels and high overall resilience. The success of the Faster Payments Service (FPS) with its end to end customer focused outcome has led an increasing number of jurisdictions to emulate this model. The introduction of recent cross-industry initiatives such as Paym and the Current Account Switch Service (CASS) demonstrate the breadth of capability and reach of the UK payments infrastructure.

However, the UK payments infrastructure landscape is technically complex and costly to maintain. The existence of multiple layers of operators and infrastructures – each with specific standards, connectivity, rules and operating models – has arguably introduced greater complexity and higher costs, and has made access more difficult for new entrants.

For existing Payment Service Providers (PSPs), managing and interacting within this environment can be challenging due to the multiple regulatory and innovation change programmes being implemented concurrently.

The UK payments infrastructure generally serves the national economy well, but requires constant and focused effort to continue to keep pace with market requirements, innovation and regulation, whether competitively or collaboratively driven.

This report explores potential collaborative improvements to the UK payments infrastructure and suggests areas that the new Payment Systems Regulator (PSR) may wish to prioritise for further analysis, in the context of its objectives to improve competition, innovation and service user outcomes.

## 1.1 Objective, definition and structure

1.1.1 The objective of this *UK Payments Infrastructure: Exploring Opportunities* report is to assist the PSR to:

- Understand the current infrastructure and its limitations;
- Outline world leading payments infrastructure attributes;
- Evaluate future payments infrastructure scenarios; and to
- Consider how the PSR might regulate the current UK payments infrastructure.

1.1.2 The term 'payments infrastructure' for the purposes of this report relates to the hardware, software applications, networks and processes required to allow the clearing and settlement of payments from a payer (usually the sender) to a payee (usually the beneficiary). The ecosystem of the UK payments infrastructure is made up of historic silos for retail, high value and card based transactions, with multiple payment schemes, payment system operators (PSOs) and Third Party Service Providers (TPSPs).

1.1.3 This report is structured into the following sections:

- Current UK payments infrastructure is an overview of current UK payment systems.
- Achieving a world-leading payments infrastructure describes attributes of a world-leading payments infrastructure and provides some examples.
- Improving the UK payments infrastructure outlines some potential areas for further analysis.
- Looking ahead discusses the topics that the PSR might wish to turn its attention to in the future.

## 1.2 Findings on the current UK payments infrastructure

1.2.1 Seven banks dominate the clearing and settlement landscape for retail sterling transactions in the UK and are directly connected to the interbank payment infrastructures.[1] A subset of these provides 'agency' services to other banks, non-bank financial institutions and corporates to gain access to the payments infrastructures. The varying product ranges and services of the banks are driven by market segmentation, service user demand, product focus and technical capability.

1.2.2 There are a number of collective arrangements, known as 'schemes', which facilitate payments between UK market participants. The technical architecture, operating models, operators and use of Third Party Provider models vary.

1.2.3 VocaLink has emerged (since the merger in 2007 of Voca and LINK) as a single entity and the primary supplier of the retail payments infrastructure under contract to the Bacs, FPS and LINK schemes. This provides both distinct advantages and challenges.

1.2.4 Regulatory change continues to have the most significant impact on payment systems development in terms of cost and complexity. Multiple phases of relevant legislation and regulation (UK, EU and international such as Financial Action Task Force on money laundering (FATF) and the US Foreign Assets Tax Compliance Act (FATCA)) will continue to impact the UK banking community. In assessing the impact of this on infrastructures, technical impact is examined and any changes are defined and managed to meet the declared required business outcome. It is not evident that the impact of multiple concurrent changes at multiple infrastructures in the UK (some international) is actively co-ordinated in a portfolio management approach across all infrastructures holistically, where achieving a good or improved outcome for the user is an over-arching objective.

1.2.5 The overall speed of development for central payment infrastructures in the UK and in most countries tends to be reasonably slow as major infrastructure change is complex and expensive. This is due to the network impact of any change to each connected organisation and the significant risks and cost of IT testing required across the ecosystem.

1.2.6 Most countries have followed a similar path to the UK in the development of Credit Transfer (CT), Direct Debit (DD), e-billing, ATM services and debit and credit card processing since the establishment of Automated Clearing Houses in the 1960s and Real Time Gross Settlement (RTGS) systems in the 1990s. These scheme-based outsourcing solutions were established to improve network connectivity efficiency and to reduce costs and financial risk between participants. Such solutions can reduce investment required for similar processing in each organisation and enable a new entrant to reduce costs by establishing a link or links to an ACH, rather than multiple links to each other participant. A new entrant would want to be able to connect easily to any central infrastructure. However, there are potential challenges with the current UK payments infrastructure, including:

- High technical access barriers: The technical standards and requirements for connecting to the payments infrastructure (whether directly or indirectly) can be prohibitively expensive for some PSPs. The existence of multiple payment infrastructures with UK specific standards can require the duplication of infrastructure connectivity, introduce additional technical and operational complexity, and increase the overall setup costs of joining the infrastructure.
- Lack of focus on service user innovation and service levels: While the UK has developed some unique and world leading payments innovations (e.g. FPS), it is generally accepted that these required significant regulatory pressure to effect a change. Additionally, the speed of innovation across the industry to achieve other

[1] The seven banks are Barclays, HSBC, Lloyds Banking Group, National Australia Group (including Clydesdale Bank and Yorkshire Bank), Santander, The Co-Operative Bank, and RBS Group. The interbank infrastructures include Bacs, Cheque & Credit Clearing, CHAPS, Faster Payments, LINK, Visa and MasterCard.

enhanced service offerings has lagged, for example, in fuller functionality for mobile payments. Although there are accreditation systems in place, the lack of open and transparent technical specifications for connectivity of applications to some central infrastructure, has potentially stifled an open market in the development of new products and services that require a connection to the payment infrastructures.

## 1.3 Findings on a world leading payments infrastructure

1.3.1 In order to guide the creation of a world leading payments infrastructure, a clear set of objectives is required with a vision for the overall direction of development. Agreement on a set of core principles is also required to consistently achieve the following priorities while adapting to the ever changing external environment:

- Easy customer access to funds and timely information;
- A service that is simple to use and understand;
- Low cost, providing value for money;
- Speed, availability and efficiency of transactions, including clearing and settlement;
- Service levels, functionality and capability;
- Security of transaction and related transaction data; and
- Adheres to international legislation related to payments (e.g. FATF/PSDII).

1.3.2 We have deduced from our research that the payments community does not recognise a single world leading payments infrastructure. Rather, a number of specific systems in various countries have world leading or world class features and attributes in terms of superior speed, functionality and benefits to direct users (typically banks and financial institutions) and service users.

1.3.3 The UK already leads in some of the key attributes of infrastructure and payments service delivery, such as in the early implementation of a real time end-to-end payment system. Since FPS was implemented, other international examples of similar innovation have emerged. Examples include the Danish Real Time system (not yet live), the Australian New Payments Platform (not yet live), Singapore's FAST platform, and Sweden's Swish mobile real time services. In addition, features such as Direct Corporate Access (DCA) and the Current Account Switch Service (CASS) do not exist in many other countries.

1.3.4 The smooth operation of payment systems requires significant co-ordination and planning. Any change or upgrade of capability must be risk managed to minimise disruption or negative impact to any service users. Many national payment systems therefore follow a process of identification of a need, business requirements gathering and solution design, conducted in consultation with direct users or the industry, to arrive at a mutually acceptable plan to develop core functionality within the ecosystem. This needs to be achieved in a timeframe that can allow those organisations to manage funding requirements, establish change and test programmes and consider the dependencies and risks to other programmes of work. Formal processes are found in highly consultative societies such as Sweden and Japan, where long term planning for the payment system is extremely effective.

1.3.5 Technological innovation in the simplification of channels and infrastructure may be a source of economic benefit for customers and industry. However, adoption and migration to new technologies is likely to incur initial investment and transition cost. In addition, not all service users are capable of adoption of newer services immediately and legacy options can be costly to support.

## 1.4 Improving the UK payments infrastructure

1.4.1 We explore a number of potential approaches to improve the UK payments infrastructure. Some of these were also evaluated by stakeholders against PSR objectives.[2]

- A strategic approach to data management: There is a case for a comprehensive joined up review of the use of all reference data – sort codes, account numbering, IBAN, Business Identifier Code and creditor reference data. A strategic alignment to determine the future direction could provide long term benefits.
- Message standard convergence: Convergence to a single message standard could reduce interoperability barriers, with the potential to improve data capacity within the message to deliver greater functionality and value for all users. However, the cost and complexity of migration could be significant, impacting the corporate market and Government as well as financial institutions. Any migration strategy would need to be considered carefully to reduce risk in the transition, and to manage change while delivering business benefits.
- Overcoming technical access barriers: Technical access barriers to payment infrastructures exist for corporate and PSP service users seeking to provide new services through accessing the existing payments infrastructures.
- Collaborative overlay initiatives: Existing collaborative initiatives such as Paym could be enhanced or expanded, and new initiatives introduced such as an extension of the use of Alias ID. Implementation of lowest cost routing, improvements in sort code management, authentication/anti-fraud measures and delivery of enhanced reference data are also potential areas that could play a part to deliver an improved UK payments infrastructure.
- Infrastructure management and operation (consolidation): The existence of multiple systems, operators and infrastructures for retail payments contributes to cost and complexity. The full or partial consolidation to enhance the service user experience with regards to connectivity, messaging and security protocols could deliver an improved UK payments infrastructure.

1.4.2 Interoperability with payment systems in other markets, access to the European single market, the impact of EU price regulation and the focus on protection of customer rights could have significant effects on the payment industry. The impact of these changes will be varied across different provider types and may result in additional regulatory costs with low short term return on investment.

1.4.3 The timing of new legislation or its potential impact on payment systems is not always immediately clear and transparent to all service users, third party processors, financial institutions, PSPs or payment system operators. There are a significant number of changes proposed that can impact how payments are managed that often appear in unrelated primary or secondary legislation (both UK and EU) that need to be monitored on an ongoing basis (e.g. EU Consumer Rights Directive). The transposition of the Payment Services Directive II has the potential to significantly impact how the UK payment infrastructures operate. The introduction of a structural ring-fence within UK banks will also impact on the current structure of the ecosystem, as some banks will need to make structural changes to their current operating model including their technical method of accessing the payment systems and the routing and funding of payments.

## 1.5 Looking ahead

1.5.1 Industry feedback, both domestic and from other jurisdictions, suggests that several aspects of the UK payments infrastructure are already considered to be world class. Examples include FPS, Direct Corporate Access and Bacstel-IP and the reach of the LINK

[2] Please refer to Appendix 5 for a description of the methodology employed.

ATM network.

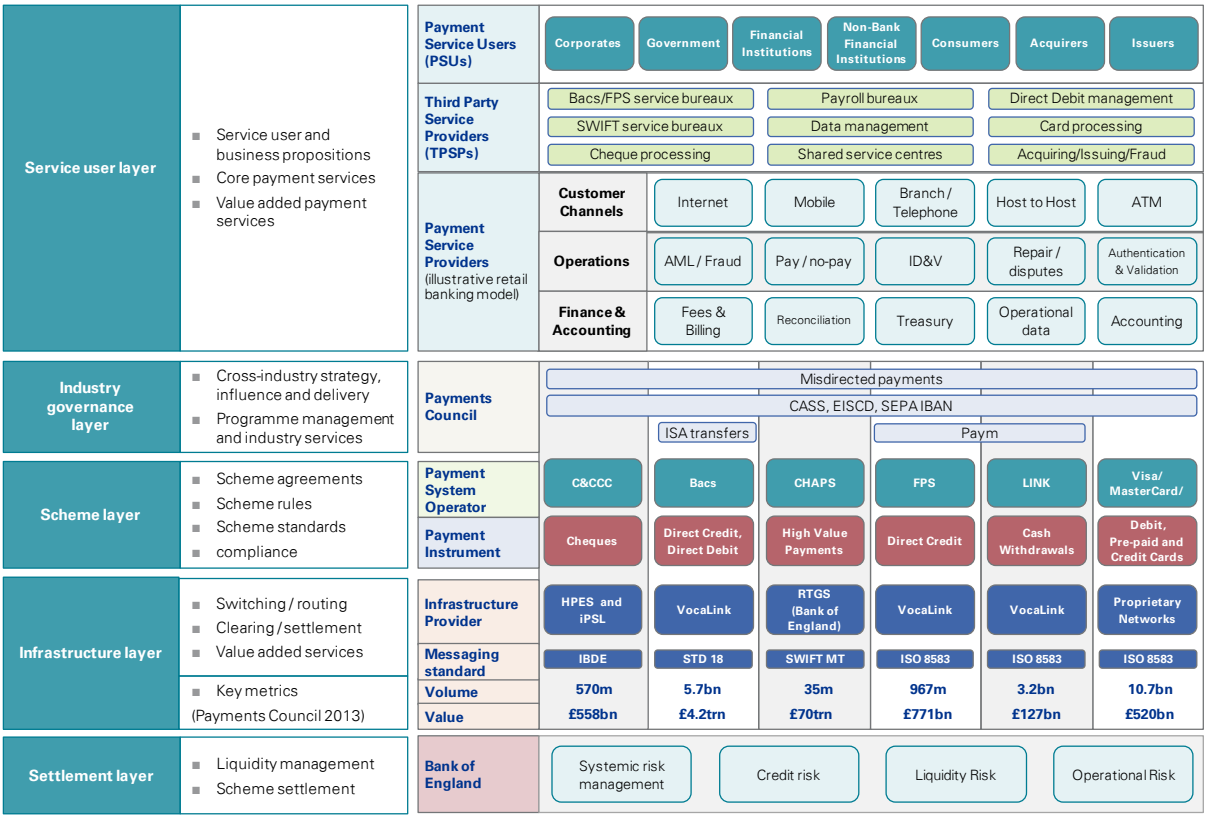
However, some new entrants report concerns around access to payments infrastructure, and some opportunities are thought to exist to deliver enhanced efficiency, more competition and better service user outcomes. The infrastructure related topics that may be prioritised in terms of further analysis and investigation include:

- Co-ordination of development and consultation: Industry stakeholders recognise there is sometimes merit in taking a collaborative approach to payments related initiatives. Potential areas for future collaborative work may include the enablement of enhanced data services with the payment information and improvements in authentication, security and anti-fraud measures.
- Encouraging standardisation: Additional standardisation around message formats, reference data and technical access to the payment infrastructures could improve interoperability and lower long-term costs to both participants and service users.

# 2 Current UK payments infrastructure

## 2.1 Overview of the UK payments infrastructure

Figure 1: Current UK payments infrastructure overview.




2.1.1 The current UK payments infrastructure enables the transfer of funds between entities. These financial market infrastructures contribute significantly to economic activity through:

- Enabling the lending and repayment of money;
- Allowing businesses to receive payments for goods and services; and
- Facilitating the payment of salaries and benefits to the general public.

2.1.2 The scope of this report includes payment infrastructures in GBP sterling and does not include Euro (including SEPA) or USD transactions. The value transacted in 2013 across the UK schemes was around £75 trillion, with key metrics represented in Figure 1 above. (Payments Council, 2013).

2.1.3 The payments infrastructure is defined as the hardware, software and operating environment to support the payment instruments and mechanisms used (where rules are determined by payment systems operators) for the clearing and settlement of payment transactions. The payments infrastructure has a number of components that typically from a service user's perspective involve their PSP, a central infrastructure, and the PSP of the beneficiary. The service user initiates an instruction via a PSP's channel (sometimes including proprietary software or hardware applications) and the payment instruction is processed within a proprietary application stack within each PSP and submitted to a central infrastructure via a gateway. These gateways can be proprietary, but result in a standardised message exchange with the central infrastructure to support an industry standard process model for that instrument. The central infrastructure routes the instruction to the appropriate receiving PSP via its gateway and processing is conducted within the

proprietary software and hardware stack of that PSP to confirm and process that instruction and notify their service user via their appropriate channel.

2.1.4 The typical Service Level Agreement (SLA) boundary of the payment process is usually determined at the point at which the initiation message moves from the PSPs channel access mechanism (for example, internet banking) and is accepted as a valid (already debited) instruction to be transmitted for clearing and settlement. Where a payment service provider has both the payer and the payee as customers, and there is often no external processing of the transaction, then the relevant infrastructure could be that of the PSP itself. This is referred to as an 'on-us' transaction. This report does not explore in detail the processing of 'on-us' transactions as they occur within the application stack of that PSP and these are proprietary and almost all are bespoke to some degree to reflect the particular differentiated competitive attributes of the service model of that PSP.

2.1.5 The traditional analysis of payment processing involves a four corner model of payer, payer's bank, payee's bank and payee. This is widely used standard methodology for the processing of all types of payments with the exception of on-us and third party card schemes (where the issuer and acquirer are the same entity e.g. American Express). Payments infrastructures evolved to rationalise the many bilateral links that had emerged over time to enable efficient and effective payment processing. The 'payment infrastructures' are therefore generally accepted as being those clearing houses that operate a central switch or clearing processes to efficiently and cost effectively manage high volume multilateral and bilateral processing of transactions between parties who may or may not be individually known to each other. This provides the economic benefit of mediation of what can be a complex competitive demand and supply environment.

2.1.6 The categories of participants in the UK payments infrastructure have been divided into the following groups, aligned with the definitions included in the FCA 'PSR Call for Inputs' dated March 2014. They are summarised in Figure 1 and the layers are described in more detail below.

### Service user layer: Payment Service Providers

2.1.7 Seven PSPs dominate the clearing and settlement of retail sterling transactions in the UK market and a smaller subset additionally provide 'agency' services to other banks and financial institutions, corporates and non-banks e.g. electronic money issuers to gain access to the payments infrastructure. The product ranges of the various PSPs are driven by market segmentation, product focus and technical capability. Typically, PSPs provide payment services, including: services enabling cash to be paid into an account; services enabling cash withdrawals from an account; execution of payment transactions, including transfers of funds on an account; execution of payment transactions where the funds are covered by a credit line; issuing and acquiring of payment instruments; and money remittance services (domestic and international).

2.1.8 PSPs include:

- Direct members of the payment schemes: Typically the largest of the retail banks are members of all payment schemes. Depending on the scheme, smaller banks, building societies, and overseas banks may also be members. For wholesale payments in CHAPS, the membership also is representative of money market and investment banks transacting in the foreign exchange, trade finance, correspondent banking, securities and insurance markets.
- Indirect participants of the payment schemes: For example smaller banks, building societies or overseas banks may choose to operate an agency arrangement with a direct member over direct membership for themselves, usually for cost or operational reasons. This is a typical arrangement for CHAPS, Bacs, cheques, and increasingly for FPS.
- Other payment providers: These include non-bank financial institutions and other service providers that use the payments infrastructure to provide payment services to service users, either as a primary or a secondary function of their businesses.

2.1.9 PSPs enable customers to initiate transactions utilising a variety of customer channels. Customer channels include internet banking, bespoke host to host (H2H) connectivity from an Enterprise Resource Planning (ERP) system to the PSP (only usually available for high volume corporate users) and mobile payment platforms and ATM services for retail banking.

2.1.10 For service users that rely on connectivity via their PSP to access the payment system indirectly, then the capabilities of that PSP can enhance or constrain their ability to interact with the payment system – either in terms of data and reporting, or the timing of transactions and responses.

### Service user layer: Third Party Service Providers

2.1.11 Corporates and financial institutions often require more complex interfaces to the payment infrastructures. Third Party Service Providers (TPSP) exist that provide services including: technical access platforms (service bureaux); data management; message translation services; fraud management and compliance; security and stand-in services (when FPS outputs transactions and the operations of that entity are not 24/7). Additional services can include full shared service centre capability for corporate treasury operations and payments, processing for card issuers or merchant acquiring for Point of Sale. Point of Sale, internet banking software platforms and ATM hardware and software are also competitively supplied in the market.

2.1.12 As an example of a TPSP within the automated clearing domain, one provider provides collaborative payment, invoice and document automation solutions to corporations, financial institutions and banks. Some of these solutions are used to streamline, automate and manage processes involving payments, invoicing, global cash management, supply chain finance and transactional documents. Specific services relevant to the UK payments infrastructure include: domestic and international payment solutions; Bacs approved training; Direct Debit management software; Bank account validation and verification; SWIFT Access Services; cheque solutions; Bacs payments bureau services; Bacs and Faster Payments software; Direct Debit bureau services.

2.1.13 These private sector solutions also form part of the overall payments infrastructure for service users. There are 770 Bacs Approved Bureaux across the UK providing computer based access to the Bacs schemes (for organisations sponsored by a direct participant of the schemes).

2.1.14 Only software solutions that have passed rigorous testing and approval processes are able to connect to Bacstel-IP and/or Secure-IP for Faster Payments. There are currently eighteen approved vendors of software to support access to the Bacstel-IP and six for Secure-IP for Faster Payments. Additionally, some of these products support Bureaux services and others support hosted environments.

2.1.15 Access to the payment systems is managed by a PSP. This PSP bears the responsibility to adhere to rules, operations and risk management requirements of the scheme operator. Customers can access services via a branch or online/mobile services, or in the case of institutional or corporates, via a number of additional 'channels' that the PSP provides, or via a service bureau.

### Service user layer: card processing

2.1.16 The card processing value chain has two primary financial activities, issuing and acquiring. The process is described as a four party model, where the issuer serves the cardholder and the acquirer serves the merchant. The card network manages the transaction, the exchange of funds and the rules of engagement. Cards issued by organisations in the UK work on the LINK ATM network and are often co-branded with another international scheme – typically Visa or MasterCard. In order to ensure a good customer experience, interoperability and ease of use is paramount for these cards.

2.1.17 The card processing environment is highly standardised internationally to achieve widespread interoperability, based on the ISO 8583 data standard. The principles of open

financial institution membership apply where any eligible entity can apply to join the LINK scheme, with protocols and timelines for open loop exchange of transactions, interchange fees, and brand control via bylaws and operating rules to define these payment systems. There are protocols for issuing, acceptance, transaction management, system economics and brand management.

2.1.18 Card acquiring comprises a set of functions provided to card-accepting merchants. The suite of services varies according to the complexity of the merchant, with corresponding varying degrees of bundling of services. It can cover a range of functions to support card payments acceptance, including POS terminals, software, card processing, dispute management and merchant customer service. A merchant needs to receive and submit transactions (possibly via a third party processor) through a contract with a bank that is a member of the network and bound by its rules.

2.1.19 Acquiring is often thought to have a higher risk profile than issuing, as the acquirer can be held liable for the credit risk of merchants, particularly where a service is due to be provided in the future and cardholders have the ability to claim against the acquirer via their issuer for a disputed transaction or where a service has subsequently not been provided post payment.

2.1.20 The card associations also play a role in managing fraud reporting and encouraging fraud prevention with sophisticated data analysis to help fight fraud.

2.1.21 Arbitration processes exist to resolve disputes – the 'chargeback system'. This is a value added process designed to manage what can be a complex process for the customer, and to protect the merchant, issuing bank and the acquirer in a model where the parties are not known to each other.

2.1.22 Global standards have emerged for the formatting of physical cards, definition of key fields of data and the interaction across the cards networks. These apply both to magnetic stripe cards and to Chip and Pin or EMV (a smart chip which can carry data encryption).

2.1.23 The Payment Card Industry Data Security Standard (PCI DSS) is the voluntary international standard for the protection of personal card data. Merchants that accept payment cards are required to comply with the PCI Data Security Standard. Exact compliance requirements for merchants are issued by the payment brand or acquirer. Self certification is required.

### Trade and regulatory bodies

2.1.24 The PCI Security Standards Council is an open global forum for the ongoing development, enhancement, storage, dissemination and implementation of security standards for account data protection.

2.1.25 The PCI Security Standards Council was founded by American Express, Discover Financial Services, JCB International, MasterCard, and Visa Inc. in 2006. Each of these organisations (plus Visa Europe) has incorporated the PCI DSS as a technical requirement designed to protect cardholder data. The Council is responsible for managing the security standards, while compliance with the PCI Security Standards is enforced by the payment card brands. The standards apply to all organizations that store, process or transmit cardholder data, with guidance for software developers and manufacturers of applications and devices used in those transactions.

2.1.26 The Payments Council undertakes the prioritisation, research, design and delivery of strategic industry services collaboratively. Co-ordination of activity is required across the many organisations that develop and manage the payments infrastructure to provide an agreed common direction and guidance on key issues that impact all users and providers within the ecosystem. (See Appendix 3 for a list of Payments Council activities.)

### Scheme layer

2.1.27 Schemes refer to the collective agreement of the participants to operate under the terms of the infrastructure. The scheme company is responsible for defining the 'rulebook' or operating terms of the scheme to which members and participants adhere. In the UK, following a governance review post publication of the Cruickshank Report (2000)[3], the banking industry separated the management of the Bacs scheme rules from the ownership and operation of the infrastructure. In practice, this means the organisation managing the collaboration is usually referred to as a 'scheme company' or a 'Payment System Operator' and tenders contracts for services to an 'Infrastructure Provider' (e.g. VocaLink). The premise is that the scheme company is not restricted to buying services solely from a single provider, which would slow or limit scope of innovation or control the price. In practice, it is extremely difficult for a third party to innovate without open and transparent interface specifications to the core systems and the process and operational design.

2.1.28 The schemes in the UK with significant values and/or volumes are CHAPS, Bacs Direct Credit and Bacs Direct Debit, Faster Payments Service, Cheque and Credit Clearing, LINK ATM, Visa Europe and MasterCard.

2.1.29 There are a few smaller additional private sector schemes in operation such as International Banking One Solution (IBOS). They are typically set up as a 'members' club' to offer additional functionality in the payments domain coupled with cash management or trade finance enhancements. IBOS is an international 'club' of banks that do not compete domestically, but provide enhanced data-rich functionality for the customers of member banks.

2.1.30 There are also a small number of (often international) three party card schemes including American Express and Diners Club with merchant acceptance and users within the UK.

### Infrastructure provider layer

2.1.31 Infrastructure providers run the payment infrastructures on a day to day basis to provide services to the scheme companies (Payment System Operators). They provide the interbank payment infrastructure for clearing, settlement and associated services such as dispute management and provision of management information. The infrastructure is made up of hardware and software which has been designed to meet the functionality required by each scheme. Payment systems infrastructure providers are listed below in Figure 2.

Figure 2: UK payment schemes, infrastructure providers and settlement models.

| Payment schemes | Infrastructure provider | Settlement model | Products supported | Features |
|---|---|---|---|---|
| **CHAPS** | Bank of England | Real Time Gross Settlement | Settlement of high-value GBP interbank payment obligations | ■ One of the largest RTGS systems globally<br>■ 21 direct participants, 4500 indirectly participating institutions<br>■ Annual volume of nearly 35 million transactions, with a value of £70 trillion<br>■ CHAPS is recognised by HMT for statutory oversight by the Bank of England |

[3] The Cruickshank report on Competition in the UK Banking Industry (2000). The report was the result of an independent review of the banking industry, commissioned by the Government.

| Payment schemes | Infrastructure provider | Settlement model | Products supported | Features |
|---|---|---|---|---|
| **Bacs** | VocaLink | Multilateral Deferred Net Settlement<br><br>Three day processing cycle; settlement synchronised on day three | Bacs Direct Credit (bulk credit transfers)<br><br>Direct Debit<br><br>CASS | ■ Retail payment system that offers processing of high volume credit transfers and Direct Debits.<br>■ 16 direct member institutions.<br>■ Annual volume of 5.7 billion transactions, with a total value of £4.2 trillion.<br>■ £20 million item limit.<br>■ Bacs is recognised by HMT for statutory oversight by the Bank of England. |
| **FPS** | VocaLink | Multilateral Deferred Net Settlement, three times a day | Near real time credit transfers<br><br>Standing Orders (recurring credit transfer)<br><br>Single Immediate Payments<br><br>Forward Dated Payments<br><br>CASS<br><br>Paym | ■ FPS launched in 2008, in response to regulatory pressure on speed of customer payments.<br>■ 10 direct member institutions.<br>■ Service Level Agreement for payments is two hours, but often occur in a matter of seconds.<br>■ Annual volume of 967 million transactions, with a total value of £771 billion.<br>■ Payments are capped by scheme rules and credit transfers over the scheme threshold (i.e. over £100,000) are sent via Bacs and CHAPS.<br>■ FPS is is recognised by HMT for statutory oversight by the Bank of England. |
| **Cheque and Credit Clearing** | Central system: CGI<br><br>IPSL<br>HPES | Multilateral Deferred Net Settlement<br>(T+2)<br><br>2-4-6 cycle (days) | GBP/EUR/US cheque clearing<br><br>Paper credits<br><br>CASS | ■ 11 direct member institutions.<br>■ Annual volume of 570 million cheques/credits, with value £558 billion. |
| **LINK ATM** | VocaLink | Deferred Multilateral Deferred Net Settlement (T+1) | ATM withdrawals<br><br>Charity donation<br><br>Mobile top-ups | ■ LINK facilitates cash withdrawal from participating institutions at almost all UK ATM terminals.<br>■ LINK also offers additional services such as mobile top-ups, charity donations and PIN management via the ATM network.<br>■ Annual volume of 3.2 billion transactions, with a total value of £127.5 billion. |
| **Card networks** | VISA<br><br>MasterCard<br><br>Amex<br><br>Diners Club | Multilateral Deferred Net Settlement<br>(T+1)<br><br>Underlying settlement timing is variable | Card payments | ■ VISA and MasterCard provide the switches for debit and credit cards issued by banks in the UK.<br>■ American Express and Diners Club also have low levels of activity and are closed schemes.<br>■ Processing is carried out by a number of operators but also for acquirers by third party payment processing operators such as WorldPay and First Data. |

### Settlement layer

2.1.32 The Bank of England is the infrastructure owner and operates the RTGS platform for the Clearing House Automated Payment System (CHAPS), which is the UK's high value payment system. CHAPS is recognised by HM Treasury as a Systemically Important Financial Market Infrastructure, and as such is overseen by the Bank of England.

2.1.33 The Bank of England provides settlement in central bank money for sterling interbank payment obligations. In order for a payment to be irrevocable and final, it is must be settled by an accounting transfer between participants' settlement accounts at the Bank of England. Other international systems exist at respective central banks for the settlement of foreign currency (e.g. TARGET2 for Euro).

2.1.34 All direct participants of CHAPS are required to operate a settlement account at the Bank of England in order to use the CHAPS system to settle interbank obligations in real time.

2.1.35 The Bank of England operates reserve accounts for 121 banks and settlement accounts for 30 banks to enable them to discharge cash interbank obligations via the CHAPS real time gross settlement (RTGS) system.

2.1.36 In addition to CHAPS, transactions from Euroclear UK and Ireland are settled by CREST (real time Delivery Versus Payment (DVP) related to the settlement of securities transactions) and a number of multilateral deferred net settlement systems including FPS, Bacs, LINK, C&CC and Visa Europe settle net multilateral positions via the Bank of England settlement process during the day.

### Oversight function

2.1.37 In addition to the day to day operation of the RTGS environment, the Bank of England executes its role in promoting financial stability under Part Five of the Banking Act 2009, which established the oversight regime for interbank payment systems.

## 2.2 Evolution of the current UK payments infrastructure

2.2.1 Historically, the UK payments infrastructure has evolved towards siloed arrangements for high-value, retail and card-based transactions. There are a number of collective arrangements between entities, known as schemes, which facilitate payments between participants in the UK. The operators and governance of the schemes vary, with many schemes outsourced to separate infrastructure providers.

2.2.2 UK payment systems primarily follow the centralised infrastructure model (as opposed to a many-to-many distributed infrastructure) due to the volume of transactions and the number of participants involved. These are tiered systems with direct and indirect participants. A centralised model receives payment requests from all participants through a central infrastructure and routes the payment instruction to other participants via a central switch. This design reduces the costs for participating organisations as they do not have to create segregated files per organisation and only have to maintain connectivity (including security requirements) to the central infrastructure. The centralised schemes are Bacs, CHAPS, FPS, LINK, and the international card schemes Visa Europe and MasterCard. C&CCC also follows a similar model but PSPs have different competing providers for paper processing.

2.2.3 UK banks have sought to simplify processing and reduce costs via the centralisation and outsourcing of processing. UK centralised models are often driven by the identification of common processing requirements and a desire to further automate existing processes.

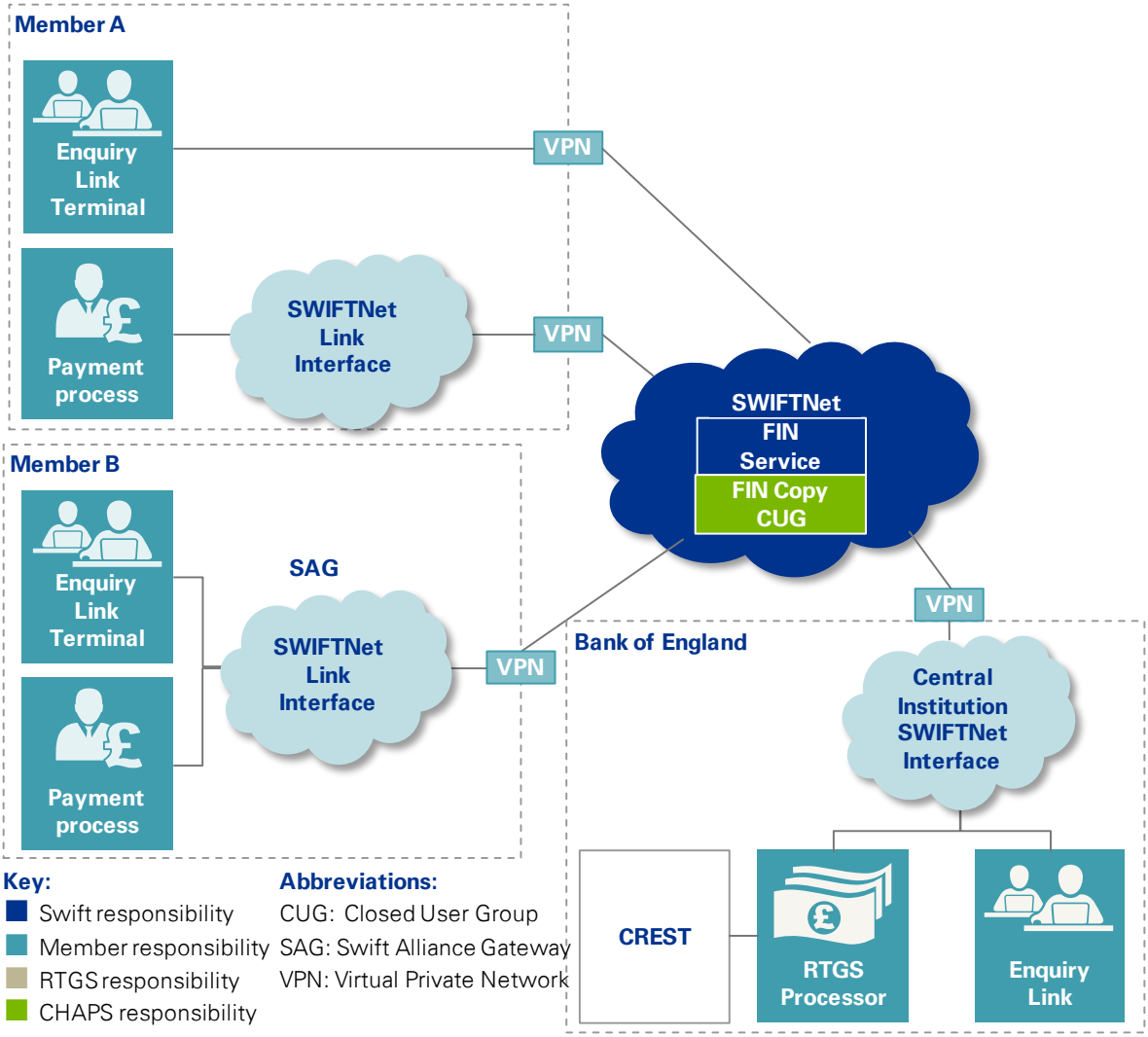
2.2.4 Technology innovations are likely to drive service user and customer uptake of electronic services. New, innovative customer technology interfaces could provide future benefit in terms of ease, speed and functionality of transactions, driving efficiencies for customers. When the Department for Work and Pensions migrated from cheques to electronic payments, it estimated savings in excess of £400 million a year in social welfare disbursement costs. Driving the adoption of electronic payments benefits the taxpayer as

more payments also come into the mainstream (taxable) economy and are subject to scrutiny by HMRC.

## 2.3 CHAPS

### CHAPS overview

Figure 3: CHAPS overview.




2.3.1 CHAPS is the UK payment scheme that processes and settles systemically important and time-dependent payments in sterling. The CHAPS Clearing Company Limited is the Payment System Operator that processes and settles systemically important and time-dependent payments in sterling. Processing of payments is performed through the Bank of England's Real Time Gross Settlement system.

2.3.2 CHAPS payments are used for money market transactions and are also typically used for large or high value payments such as treasury payments where the timing of legal certainty is critical. Under the CHAPS scheme, same day settlement finality is guaranteed. Each individual payment instruction is settled in real time across the accounts of the sending and receiving banks at the Bank of England. This provides irrevocable interbank settlement and CHAPS designation under the Settlement Finality Directive ensures transactions cannot be unwound in the event of insolvency.

2.3.3 CHAPS participants submit instructions directly to the Bank of England's RTGS system. All direct participants of CHAPS are required to have a settlement account at the Bank of

England, through which funds are received and paid. Direct participants of CHAPS can also settle on behalf of their clients (who can also include banks or non-banks). These clients sometimes include other financial institutions that have reserve accounts, but have chosen not to connect directly to CHAPS for settlement of cash obligations (Bank of England, 2013).

### Usage

2.3.4 Annual volume of transactions in 2013 was nearly 35 million transactions, with a value of £70 trillion (Payments Council, 2013). Transactions represent about 0.5% of total UK clearing volumes, but accounts for 93% of total clearing value in sterling. CHAPS volumes increased 3% from 2012 to 2013.

### CHAPS infrastructure

2.3.5 There are four core areas of responsibility within the CHAPS system:

1) The CHAPS Clearing Company Limited is responsible for the governance, rules and operational decisions surrounding the CHAPS system. This includes decisions regarding membership, and management of the CHAPS SWIFTNet Closed User Group (CUG).
2) The Bank of England operates the RTGS processor, provides settlement accounts and the Enquiry Link service. The Enquiry Link service allows CHAPS members to schedule their payment (in accordance with scheme rules) and perform payment enquiries.
3) SWIFT operates the network infrastructure (based upon SWIFT FIN Copy) and connects members to the Bank of England RTGS system. Each participant uses a SWIFT Computer Based Terminal with a SWIFT Alliance Gateway (SAG) (or equivalent) to manage their interface.
4) Direct participants (PSPs) are responsible for maintaining their payment flows, settlement account balances and the operation and maintenance of interfaces to the CHAPS network.

2.3.6 The RTGS system receives payment instructions from CHAPS participants over the proprietary SWIFTNet network via Y-copy. SWIFT is responsible for the authentication, encryption and transmissions of messages to and from the processor.

### CHAPS processing flows

2.3.7 Payment instructions are sent from CHAPS Members to other Members via Y-copy over SWIFTNET, with the following message flows:

- Payment messages (eg. MT 103/ MT 202) are sent from the payer to the payee across the SWIFTNet FIN Copy network.
- Messages are stored in the FIN Copy network while a partial copy of the message is sent to the Bank of England RTGS for confirmation.
- The BoE RTGS will settle the payment instruction and a confirmation message is returned to the FIN Copy network.
- The original payment message is delivered to the recipient (payee), notifying the receiving bank that transfer and settlement has occurred. The receiving bank can then perform any additional processing as necessary.

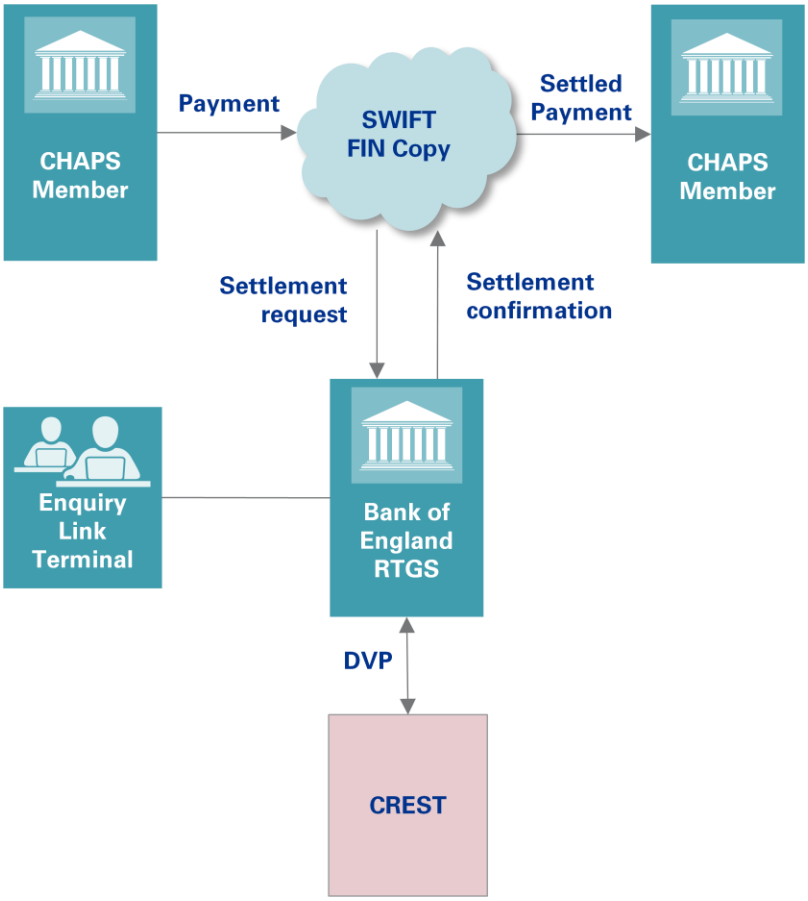



Figure 4: CHAPS Payment Process Flows (CHAPS)

### CHAPS settlement process

2.3.8 CHAPS settles payments on a real-time gross basis between 6:00am and 16:20am on weekdays.

2.3.9 CHAPS payments are used for money market transactions and are also typically used for large value payments such as house purchases where the timing of legal certainty of ownership is critical. Under the CHAPS scheme, same day settlement finality is guaranteed for payments of any value. Each individual payment instruction is settled in real-time across the settlement account of the sending and receiving banks within the accounting systems at the Bank of England. This is regarded as the ultimate solution for safety and soundness in interbank settlement and legislation ensures it cannot be unwound in the event of insolvency.

2.3.10 CHAPS connects directly to the Bank of England's Real Time Gross Settlement system (RTGS). All direct participants of CHAPS are required as a technical minimum to have a Settlement Account at the Bank of England, through which funds are received and paid. Direct participants of CHAPS can also settle on behalf of their clients (who can be banks or non-banks) These clients sometimes include other financial institutions that have Reserve Accounts, but have chosen not to connect directly to CHAPS for settlement of cash obligations.

### CHAPS service user interface

2.3.11 Members access the CHAPS network through their individual Computer Based Terminals (CBTs). SWIFT connectivity for the system includes the use of RMA – a tool to determine

technical security of relationships within the Bank of England's Closed User Group (SWIFT CUG) for CHAPS.

2.3.12 The CHAPS systems open at 6:00 am and close at 4:20 pm, with most direct settlement members responding to customer payment requests on a best effort basis after this hour. The timing of settlement of transactions during the day is co-ordinated by the direct participant and CHAPS and the time at which a customer submits a transaction may not determine when settlement finality occurs.

### CHAPS message standards

2.3.13 CHAPS utilises SWIFT MT messages and the SWIFT Y copy service. CHAPS members are required to implement SWIFT gateway software and security technology. This is standard practice for RTGS systems worldwide.

2.3.14 Participant payment messages supported include the SWIFT MT103 single customer credit transfer and SWIFT MT202 general financial institution transfer.

- MT103 is a single customer credit transfer i.e. customer to customer. For CHAPS, the latest time a customer MT103 payment should enter the SWIFT network is 16:00. This will allow a five-minute period to meet the SWIFT service level processing time. The last time for receipt by the real-time gross settlement (RTGS) system of inward MT103 payments for same day value is 16:05. At 16:05 participants must cancel any customer payments for which settlement requests are on the funds queue.
- MT202 is a general financial institution transfer i.e. bank to bank. For CHAPS, MT202 payments, which may be made between 16:00 and 16:20, are settlement period payments, unless bi-laterally agreed. In addition a participant is allowed to send a total of nine payments, up to a value of £1 million each, to other participants. The last time for receipt by the RTGS system of inbound MT202 payments for same day value is 16:20.

2.3.15 Additional SWIFT messaging capability (a total of 57 messages) is required to perform day to day operations.

### Recent innovation: the Bank of England's Liquidity Saving Mechanism (LSM)

2.3.16 Under normal RTGS, the sender of a payment (payer) must have sufficient balance in their settlement account before a payment can be executed. If this is not the case, the sending bank must deposit additional funds into its account or wait for payments to arrive from other institutions before executing its own instruction. As withholding payment may reduce the liquidity available to other participants, it is possible that several banks awaiting additional funds may 'gridlock' the infrastructure, vastly reducing the flow of payments between participants. In June 2013, the Bank of England introduced the Liquidity Saving Mechanism (LSM), enhancing the functionality of the RTGS settlement platform.

2.3.17 The LSM contains a flow management system called a 'central scheduler' which adopts some of the functionality previously enabled by banks' own internal systems (for example the queuing and release of payment instructions). Two queues are available, for urgent (immediate settlement) and non-urgent (matched) payments.

2.3.18 Under LSM, urgent payments are settled normally using RTGS, whereas non-urgent payments are subject to a 'matching cycle' that runs every two minutes throughout the business day. The matching cycle uses offsetting algorithms to identify payment instructions across two or more participants that broadly offset against each other, allowing for only the net amount to be settled between participants. This reduces the liquidity requirement for banks to settle transactions, and can be used to resolve gridlock situations. Payments made in this manner are still considered to settle individually and irrevocably in the CHAPS system, meaning that the batch settlement of transactions does not result in new credit risk.

### Recent innovation in Business Continuity: Market Infrastructure Resiliency Service (MIRS)

2.3.19 The Market Infrastructure Resiliency Service (MIRS) is a contingency solution for the RTGS system that has been developed and is hosted by SWIFT. MIRS was introduced in early 2014 to increase the operational resilience of the UK payments infrastructure.

2.3.20 Prior to MIRS, contingency options included the 'bypass' mode, where in the event of a failure of the RTGS, settlement in CHAPS would resort to end-of-day deferred net settlement. This introduced a significant settlement risk to participating banks. Furthermore, a 'contingency database' would hold the reserve and settlement account balances of participants, allowing limited manual payments to be executed by the Bank of England for critical transactions.

2.3.21 The MIRS solution involves SWIFT acting as a contingency operator of the RTGS system, allowing normal settlement finality in the event of a major RTGS outage.

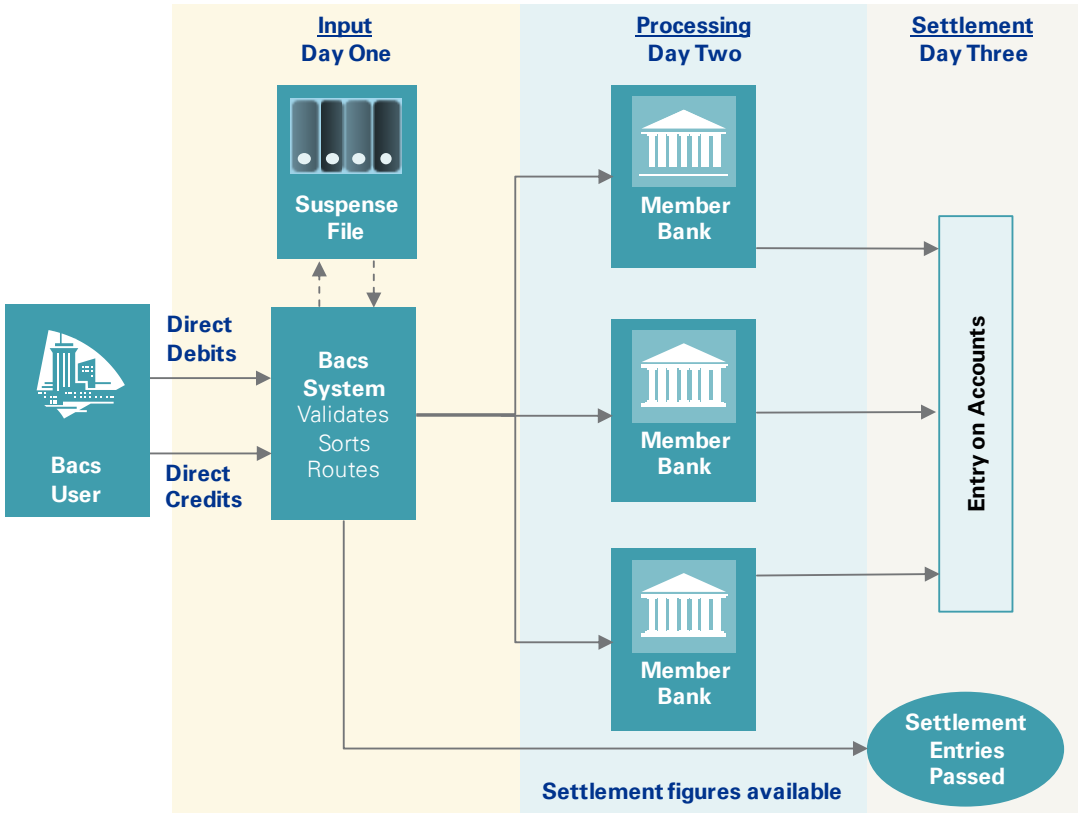
2.3.22 The adoption of MIRS increases the operational resilience of CHAPS in two ways:

- As SWIFT is a global provider, it increases the geographic diversity of infrastructure sites and hence the vulnerability to regional shocks;
- MIRS is based upon a different technology platform, therefore technology diversity is achieved, reducing the risk of failure in a particular software/hardware configuration (Bank of England and SWIFT, 2011).

## 2.4 Bacs

### Bacs overview

Figure 5: Bacs processing cycle.



2.4.1 Bacs Payment Schemes Limited is the Payment System Operator of the schemes for clearing and settlement of Direct Credits (DCs) and Direct Debits (DDs), which are both file-based schemes.

- Bacs DCs are used for non-urgent forward dated credits such as salaries, benefits and pensions. They are also used by corporates for settlement of invoice payments and are typically submitted in bulk files for convenience.
- Bacs DDs are used by Bacs originators to claim money from a bank account to which they have been granted access by the owner of that account signing a Direct Debit mandate. Typical DD originators are utility companies and local authorities.

2.4.2 Bacs is recognised by HM Treasury as a Systemically Important Financial Market Infrastructure, and is overseen by the Bank of England. Bacs payments are settled on a multilateral deferred net settlement basis at the Bank of England once a day. Whilst Bacs volumes are extremely high (with a peak of over 93 million transactions in one day), values, and therefore settlement risk, are relatively lower and the net settlement reduces overall exposures between direct participants.

2.4.3 The use of Bacs DCs has changed since the introduction of the EU Payment Services Directive (PSD) (as transposed into UK legislation as the Payment Services Regulation) in 2012. The PSD requires that an electronic payment instructed by a user (without a forward date) must be settled and funds made available to the beneficiary by the end of the next business day (D+1). This legal driver has seen banks migrate customer internet banking transactions from Bacs to the Faster Payments Service. CHAPS can process customer credit transfers above the FPS scheme limit (currently £100,000) intra-day.

### Bacs usage

2.4.4 Annual Bacs volumes in 2013 of 5.7 billion transactions represented a total value of £4.2 trillion. Of these, approximately 3.5 billion transactions were DDs and 2.2 billion were DCs. Bacs volumes have remained relatively stable, despite the migration of Single Immediate Payments (SIPs) and Standing Orders to FPS, with an incremental growth of 1% from 2012 to 2013 (Payments Council, 2013).

### Bacs infrastructure

2.4.5 VocaLink provides hosted infrastructure services to Bacs for the processing of transactions, messaging and network services (see section 2.10 for further details on VocaLink services).

### Bacs processing flows.

2.4.6 Payments submitted to Bacs are subject to a three day clearing and processing cycle. The deadline for the receipt of payment instructions from users is 22:30 on day one (D-2), of the cycle. Data submitted is validated and sorted into bank order by the central infrastructure to be transmitted onwards to the destination account. The destination bank may be either a receiving bank or paying bank, depending on whether the transaction is a DD or DC. Processing of input transactions is typically completed within four hours – and always completed by 06:00 on day two (D-1) and forwarded to the relevant institutions. Amounts are credited/debited on customer accounts (often overnight in batches) in the morning on day three, which is the value date (D), resulting in a three day overall clearing and settlement cycle.

### Bacs settlement

2.4.7 The calculation of the multilateral net settlement figures is communicated at 09:30 on day three to the Bank of England for final settlement, via the RTGS system.

### Bacs service user interface

2.4.8 Bacs payment files are sent over the Bacstel-IP network and proprietary links to the central Bacs infrastructure. PSPs can connect as direct participants. In addition, a total of over 108,000 users connect via DCA. Over 48,000 corporate users connect directly to the infrastructure, with bureaux (e.g. payroll specialists) and agencies representing more than

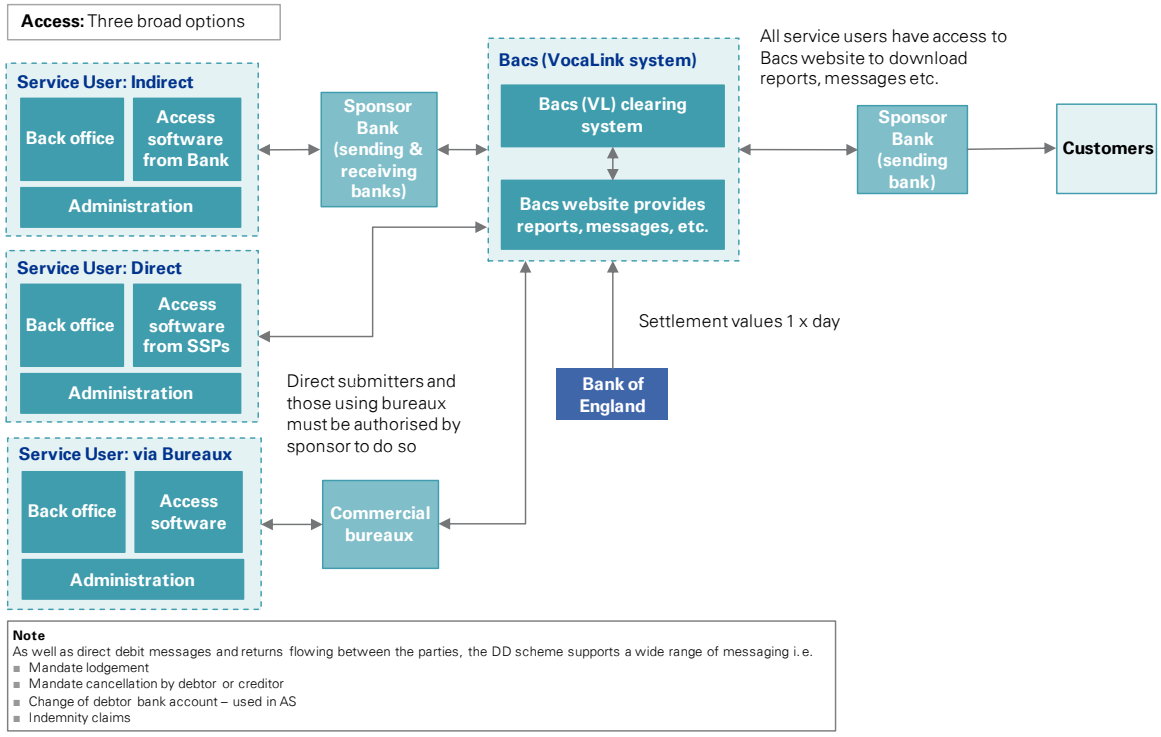
an additional 60,000 corporates using Bacstel-IP to submit payments. Bacstel-IP is one of the largest private sector Internet Protocol Virtual Private Network (IP-VPN) based solutions and is a secure communications infrastructure designed to prevent intrusion and cybercrime. Users can submit payment instructions between two and 71 days ahead of the payment date.

2.4.9 End-to-end PKI requirements for Bacs submission (including over SWIFTNet) require banks to ensure their customers are using bank recognised encryption keys. This security standard is in addition to that required for use of SWIFT. The PKI utilises a number of Certificate Authorities (CAs) and is a competitive mix of owner operated (e.g. Bank of England) and IdenTrust CA-managed security issued by a number of member banks. Some banks provide this as a specialist service to others. Users submit payment instructions through Bacstel-IP, a bespoke submission channel. High volume users of Bacs utilise direct high-speed links (ETS or STS – see 2.10.14 and 2.10.15).

2.4.10 Bacs provides a number of reports and services for the automated management of amendments, queries and changes to instructions. These are referred to as 'A services' and also use the Standard 18 format. Automation of 'A services' was a mandatory programme for both agency and member banks, i.e. all banks using Bacs now use automated Bacs messaging and return payments associated with:

- ADDACS – Automated Direct Debit Amendment and Cancellation Service;
- AWACS – Advice of Wrong Account for Automated Credits Service;
- AUDDIS – Automated Direct Debit Instruction Service;
- ARUDD – Automated Return of Unpaid Direct Debits;
- ARUCS – Automated Return of Unapplied Credits Service;
- DDIC – Direct Debit Indemnity Claim; and
- ToDDaSO – Transfer of Direct Debits and Standing Orders.

Figure 6: Bacs infrastructure access.



### Bacs message standards

2.4.11 Bacs payment messages use a proprietary format known as Standard 18. This message format has limited fixed character length fields which restrict the amount of information that can be provided within the payment.

2.4.12 Standard18 contains two formats for data records: Bacs input and Bacs output. Both of these formats have the same basic field structure of 100 bytes, but the Bacs output format is extended by additional fields. It also defines volume and file and user header records which vary in size.

- The Bacs input format is used by banks and their customers, to send payment data to Bacs by electronic transfer, or other means. After initial validation, the data is forwarded to the relevant bank(s) using Bacs output format. The Bacs input format can be either 100 or 106 bytes. The additional six bytes are used to specify individual processing dates within Bacs.
- The Bacs output is always 120 bytes. The additional 20 bytes contain fields added after validation by Bacs: Error Code, Bacs User Number and Bacs Reference (unique reference for each payment; used by Bacs for query purposes).

The data provided by the BACS output format is useful in providing additional unique identifiers for each transaction. There are several types of data records in Bacs format. These data records are identified by a transaction code and vary depending upon whether the sender is a Bank or a Bank's Customer.

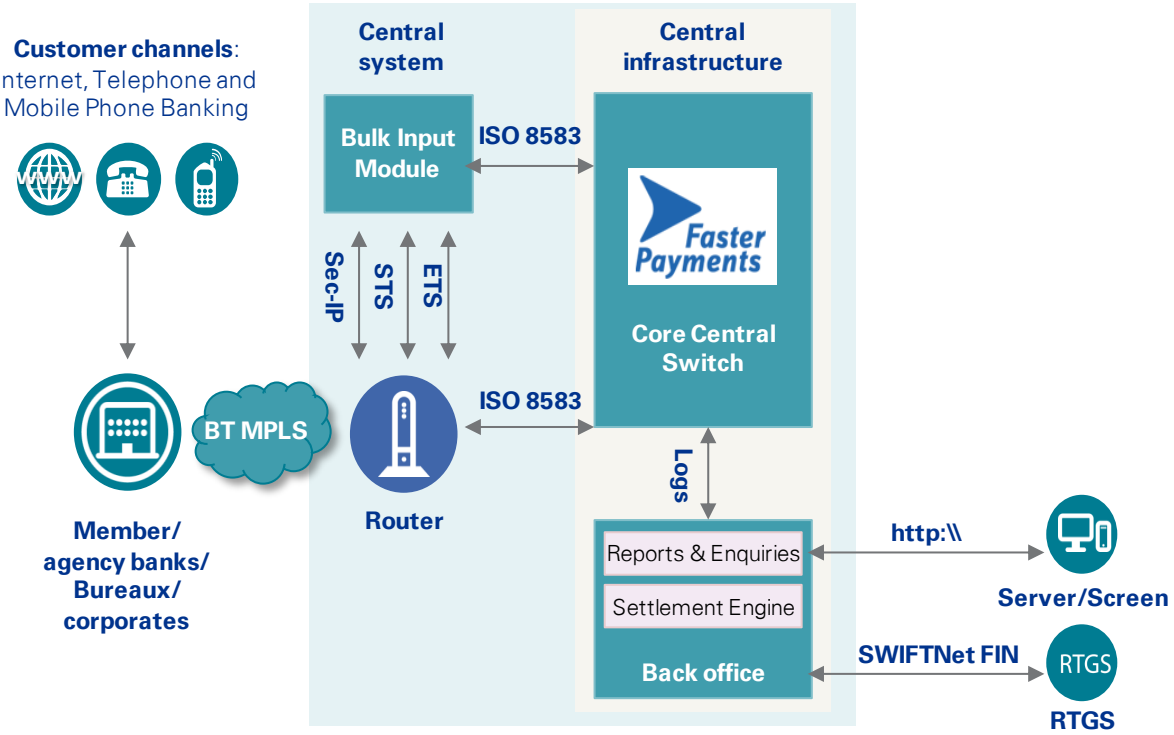
### Recent innovation: CASS

2.4.13 Bacs also supports the management of the Current Account Switch Service, which utilises ISO 20022 XML messages to execute a full account switch from one PSP to another (facilitates the automated migration of all of a service user's direct debits and standing orders). ToDDaSO remains for a partial account switch, where a service user does not close the original account with a PSP, but chooses to move certain transactions to a new provider. (For further cross-scheme related use of ISO 20022 see also Cash ISA transfer service provided by VocaLink 2.10.7.)

## 2.5 Faster Payments Service (FPS)

### FPS overview

Figure 7: FPS overview.




2.5.1 The Faster Payments Scheme Limited (FPSL) operates the FPS and sets the scheme rules. Infrastructure. FPS is recognised by HM Treasury as a Systemically Important Financial Market Infrastructure, and is overseen by the Bank of England. The figure above shows an overview of the FPS system (VocaLink, 2014).

2.5.2 FPS was launched in May 2008 and processes retail or low value credit transfers including all Standing Orders, Single Immediate Payments and Forward Dated Payments up to a current interbank limit of GBP £100,000. This limit is set by the scheme and has been increased since the start of the service, when it was set at £10,000.

2.5.3 FPSL has a contract with VocaLink which owns and operates the infrastructure that processes Faster Payments. Voca and LINK together won a competitive tender to provide the infrastructure solution for FPS in 2006. Voca and LINK merged in 2007.

2.5.4 FPS products include:

- Single Immediate Payments (SIPs): These are one time payments, processed in Near Real Time (NRT).
- Standing Orders and Forward Dated Payments: A Standing Order is a payment that is set up in advance which then occurs regularly. A Forward Dated Payment is a one-off payment that is set up in advance.
- Return Payment: This payment may be sent via FPS when receiving FPS Institutions have accepted payments and subsequently, for any reason, determine that the funds should be returned to the Sending FPS Institutions.
- Scheme Return Payments: These are created by the CI in response to a rejection by a receiving FPS Institution of an Asynchronously Processed payment.

2.5.5 There are a number of methods that have been introduced to allow specific sponsored service users and direct participants to submit bulk files of transactions to FPS and these include:

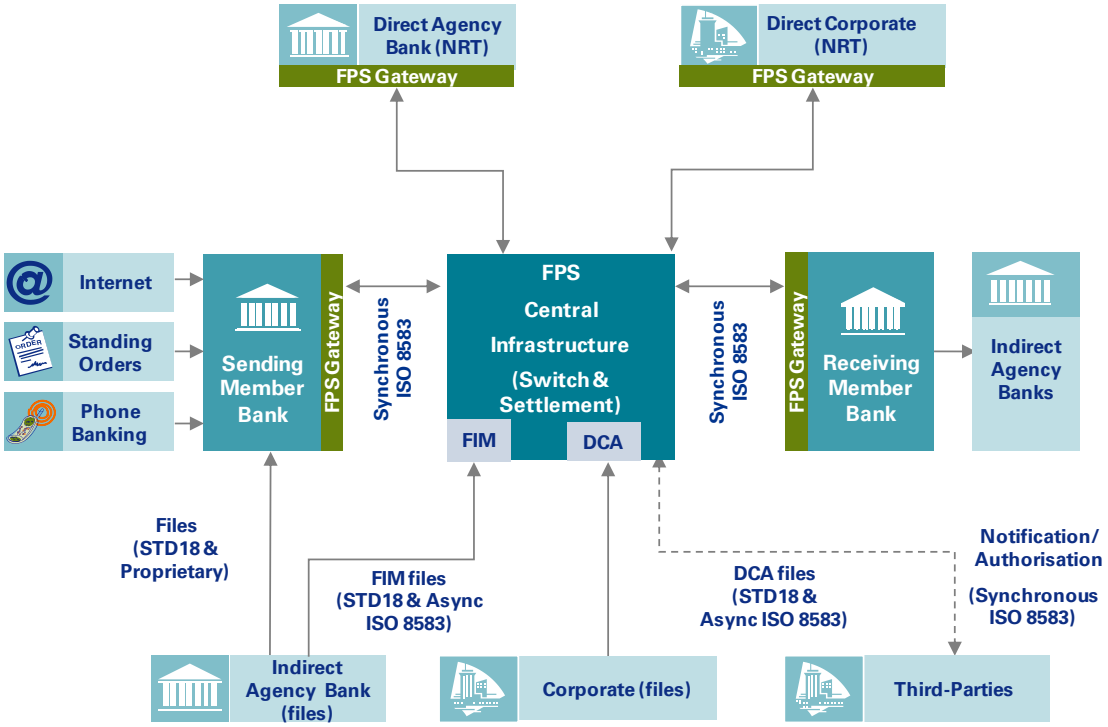
- Direct Corporate Access (DCA) Corporate Bulk Payments: These payments are submitted in files by corporates (or bureaux on behalf of a corporate) directly to the Direct Corporate Access (DCA) service and then on to the Core Central System.
- File Input Module (FIM): This allows FPS institutions to submit a file of payments to FIM using the SWIFTNet FileAct or ETS channels.

## FPS usage

2.5.6 Annual volume in 2013 was 967 million transactions, with a total value of £771 billion. Faster Payments volumes grew 19% from 2012 to 2013 (Payments Council, 2013).

## FPS infrastructure

Figure 8: FPS central infrastructure




## FPS process flows

2.5.7 For Single Immediate Payments, the FPS customer should experience no more than a 15 second wait, from the initiation of the payment (via internet/telephone banking) to the point of confirmation that the transaction is complete. FPS scheme rules state that in the event of a qualified response, at a maximum the funds should be available to the customer within two hours. This time is to allow checks to be made with regard to fraud and money laundering. In some circumstances a qualified acceptance is provided by the receiving bank. The sender bank provides a message to the sender based on the conditional code provided by the receiver.

2.5.8 Faster Payment instructions can be submitted to the central infrastructure 24/7 in either single payment or bulk form. Standing Order (recurring credit transfer) payments currently account for a significant volume and are processed in the early hours of the morning to balance load on the IT architecture, whilst customer transactions typically occur during the day typically between 07:00 and 21:00. Standing Order payments have to be submitted by 06:00 (90% of the daily total). During a weekend or a bank holiday, payments are settled in the first cycle on the next working day at 07:15.

## FPS settlement

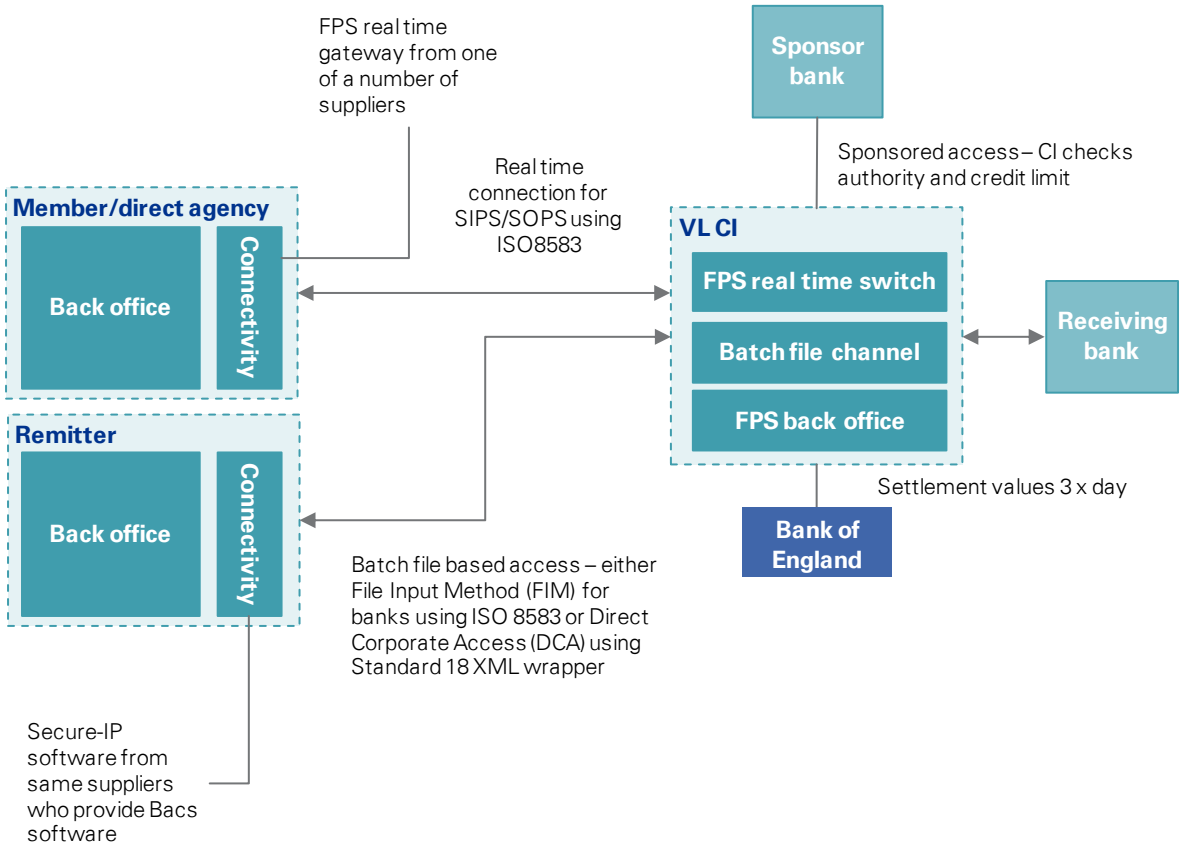
2.5.9 In the background, Deferred Net Settlement (DNS) at the Bank of England settlement accounts occurs (currently) in three daily (weekday) cycles at 07:15, 13:00 and 15:45. This is not transparent to the customer, who typically sees the transaction as complete almost instantaneously. The number of DNS cycles is configurable and could be increased if demand existed and the scheme requested this.

## FPS service user interface

2.5.10 Banks interface with the central switch through ISO 8583 specific payment gateways that have been engineered to connect with the FPS with a proprietary orchestration set up to ensure the correct message flow. There are a limited number of competing solutions available for this gateway provision.

2.5.11 FPS was designed for Single Immediate Payments. There is limited demand for file based submission or collection of payments via FPS. Direct Corporate Access (DCA) is a file based payment submission method at present offered for FPS by one direct member to its sponsored corporate customers. This allows a corporate to submit multiple payments in a single file. With DCA, FPS payment files are input using a Secure-IP solution (similar to Bacstel-IP), using the same standard file format as Bacs transactions (Standard 18) or ISO 20022 XML. This service is operated by VocaLink for direct members and allows their customer to connect directly to the technical platform to submit bulk files of transactions to be unpacked and released by VocaLink into the FPS central infrastructure. The typical SLA for this service is 30 minutes to send the file (see **Error! Reference source not found.** elow).

Figure 9: FPS direct access options.




## FPS message standards

2.5.12 SIPs use the ISO 8583 card processing message protocol with a private message standard defined for FPS messages. For some organisations, bulk FPS payments can be made

through Direct Corporate Access (DCA). The message protocol for the DCA channel supports both ISO 20022 and Standard 18.

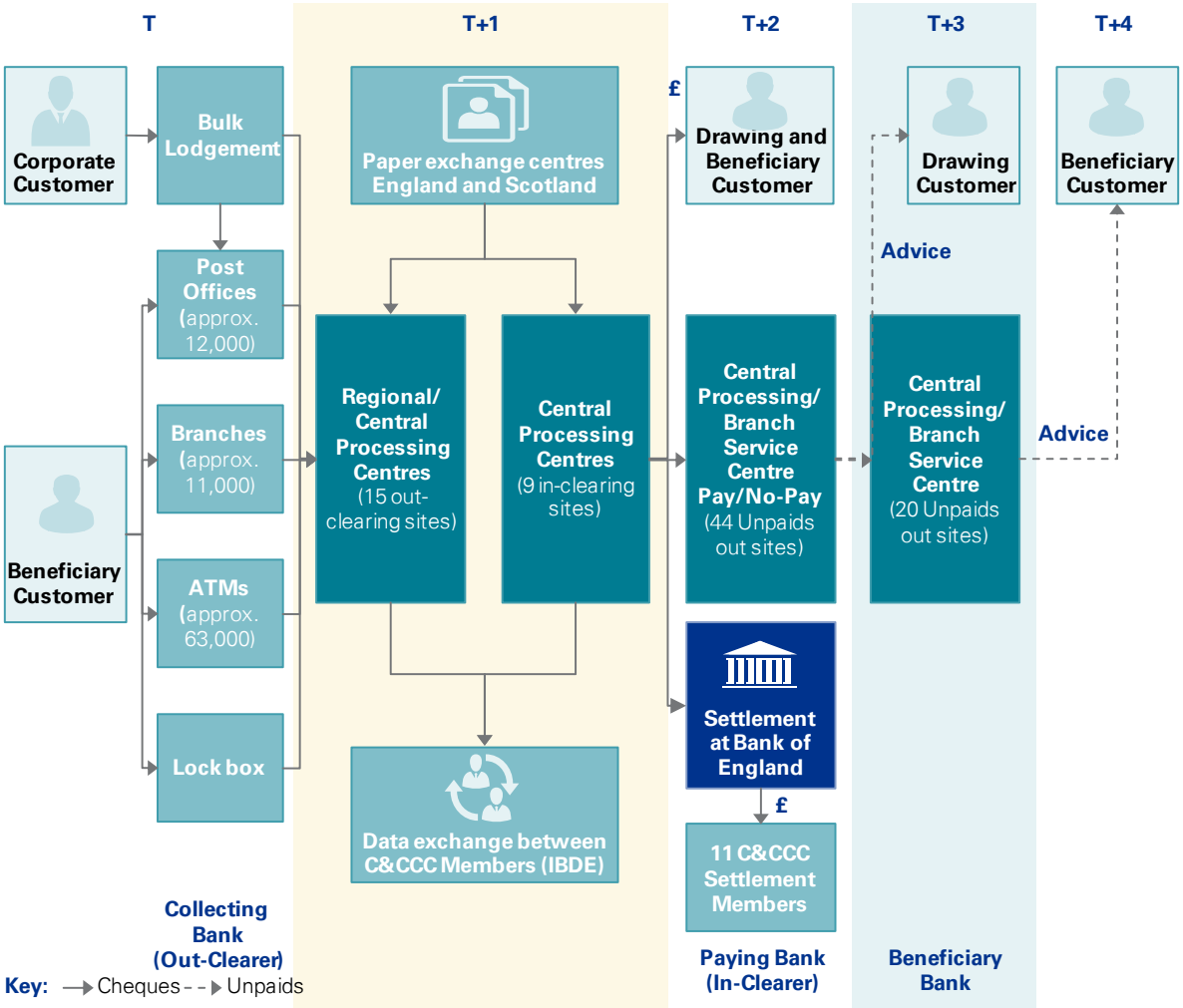
### Recent innovation: Paym

2.5.13 In April 2014, a new facility to pay using just a mobile number, Paym, was launched by layering a proxy database with the Faster Payments infrastructure to facilitate a simpler addressing service for mobile customer payments. Actual payment limits are set by each directly participating bank.

## 2.6 Cheque and Credit Clearing

### C&CCC Overview

Figure 10: C&CCC process overview.




2.6.1 The Cheque and Credit Clearing Company (C&CCC) runs the scheme for the clearing of cheques and paper credits. The Cheque and Credit Clearing Company also manages the systems for the clearing of euro cheques (where drawn on GB banks) and US dollar cheques (where drawn on GB banks C&CCC cheque usage

2.6.2 Annual volumes in 2013 were 570 million cheques/credits, with value £558 billion. Cheque volumes continue to decline year on year and have declined by 13% from 2012 to 2013. (Payments Council, 2013).

### C&CCC infrastructure

2.6.3 Members of the scheme have outsourced many of the processes associated with the clearing of cheques to two commercial providers, IPSL (a joint venture between Unisys and several banks) and Hewlett Packard Enterprise Services.

### C&CCC cheque payment processing flows

2.6.4 The figure above illustrates the cheque clearing processing flow (Cheque and Credit Clearing Company) (Payments Council).

2.6.5 On T+0, cheques are forwarded to each bank's processing centre for scanning and evaluation. Electronic cheque information is forwarded on T+1 over the Inter Bank Data Exchange (IBDE) to the paying bank, with the physical cheque being simultaneously delivered through a central paper exchange centre.

2.6.6 IBDE files must be submitted between 00:01 and 11:00 each business day although the facility to request an extension up to 12:00 exists. Paper must be delivered to one of the agreed exchanges no later than 11:00 each business day. The exchange of paper occurs on day two (T+1) and settlement occurs at the Bank of England on day three (T+2).

2.6.7 The C&CCC provides a centrally managed, distributed payment processing system connected to third party suppliers. These third party service providers (HPES and IPSL – see below in 2.11 and 2.12) provide a daily cheque and credit paper clearing exchange service for normal banking business days at secure premises. There are two exchange centres, one in central England and one in Scotland. The exchange centres are used for credit clearing and euro clearing as well as for sterling cheque clearing. The clearing of cheques and credits and the clearing of euro cheques in Northern Ireland is managed by the Belfast Bankers' Clearing Company.

### C&CCC settlement

2.6.8 Settlement, account debit/credit and interest liability occurs at T+2, although funds are only accessible to service users at T+4. At T+6 the payment is irrevocable. T is the date at which the cheque is submitted by the payee for processing e.g. a customer at a bank counter.

2.6.9 Settlement is on a multilateral net settlement basis through the Bank of England. SWIFT MT messaging is used to transmit advice of the multilateral net settlement figures directly into the RTGS system at the Bank of England for final settlement.

### C&CCC service user interface

2.6.10 The C&CCC's central network infrastructure is the IBDE network. It allows the transfer of digital data on cheques and is provided by BT. This is a secure network to which only members of the cheque clearing system have access.

2.6.11 Cheque data passing across IBDE or between members using the same outsourced processor must be encrypted. It must also be signed with a digital signature for authentication purposes so that the receiving bank can verify that the data has not been tampered with as it passed across the network. The encryption and authentication security sub-system is provided by a third party software supplier. The calculation of netted positions is managed using CGI supplied software and is managed by the C&CCC.

### C&CCC cheque processing message standards

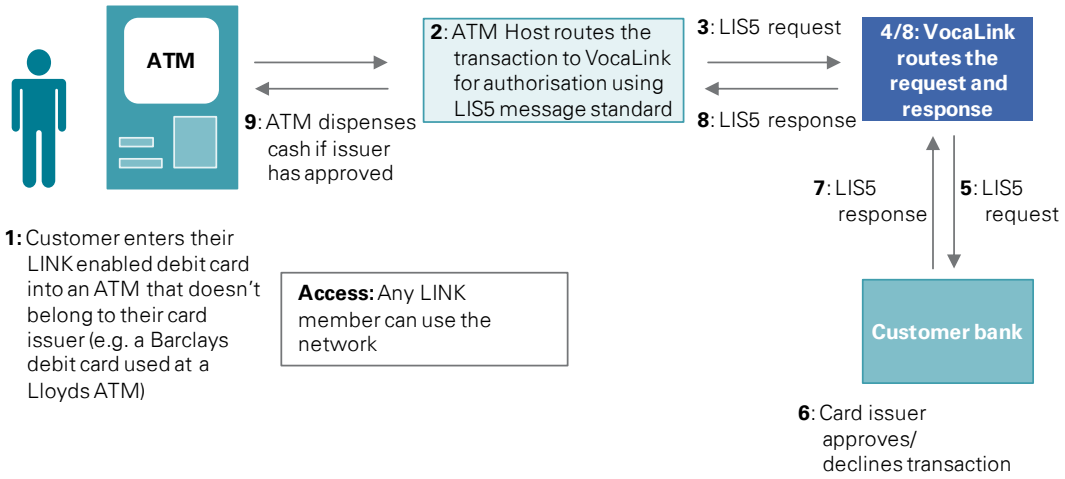
2.6.12 The IBDE standard applies to the electronic exchange of cheque information.

2.6.13 The impending industry move to an image based model, earmarked for implementation circa 2017, may obviate the need for movement of paper between clearing banks, avoiding the associated logistical issues. This creates an opportunity to explore alternate suppliers and new innovation to provide cheque clearing services to customers and truncate the period for confirmed value for settlement of cheques issued.

## 2.7 LINK ATM

### LINK ATM overview

Figure 11: LINK ATM process overview.




2.7.1 The LINK ATM scheme brings together banks, building societies and other institutions that operate cash machines (ATMs) and/or issue cards that can be used in these ATMs.

2.7.2 LINK is an unincorporated body comprising a committee of network members. The LINK switch is owned and operated by VocaLink. Most of the UK's cash machines (approximately 65,500) are connected to the LINK network. Cards designated for use in the LINK network can be used at any ATM that carries the LINK logo. The LINK ATM scheme governs the use of a debit card in an ATM by a customer of a bank, other than the bank that owns the ATM (known as a not on-us transaction). The scheme sets the rules that cover issues such as how transactions are made, how customer data is kept secure, and how any charges that apply are made clear to customers.

2.7.3 LINK is not recognised by HM Treasury as a Systemically Important FMI.

### LINK ATM usage

2.7.4 Annual LINK volumes in 2013 were 3.2 billion transactions, with a total value of £127.5 billion (LINK).

### LINK ATM infrastructure

2.7.5 The LINK switch is a proprietary software switch and is one of the world's busiest switches of this type. The software resides on HP non-stop hardware to ensure 24/7 availability, resilience and scalability. The LINK switch is owned and operated by VocaLink.

### LINK ATM processing

2.7.6 Real time payment messages pass between acquirer host system and issuer host via the LINK switch in real time. The LINK switch is a proprietary implementation of commercially available software and hardware configured and operated by VocaLink.

### LINK ATM settlement

2.7.7 Daily settlement occurs at the Bank of England at 11:00 each day (D+1) based on the position of each member at 20:00 the previous business day (D).

2.7.8 The switch end of business day is at 20:00 each day. On the morning of each working day a bank receives a fax detailing settlement figures. Any significant differences identified in the faxed settlement figures are advised by telephone to VocaLink staff by 09:30. Each direct member is required to fund their settlement account by 11:00.

### LINK ATM service user interface

2.7.9 The LINK ATM network can support (and is not limited to) the following capabilities:

- Processing of ATM cash withdrawal
- Sharing of domestic ATM facilities;
- ATM reciprocity with international schemes (e.g. via MasterCard and Visa);
- Deposit capabilities;
- Mobile Phone Top Up (MPTU);
- Internet Banking Top Up (IBTU – top up of a mobile contract via internet banking);
- Voucher dispense;
- Balance enquiry;
- Mini-statement;
- PIN management;
- Account charging (some ATMs are surcharged);
- Mobile payment transaction

2.7.10 LINK ATM service user interface. The figure above shows the service user interfaces involved in the LINK system, and how ATM providers interface with VocaLink. For example, if a customer of Barclays uses a Lloyds ATM, Lloyds needs to know if it is authorised to pay out the amount that the customer has requested. The Lloyds ATM host sends a message to the VocaLink switch to request authorisation. The VocaLink switch determines that it is a Barclays Bank issued card from the BIN range (first six digits of the card number) and routes the authorisation request to the Barclays ATM host system. Barclays will then send a pay or no-pay message back through the VocaLink switch to the acquirer (Lloyds). In summary, it is the link between acquirer ATM systems and card issuer systems which allows card holders of one member to use the ATM of another

### LINK ATM message standards

2.7.11 LINK operations are based on the LIS5 specifications which include the use of the ISO 8583 message standard, which is the most commonly used standard for ATM and card switches. LINK members adhere to the LIS5 standard as set out by the LINK scheme (see steps 2-8 above in Figure 10).

2.7.12 The LINK network is highly interoperable with other national ATM schemes and LINK has interoperability frameworks in place with a wide range of international card schemes (e.g. Visa and MasterCard) and operators to allow foreign nationals access to cash while in the UK e.g. UnionPay.

2.7.13 The current architecture of the scheme/system does not allow LINK to set up reciprocal interoperability so that UK customers could use an overseas network to achieve similar benefits. This type of arrangement can be established bilaterally by each card issuer.

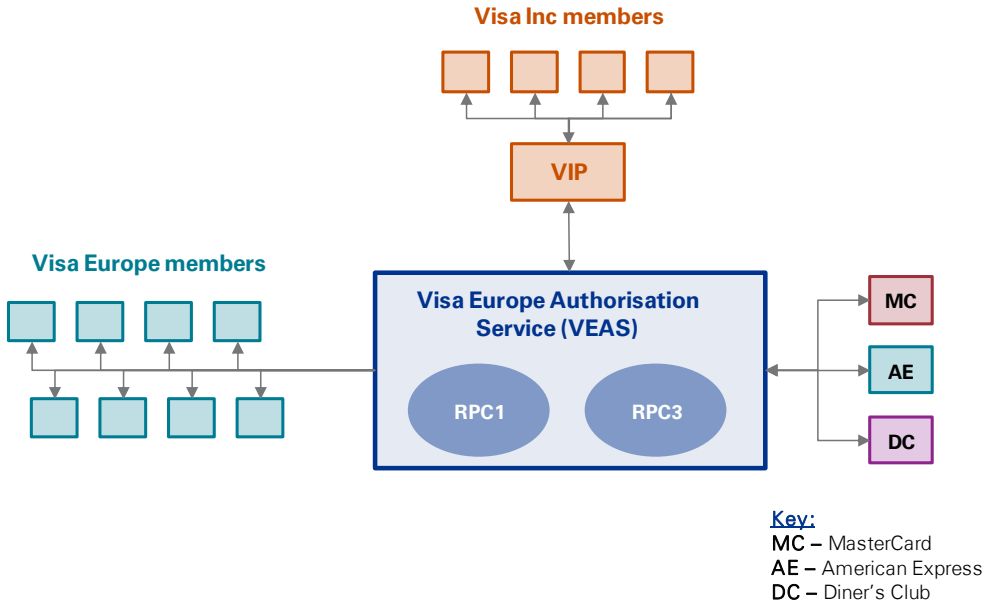
### Recent innovation: Paym

2.7.14 In April 2014, a new facility to pay using just a mobile number, Paym, was launched by layering a proxy database with the Faster Payments and LINK infrastructures to facilitate a simpler addressing service for mobile customer payments. Actual payment limits are set by each directly participating bank.

## 2.8 Visa Europe

### Visa Europe overview

Figure 12: Visa Europe authorisation service.




2.8.1 Visa Europe is a membership organisation, headquartered in the UK that is owned and operated by its 3000 members across Europe. Members consist of banks, financial institutions and other PSPs. Visa Europe is a distinct entity from Visa Inc (an international organisation), from which it has an exclusive, irrevocable and perpetual license to provide Visa branded products and services in Europe. Visa Europe is a shareholder in Visa Inc. and the two organisations work closely to ensure interoperability of Visa payments worldwide.

2.8.2 Visa Europe is primarily a payment processor, in that it does not act as an acquirer or issuer, but provides the network and processing infrastructure to enable the authorisation, clearing and settlement of card payments.

### Visa Europe infrastructure

2.8.3 The Visa Europe infrastructure consists of three core components, dedicated to the specific functions required across the card network:

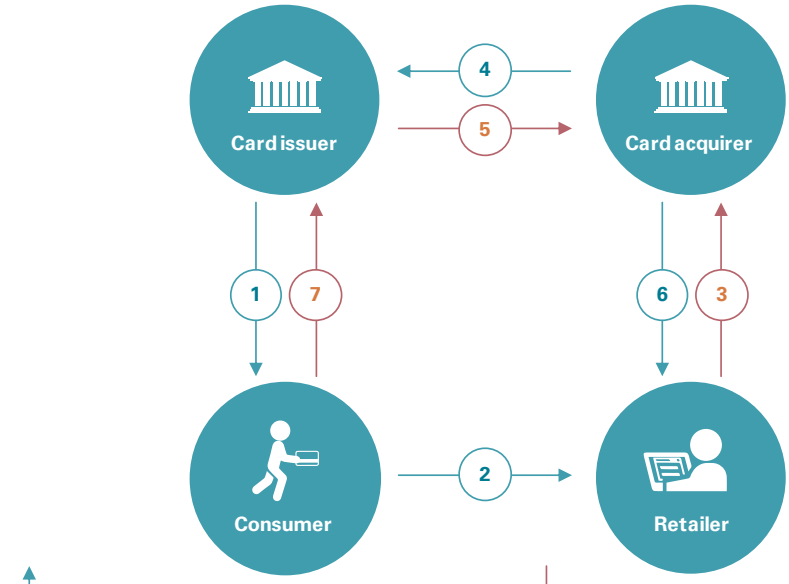
- The Regional Network Infrastructure (RNI) is the network that links Visa Europe, its member banks and processors. The RNI is provided by BT.
- The Visa Europe Authorisation Service (VEAS) is a real-time service that routes and processes payment authorisation transactions, enabling almost instant Point of Sale experiences.
- The Visa Europe Clearing and Settlement Service (VECSS) is a batch service that manages the clearing and settlement of authorised transactions between Visa Europe member banks.

2.8.4 The Visa Europe Authorisation Service is a high availability (99.999%) service that processes the authorisation of card transactions made across the network. The components of the service (Figure 11) are duplicated across data centres (RPC1 and RPC3) in active/active architecture to provide a very high level of resilience in the case of component failure or change.

2.8.5 Settlement in the Visa Europe scheme occurs at designated, often commercial banks for each jurisdiction. In the UK, Visa Europe settles through the Bank of England.

## Visa Europe processing flows

Figure 13: Visa Europe four party model.




1. The issuer provides the consumer a Visa account – which could be debit, credit or repaid. The account could operate via a physical card, mobile or be online only.
2. The consumer selects goods to buy and indicates that they want to Pay by Visa.
3. The retailer submits the transaction to the acquirer.
4. The acquirer submits the transaction to the issuer.
5. The issuer approves the transaction – and remits the retailer price to the acquirer, less an interchange fee.
6. The acquirer pays the retailer, less a merchant service charge (which is negotiated directly between the acquirer and the retailer).
7. The consumer's account is debited the retailer price which appears on their statement.

2.8.6 There are two processes that must occur relating to a card transaction:

- Authorisation, the process by which the customer's bank (the issuer) approves the transaction; and
- Clearing and settlement, the process by which merchants and financial institutions are paid for their services.

2.8.7 Visa follows a 'four party' model of card processing, in that there are four key participants in the purchase process: the card issuer, the customer, the retailer and the acquirer. The issuer refers to the financial institution that provides Visa-branded cards to the customer (whether debit, credit or prepaid), and may also offer current account or credit facilities to the customer. The acquirer refers to the financial institution that collects Visa payments on behalf of the merchant.

## Visa Europe service user interface

2.8.8 Merchants accumulate transaction details throughout the day, including account numbers and transaction values and submit the batch files to their acquirer. Their acquirer submits transaction files to VECSS, which clears the transactions across Visa member institutions and settles them at designated banks.

## Visa Europe settlement process

2.8.9 The exchange of funds within clearing and settlement process is as follows:

- The issuer bank credits the acquirer with the face value of the transaction minus an 'interchange fee' to cover the cost of the issuer and network.
- The acquirer credits the merchant with the face value of the transaction minus the 'merchant service charge', which will typically include the interchange fee plus a

margin. The merchant service charge is negotiated individually between the retailer and the acquirer.

- The customer's account is debited the full retail price by their issuer, which appears on their statement.

2.8.10 For intra-UK transactions, Visa settles multilaterally via the RTGS system on a daily basis. As of October 2013, Visa Europe settles sterling transactions daily across accounts at the Bank of England.

2.8.11 Many Visa members settle via their own settlement account held at the Bank of England, whilst others (who do not have a settlement account) settle via an arrangement to use another commercial bank's account. Finally, Visa uses its own commercial bank arrangements to settle for a number of members who do not have their own settlement account nor the ability to use the account of another member.

2.8.12 Notification of net positions is provided to participants by 07:30 daily, with the cut-off time for payments instructions to settle these positions at 12:30. Actual settlement occurs at 14:00.

### Visa Europe message standards

2.8.13 Visa employs the ISO 8583 card standard for authorisation.

### Recent Innovation

2.8.14 Visa payWave Is a contactless payment service, which supports both contactless payment cards and Near Field Communication (NFC)-enabled mobile devices. This is also being extended to mobile phones.

2.8.15 V.me by Visa digital wallet service is offered by banks and financial institutions allowing consumers to pay online, simply and securely, using just an email address and password.

2.8.16 Targeted Marketing Solutions helps retailers identify the best way to engage with existing and potential customers through the medium of card-linked offers to drive incremental sales. As well as funding the cash back offers, retailers also pay a commission on all successful sales, to be shared across involved parties based on their contribution to the overall service. Cardholders will be invited to actively opt in to the programme, decide when and how to receive their offers and be able to change their settings or opt out at any time. Retailers will not be able to identify individuals and will not receive any individual-level data.

2.8.17 Visa Personal Payments is a person-to-person payment solution, which allows Visa cardholders to send money to each other using their mobile phones. The emphasis is on simplicity. It is easy to make and receive payments (all the sender needs to know to initiate a payment is the recipient's mobile telephone number or Visa account number). Issuers can participate in the service via an API (Application Programming Interface) which enables easy integration with the issuer's mobile bank app, website or ATMs. More than 30 members have signed up to the service, which went live during 2013, most notably with RBS/NatWest. Visa expects to develop this infrastructure and the functionality (with the roll-out of the open APIs and multi-currency capabilities)and expects uptake to escalate.

## 2.9 MasterCard Worldwide

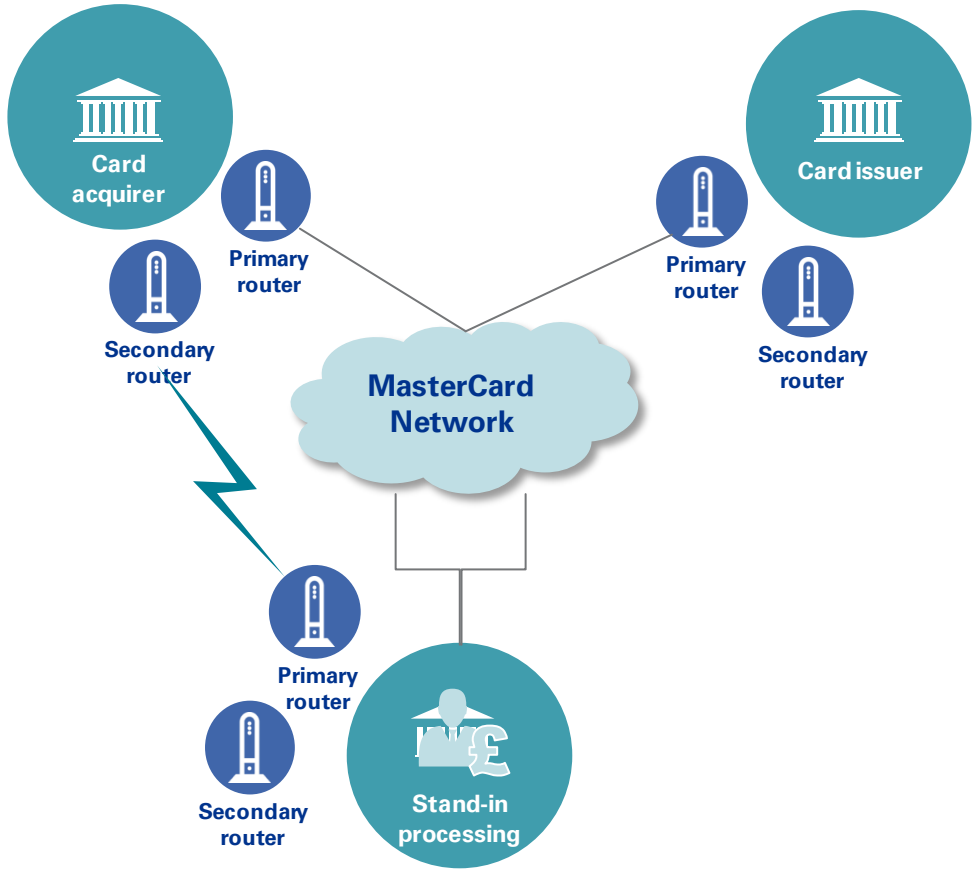



Figure 14: MasterCard network overview

### MasterCard overview

2.9.1 MasterCard is a technology company in the global payments business providing payment options covering debit, credit, prepaid, corporate, contactless, online and mobile payments through a globally integrated processing network. MasterCard connects more than 23,000 financial institutions in over 210 countries.

### Mastercard usage

2.9.2 Global MasterCard credit card expenditure was $2.31 trillion (€1.69 trillion) for the year end December 2013, of which $322 billion (€235.2 billion) was commercial credit. Debit/prepaid card expenditure globally was $1.79 trillion (€1.31 trillion) for MasterCard branded cards (MasterCard, 2013).

2.9.3 As of December 2013, there were 741 million MasterCard credit cards in usage and 540 million MasterCard debit cards in circulation. In addition, there were 706 million Maestro debit cards, globally (MasterCard, 2013).

### MasterCard infrastructure

2.9.4 The MasterCard infrastructure consists of the following components:

- The MasterCard Worldwide Network (MWN) is a global MPLS network that links all MasterCard members and MasterCard processing centres.
- The MasterCard Authorisation Platform (MAP) is an international message processing system that transmits validation data amongst issuers, acquirers and other points of interaction.
- The Global Clearing Management System (GCMS) manages the clearing of credit and debit transactions. It is owned and operated by MasterCard.

2.9.5 Customers connect to the MWN through a MasterCard Interface Processor (MIP), which is a mid-range front-end communications processor located on-site at the customer facility. The MIP facilitates the following activities:

- Message editing and validation;
- Message routing;
- Message logging and time-stamping for network statistics;
- Proxy server between member host and network;
- Monitoring data communications status with the member host.

2.9.6 The MWN is managed 24/7, 365 days a year from two global management sites. The primary site is located in the U.S.A. The MWN achieves an average network availability of 99.99%.

2.9.7 Authorisation flows take place between merchant acquirers and issuers over the MWN, via the MIPs each participant uses to connect to the MWN.

### MasterCard processing flows

2.9.8 The authorisation message flows for MasterCard occur at the point of sale. The message format used for authorisation is the card-standard ISO 8583.

2.9.9 The clearing process for MasterCard transactions occurs over the MasterCard network through the centralised GCMS. Clearing messages are transmitted in the IPM (Integrated Product Message) format, which is based upon the ISO 8583 format.

2.9.10 Customers can transmit data for clearing during six clearing cycles, typically accumulating transaction data for bulk submission throughout the business day. Clearing data is typically transmitted via MIP processors installed at customer sites, but can also be performed using MasterCard File Express or Connect:Direct (an IBM managed file transfer product).

### MasterCard settlement

2.9.11 Settlement occurs at a designated settlement bank (typically a commercial bank), where members are required to post funds for any net cash outflows as determined by the clearing process. Settlement for MasterCard positions is solely via a designated commercial settlement bank.

### MasterCard service user interfaces

2.9.12 Connectivity to the MasterCard network primarily occurs through MIPs, located on customer sites that grant access to the MasterCard systems.

### MasterCard message standards

2.9.13 Authorisation messages are sent using the ISO 8583 card standard format. Customers send clearing data to GCMS using a proprietary format based on the ISO 8583 format.

### Recent innovation

2.9.14 In 2013, MasterCard introduced MasterPass to enable consumers to make convenient, simple, fast and secure digital payments. Digital wallets accessible through the MasterPass acceptance network allow consumers to store all their MasterCard or other branded credit, debit or cheque card information, and shipping and billing address details securely in one place. This gives them the ability to make secure online payments without the repeated hassle of entering these details each time.

## 2.10 VocaLink

2.10.1 VocaLink is a major infrastructure provider in the UK, supporting the Bacs, FPS and LINK schemes. VocaLink provides the IT platforms, connectivity, operations and customer support directly to users such as banks and the Government to reduce costs, increase resilience and provide automated and in person handling of customer queries.

2.10.2 In addition to the connectivity banks maintain, VocaLink provides direct technical access to directly connected corporates and non banks to facilitate smooth processing of significant volumes of bill collection, payroll and social welfare benefits. These transactions are sponsored by a bank, without having to submit transactions first to a bank. The scale of this direct connectivity and capability is a unique feature of the UK infrastructure design.

### VocaLink services

2.10.3 Bacs: VocaLink runs, maintains and services the technical infrastructure that processes automated payments on behalf of Bacs. These are file based clearing systems. On a peak day, VocaLink processes 98 million Bacs transactions through the data centres (see section 2.4 for processing information). VocaLink handles the clearing of transactions and transmits the calculation of settlement amounts and details for the Bank of England settlement process. Output files are released from VocaLink to receiving PSPs along with processing data and required management information, reporting and invoicing (for processing).

2.10.4 Faster Payments Service: VocaLink runs the FPS on behalf of the Faster Payments Scheme Limited. The service operates 24x7 and offers direct customer initiation and instant transfer of value to the beneficiary (see section 2.5). VocaLink operates a real time switch for the real time communications and transmits the calculation of settlement amounts for the Bank of England settlement process (currently) three times a day.

2.10.5 CASS**:** The Current Account Switch Service (CASS) was introduced in September 2013 to provide a robust service for personal, business (microenterprise), charity and trust banking customers who want to fully switch their current account from one bank to another. CASS offers a seamless service that completes in seven working days (a Full Account Switch). The accounts covered by this service are UK sterling current accounts including personal and business current accounts. The service is currently (2014) switching approximately 100,000 current accounts per month.

2.10.6 EISCD**:** At a technical level VocaLink maintains the UK Extended Industry Sort Code Directory (EISCD) for the industry. The EISCD database contains payments related information for UK banks and building societies that participate in UK clearing systems. The database is updated on a weekly basis. Relevant UK clearing systems include Bacs, Faster Payments, CHAPS, plus Cheque and Credit Clearing. The EISCD replaces the old ISCD which did not include details about Faster Payments. Charges for the EISCD apply on a quarterly basis and are based on the licence type. The EISCD can be downloaded as many times as required. Modulus checking and Sort Code Finder are also available. TPSPs also use master distributor licenses to embed this data into products and services.

2.10.7 Cash ISA: This is a service to provide the messaging capability between the old and new Cash ISA providers, creating requests for the information required to make the transfer happen within 15 days of the customer's request. The final balance transfer from the old provider to the new provider is transferred using Faster Payments, CHAPS or Bacs.

2.10.8 LINK ATM switching: VocaLink provides the infrastructure behind the LINK Scheme and the ATM switch (see section 2.6). The LINK switch is the busiest ATM switch in the world, at peak processing over 1m messages an hour.

2.10.9 ATM Managed Service: The ATM Managed Service provides a commercial, competitive solution for companies wishing to outsource their ATM network requirements. It provides:

- Management of an ATM estate, ensures full regulatory compliance;
- Safe services, ATM staging, connectivity, installation and testing; and

- Support for different transaction types, including cash withdrawals, dynamic currency conversion and mobile phone top-ups.

2.10.10 Mobile ATM: This enables third party mobile banking solution providers to indirectly connect to a bank's infrastructure to access balance information, mini statements and perform mobile phone top-ups. For banks that choose to outsource their mobile banking solutions to third parties, VocaLink re-uses the LINK infrastructure to enable access to a customer's account and the authorisation of funds for a mobile phone top-up. With this indirect approach, mobile banking providers do not need to directly integrate with banks' back end platforms.

2.10.11 Post Office network banking: This enables customers to withdraw/deposit cash and obtain account balances and mini statements at Post Office counters (subject to card issuer acceptance). The service has enabled free customer access to basic banking facilities with the ability to withdraw 'non-standard' values of cash (for example £58.60).

2.10.12 Department for Work and Pensions (DWP): The DWP utilises sponsored access to the Bacs and FPS systems directly via VocaLink. In this way, 98% of state benefits and 95% of all salaries are paid out as CTs. This accounts for a significant proportion (more than 20%) of daily volume within the Bacs operation. Additional services VocaLink provides to the DWP include urgent payments, payment redirection, report collection and delivery, and routing of overseas payments.

2.10.13 Accurate and Real Time Information on Earnings (ARTiE) or Real Time Information (RTI): This is a solution provided by HM Revenue and Customs (HMRC) and Aspire, with support from VocaLink. The programme improves the operation of PAYE, allowing employers and HMRC to operate the system and provide employees with information. ARTiE does not change the fundamentals of PAYE, e.g. the use of codes, tax deductions and National Insurance (NI). RTI forms a critical part of the planned architecture for Universal Credit.

2.10.14 Paym: Paym allows bank customers to send instant payments to other people from their banking applications using a mobile number. The system went live in April 2014. The Mobile Payments Platform, which sits behind Paym, securely stores mobile numbers which are associated with account numbers and sort codes and/or 16 digit debit card numbers. Payments are then delivered using either FPS or LINK infrastructure.

### VocaLink connectivity options

2.10.15 The following paragraphs outline the connectivity products and services provided by VocaLink in relation to the payment systems for which it provides the central infrastructure. In some cases it is possible for other suppliers to develop and provide similar, competing solutions to PSPs, and this has already happened in the case of the VocaLink Payments Switch, for example.

2.10.16 There are a number of connectivity options that have been developed over time to meet the diverse needs of service users depending on the volume and speed of transmission required, their internal systems environment and with Faster Payments, their requirement for 24/7 support. Each scheme has typically developed its own transmission protocol and security arrangements with little overlap or re-use to date. Many users also have multiple instances of connectivity and diverse routing to provide resilience in the event of a communications failure.

2.10.17 Faster Payments Managed Service (FPMS): FPMS is a hosted service that provides connectivity to the FPS to allow the user to retain existing systems and connectivity. FPMS provides:

- Single Payment Gateway: Send and receive SIPs and Standing Orders through a gateway that is certified in accordance with scheme rules.
- File Submission Service: Submits files directly into the FPS.
- Stand-in Service: Manages customer messages and responds accordingly if the user is unable to connect to the FPMS at any time.

FPMS also utilises Secure-IP. It provides a secure access channel into VocaLink using internet technologies and public key infrastructure (PKI) security. It allows access to VocaLink payment services including payment file processing, report accessing and related services. FPMS supports ISO 8583, and could support ISO 20022 XML (although this is not currently being used).

2.10.18 VocaLink Payments Switch**:** The VocaLink Payments Switch (VPS) is a standalone gateway product offering to banks or other authorised organisations to connect and participate in the FPS. The VocaLink Payments Switch User Interface (VPS UI) provides a web-based interface to manage certain aspects of VPS. Depending on the sponsoring bank's chosen options, a variety of screens are available to monitor and manage VPS. VPS supports ISO 20022 XML input to FPS, and this is currently being utilized by one bank. It is designed primarily to support ISO 8583. Other products are available from alternative suppliers.

Figure 15: VocaLink connectivity options.

| | System | Formats | Protocol | Security/ PKI | Format Transforms | Users |
|---|---|---|---|---|---|---|
| **ETS** | Bacs | Any | SOAP/TCP | Bacs PKI | No | 3-4 Banks |
| **STS** | Bacs | Any | SWIFT FileAct | Bacs PKI SWIFT PKI | No | 5-6 Banks |
| **Bacstel-IP** | Bacs | STD18 | SOAP/TCP | Bacs PKI | No | Many Bacs users |
| **FPS Gateway** | FPS | ISO8583 | Socket | FPS MAC | ISO20022 to ISO8583 | VL and four banks |
| **FPMS** | FPS | ISO8583 | MQ Web Service | TLS | No | PayPal only |
| **DCA** | FPS | STD18 | SOAP/TCP (Secure IP) | Bacs PKI | STD18 to ISO8583 | Barclays sponsored corporates |
| **FIM** | FPS | ISO8583 ISO20022 | SOAP/TCP (ETS) | BacsPKI | ISO20022 to ISO8583 | One user only |
| **LINK** | LINK | ISO8583 | Socket | None | No | Link Scheme Members |
| **Bank of England for Settlement** | All | SWIFT MT | SWIFT FIN | SWIFT PKI | No | All Services |

2.10.19 SWIFTNet Transmission Service (STS): STS is a VocaLink data channel based on SWIFTNet FileAct, over which data can be sent to the Bacs service at high volumes, high speeds and with high security (enhanced with end to end Bacs PKI). This channel utilises SWIFTNet technology, the IP-based SWIFT network linking financial institutions globally. ETS is an alternative service (see 2.10.19)

2.10.20 Enhanced Transmission Service (ETS): ETS is a high speed, high volume, high security, format agnostic input/output channel for members and agency banks of Bacs services, bank and Government grade originators and Faster Payments users. It is a proprietary VocaLink channel.

2.10.21 Fixed Extranet: This provides users with two fully installed fixed connections (lines and routers) into VocaLink's Virtual Private Network (VPN). The service is designed for users submitting either large item volumes or high item values who require a consistent and managed connection, with speeds from 256kbps up to 2Mb+. This service extends VocaLink's VPN directly to customer site(s).

Figure 16: Standards supported via VocaLink connectivity options

| Protocol | STD18 | ISO 8583 | ISO 20022 | SWIFT MT |
|---|---|---|---|---|
| FPS CI Socket | ✗ | ✓ | ✗ | ✗ |
| Bacstel--IP | ✓ | ✗ | ✗ | ✗ |
| Secure IP | ✓ | ✓ | ✓ | ✗ |
| ETS | ✓ | ✓ | ✓ | ✗ |
| STS | ✓ | ✓ | ✓ | ✗ |
| SWIFT FileAct | ✓ | ✓ | ✓ | ✗ |
| SWIFT FIM | ✗ | ✗ | ✗ | ✓ |
| SWIFT InterAct | ✓ | ✓ | ✓ | ✗ |
| FTPS | ✓ | ✓ | ✓ | ✗ |
| AS2 | ✓ | ✓ | ✓ | ✗ |
| Web Services | ✓ | ✓ | ✓ | ✗ |
| REST/JSON | ✓ | ✓ | ✓ | ✗ |

## 2.11 HPES (Hewlett Packard Enterprise Services) and HPI (Hewlett Packard Ireland)

### Infrastructure.

2.11.1 Hewlett Packard Enterprise Services is a major infrastructure provider and has managed the cheque clearing process within RBSG (the Royal Bank of Scotland Group) for many years by providing Business Process Outsourcing (BPO) services at 11 locations throughout the UK. The larger sites, some of which run 24/7, are equipped with voucher sorting machines. Smaller sites employ image capture technology.

### Usage.

2.11.2 During 2010, these sites processed a monthly average of 71.6 million items for all work streams, which included a monthly average of 65.2 million cheques within the out- and in-clearing processes.

2.11.3 RBSG continues to work in partnership with HP and operates a BPO model that reduces costs, prevents fraud, manages change and aids regulatory compliance. This operating model helps the bank to cope as cheque usage declines.

**Processing.**

2.11.4 The services provided by HPES and HPI for cheque and credit clearing and processing for RBSG:

- Third party provision of the generic cheque and credit clearing processing for items paid-in over GB and Ulster Bank branch counters (approximately one million items per day).
- Third party provision of generic clearing processing of work received from other banks via the Clearing Exchange.
- Third party service (image based) to validate cheques received via In clearing.
- Third party service to return unpaid cheques to collecting bank, received via in clearing that Ulster Bank has decided not to pay.
- Third party service to provide high volume (>50) image requests for Ulster Bank customers and/or internal use.
- Third party post processing research function dealing with all clearing related queries and settlement differences generated by other banks or internal.
- Processing is delivered via fifteen centres spread throughout the UK with disaster recovery resilience provided via alternative site processing in the event a stricken site is unable to process work. The service is heavily dependent upon on the delivery of work to the respective locations from RBS sites in accordance with agreed delivery profiles received from branch/RBS locations via TNT couriers contractually managed via Contract Management Cash and Logistics.
- Completion of all processing and capture of all work needs to be undertaken by 22.00 daily in order that the resultant data files can be incorporated in the RBS overnight batch and customer entries are posted in accordance with terms and conditions and Industry standard*s*.

2.11.5 Applications include cheque out-clearing and cheque in-clearing. HPES services include cheque clearing services, document processing services, inbound and outbound processing services.

2.11.6 HP is the sole provider to RBS for clearing services as outlined above and alternate options currently available are limited given the scale complexity and cost associated with the current Industry model. IPSL is the only alternate provider of a comparable service and they supply services to the remaining clearing banks in the UK.

## 2.12 IPSL

**Overview.**

2.12.1 IPSL Limited is a major infrastructure provider. IPSL is a Unisys company that provides a UK Business Process Outsourcing (BPO) joint venture between Unisys, Barclays, HSBC & Lloyds Banking Group (three major banks and an outsourcing and technology services company). In addition to providing processing services to Barclays, HSBC and Lloyds, IPSL also provides services to UPSL. UPSL is an entity 100% owned by Unisys that sub-contracts IPSL services to other PSPs, including other C&CCC member banks (except RBS) and many agency banks.

2.12.2 The company was established in 2000 as a joint venture between Unisys, Barclays Bank and Lloyds Bank Group to benefit from the efficiencies of scale. HSBC joined the venture as a shareholder in 2001.

### Infrastructure.

2.12.3 IPSL currently operates nine processing sites and employs approximately 1,800 personnel undertaking a number of services for clients and their associated agency customers:

- Clearing processing;
- Fraud Detection;
- Payment Activities;
- Settlement and Reconciliation processes;
- Exceptions handling, including Research & Adjustment functions;
- Returns Processing; and
- Signature Mandates.

2.12.4 IPSL provides the UK domestic cheque clearing and associated services such as debit/credit out clearing, fraud detection, image based returns and lock box facilities. It also undertakes other complementary services such as Research and Adjustments and Mandates.

### Recent innovation.

2.12.5 IPSL has recently also taken over the International cheque clearing process for one of the major high street banks; where the risks are in foreign currency such as Dollars and Euros.

2.12.6 The introduction of Image Based In Clearing (IBIC) is now underway.

# 3 Achieving a world leading payments infrastructure

## 3.1 Desired attributes

3.1.1 In order to inform the objectives of the PSR, we define a model for what a world leading payments infrastructure should entail. There is no universally accepted definition of what a world leading payment system is, but it is recognised that there are a number of core attributes that are desirable in a high-functioning payment system. We identify four primary attributes of a world leading payments infrastructure.

3.1.2 A world-leading payment infrastructure should have the following core attributes:

- Adhere to international standards and principles;
- Superior service user outcomes and benefits;
- Superior PSP efficiency;
- Superior security and resilience.

3.1.3 The payments infrastructure is defined as the hardware, software and operating environment to support the payment instruments and mechanisms used (where rules are determined by payment systems operators) for the clearing and settlement of payment transactions. The central payment infrastructures have a number of components that typically involve the management of inbound and outbound instructions, validation; routing; calculation of settlement positions; management of transaction processing; reporting of information and correct handling of relevant reference data.

3.1.4 The payments community recognises that there is not one single world leading payments infrastructure currently in place. Rather, specific systems within various countries have world leading attributes in terms of superior speed, functionality and benefits to direct users (typically banks and financial institutions) and service users. Furthermore, the attributes of a world leading payment system continue to evolve.

3.1.5 The areas of most visible investment in innovation tend to be the competitive domain, and more recently in payment initiation and reporting capabilities. Investment in innovation within central infrastructure requires cross-industry agreement to upgrade or connect to the new service or make required changes.

3.1.6 The figure below summarises the examples of countries in which each of these attributes is considered to be particularly notable. Some of the individual attributes are then discussed in greater depth in sections 3.2 – 3.5,

Figure 17: World leading attributes of a payment infrastructure.

| World-leading attribute | Attribute description | Country examples |
|---|---|---|
| **Adherence to international standards** | ■ Meet CPSS IOSCO standards<br>■ Adoption of sound legal frameworks to support clearing and settlement and customer protection of funds<br>■ Adoption of international messaging standards | ■ Examples include: US, UK, Euro (EBA, SIA SSB and TARGET2), Hong Kong and Japan |
| **Superior service user outcomes and benefits** | ■ Enhanced management of intraday liquidity and counterparty credit risk<br>■ Low cost; high value for money<br>■ Speed, timing and efficiency of transaction, | ■ UK (mobile payments such as Pingit (proprietary), Paym (collaborative), Faster payments), PayPal |

| World-leading attribute | Attribute description | Country examples |
|---|---|---|
| | clearing and settlement<br>■ Ease of integration<br>■ Easy customer access to funds and information<br>■ Service levels and availability<br>■ Functionality of services<br>■ Customer satisfaction<br>■ Security of transaction and related transaction data | ■ Mexico SPEI system<br>■ Singapore FAST platform, Sweden SWISH mobile real time services and BiR, Africa Mpesa |
| **Superior PSP efficiency** | ■ Low cost to connect<br>■ Synergies with other schemes<br>■ Investment in resilience and capacity | ■ Brazil SITRAF<br>■ Mexico<br>■ Switzerland SIX |
| **Superior security and resilience** | ■ Resilience to operational risks<br>■ Superior protection from security risks<br>■ Cyber security risk management<br>■ Cross system integrity<br>■ Critical national infrastructure standards | ■ G20 countries |

## 3.2 Adhering to international standards

### Meet CPSS IOSCO standards and adopt sound legal frameworks to support clearing and settlement and customer protection of funds

3.2.1 The Committee on Payment and Settlement Systems (CPSS) and the International Organisation of Securities Commissions (IOSCO) principles underpin the design of Financial Market Infrastructures. Innovation and change management to improve service user outcomes need to be balanced with the requirement for safety and soundness of the system to ensure the continuation of payment transaction processing to support wider national economic activity.

3.2.2 The CPSS and IOSCO committees continue to closely monitor the implementation of the Principles for Financial Market Infrastructures (PFMIs). The PFMIs (published by CPSS and IOSCO in April 2012) are international standards for payment, clearing and settlement systems, and for trade repositories. They set minimum outcomes to ensure that the payments infrastructure supporting the global financial markets are robust and well placed to withstand financial shocks, both domestically and those that have the potential to create a systemic shock. The principles aim to ensure efficient management of legal, credit, liquidity, operational, general business, custody, investment and other risks as well as sound governance arrangements, objective and open access and the efficiency and effectiveness of systemically important payment infrastructures. The requirements are proportionate to the specific risks to which such systems are exposed. The UK has adopted the CPSS-IOSCO principles for UK payment systems under section 188 of the Banking Act 2009. The UK is currently ranked (2014) by CPSS IOSCO as at level 4 (green), which indicates that implementation of required legal frameworks and operational design and oversight are in place.

3.2.3 The overall design and operation of recognised UK payment infrastructures (CHAPS, Bacs and FPS) are subject to statutory oversight by the Bank of England.

### Adoption of international messaging standards

3.2.4 There is an interest amongst both the users of payments infrastructure and regulators in standardising local and international payment formats. This is evident in the recent rise of ISO 20022 as a global financial messaging model and standard and the acceleration of its adoption in new payment infrastructure services. Typically, it is being introduced with new products and services (such as CASS and ISA transfers in the UK, which both employ ISO 20022). Where a new IT infrastructure is proposed, it is now almost always the de-facto

messaging standard of choice. The recent decision in the UK to adopt ISO 20022 for new products and services places the UK in line with this overall direction and should be actively encouraged.

3.2.5 Several jurisdictions around the globe are currently considering or implementing strategies to consolidate payment messaging standards, the clearest being the EU with SEPA and subsequent agreement to migrate high value payments to ISO 20022 in 2017. The perceived benefits of doing so at an infrastructure level include (but are not limited to):

- Migration to a new standard: typically using ISO 20022 where the use of a standardised data model reduces complexity in communications across and within organizations. The naming convention is standardised across all services. This reduces costs for users and creates simplification in the development of new services.
- Cross-scheme integrity: the ability for payments messages to be transferred from one scheme to another, allowing for load-balancing, payment instruction portability and redundancy across schemes.
- Interoperability and regional integration: reducing the complexity of sending payments overseas and interacting with other systems for overseas payments.

3.2.6 Countries that have been seen to be pursuing this approach include India, Canada, South Africa and Denmark and the European Union (SEPA and TARGET2), to different degrees of national coordination. In Denmark for example, the newly built real time payments and intra-day retail clearing systems use virtually the same message types (based upon ISO 20022) to enable portability. In India, following the adoption of ISO 20022 in the RTGS system by the central bank, there has been a push to examine other domestic systems and develop national standards for a possible future transition. In South Africa, corporate demands to rationalise formats and move to ISO 20022 to enable trade integration across the SADC region is a powerful incentive for the community to harmonise payment standards and processes.

3.2.7 In the past, users had often been required to connect to their bank using the bank's own proprietary channels and formats. A move towards common standardised messaging offers efficiencies in global treasury and relationship management, particularly for Government and corporate users. This can reduce complexity and switching costs, encouraging competition on price and service as opposed to format.

3.2.8 There is a current trend amongst the corporate community to adopt newer technology with open standards. Many larger or more complex corporate treasuries are joining SWIFT as corporate members to facilitate direct access to their choice of provider and to ensure they are not locked in to one bank provider or PSP and can access services and migrate quickly to new banking service providers if and when they need to. The global financial crisis and subsequent flight to organisations with a higher credit rating highlighted this requirement for some of the larger multinationals and accelerated this trend. In what we see as a broader move, increasing numbers of corporates in a growing list of jurisdictions are pushing the debate for a move to the use of ISO 20022 XML messaging as they themselves introduce newer Enterprise Resource Planning systems and real time accounting platforms that harness these new technologies and messaging standards.

### Exploring benefits in richer remittance data and the potential for e-invoicing

3.2.9 An additional significant driver for XML-based payment formats over legacy fixed-length shorter messages is the desire for very detailed remittance information, to facilitate payment reconciliations and integrate data into the more complex systems now in place at corporate treasuries. New market entrants starting with state of the art technology are also incentivised to invest in newer systems, based on new standards and capabilities to offer enhanced services and innovate to acquire market share. As an example, currently some building societies and agency banks have little option but to use the Standard 18 reference field to determine the customer account (roll number), leaving no room for additional reference data to explain the reason for the payment. A flexible data structure potentially allows additional information to be carried to enable innovative new services. This challenge

is equally costly for corporates utilising Head Office Collection Account mechanisms where the level of detailed information with the payment can present challenges.

3.2.10 The potential benefits of the use of richer data within payment instructions bound for Government and corporates has recently been investigated as part of a consultation for the Government Co-ordination Committee by the Payments Council. The use of more complex XML messages also supports the concentration of financial management systems by large international corporations who wish to consolidate operations in treasury centres and manage payment operations for subsidiaries via a corporate treasury hub or shared service centres. ISO 20022 payment messaging enables this capability at an operational level. There is no doubt that a move to such a standard could impose one-off migration costs on corporates and more sophisticated users. Consumers and small businesses might not see any additional costs, as they simply complete online banking data as directed or use a service bureau.

3.2.11 Common messaging standards could potentially enable e-invoicing and e-billing innovations, to significantly reduce manual transaction costs between suppliers and businesses. E-invoicing is the use of electronic data formats (not email or PDFs) for issuing and paying bills, but the potential for innovation goes beyond this to also allow full management of the present-to-pay billing cycle and quicker release of cash flow due to quicker collections cycles. Companies who deal with high volumes of transactions can benefit from better cash flow and can also extend the power of e-invoicing to automated accounting. Denmark and Finland's Government bodies already require e-invoicing, and Brazil and Mexico have particularly strong practices in e-invoicing. Chile has recently followed their lead mandating a move to an XML e-invoicing environment.

3.2.12 The British Government's Digital Agenda and the forthcoming EU Procurement Directive could drive wider adoption of e-invoicing in the UK. There are many widespread benefits for the UK economy of such a move. The impact of any requirements and the role of the payment system in enabling e-invoicing are not clear at this point and any changes require thorough investigation.

## 3.3 Superior service user outcomes and benefits

3.3.1 The payments infrastructure in each country depends upon the maturity of their domestic economy, investment in common infrastructure and standards, access to financial products and services, the priority of a digital agenda, the maturity of telecommunication provision and geographical distribution of connectivity, branches or ATMs. The UK payments infrastructure for example, exists in a mature electronic payments environment, with significant reliance by Government, business and customers on the CT and DD products in place. The penetration of CTs for UK salary payments and DDs for collection of utility bills is extremely high and this is in part attributable to the work of Bacs in driving adoption of electronic payments within industry and local Government. The remaining payments currently not captured by CT's and DD's, might however migrate to e-billing or e-invoicing solutions rather than the current range of services.

3.3.2 Recent developments in the UK payments infrastructure to enhance service user outcomes can be categorised as being in either the collaborative or competitive domain.

- The competitive domain is where innovation is most visible in the economy and where innovators are typically most active, given that the investment is driven by a desire to solve a service user's challenge, increase market share, drive revenues or reduce the cost base for a market participant. The majority of recent competitive investment is focused on e- and m-commerce and the digital simplification agenda, both to reduce the cost of service for banks (where use of branches is diminishing) and to enhance the revenue model by leveraging data available. This is where market forces are typically most dominant in driving innovation. Many of these services require collaborative investment at the centre to drive capability end to end.

- The collaborative domain is well understood (due to the network effect of payments) across the industry where sometimes action is required by most or all participants to ensure an improvement is effective, ubiquitous and well understood across the market. FPS and CASS are high profile examples of this (where regulatory intervention was instrumental in achieving these objectives).

  It is in areas such as these where the PSR could potentially drive cross industry activity to achieve an outcome or objective against a deadline that otherwise would not be agreed or mandated. Often collaborative solutions are well articulated or debated, but as these are often issues that result in a cost to the industry, sometimes to address a small subset of customer needs, with no clear short term revenue and requiring complex planning, the lack of clear direction often impedes a short term result. The cumulative result of a lack of investment to address small issues can result in a long term gap in functionality contrasted with other countries' payments infrastructure which is often coordinated centrally. The adoption of a minimum change strategy or minimal investment is also a challenge and can lead to immediate minimal gain, but longer term constraints on innovation and a lack of a future-proof design.

### Enhanced management of intraday liquidity and counterparty credit risk

3.3.3 Around the world, many RTGS systems have been upgraded to improve technical capabilities/platforms (RIX), message formats (BOJ-NET, India's NG-RTGS) and liquidity capabilities (BOJ-NET, Bank of England, CHIPS US). These are typically initiated by the central bank or operator to address the long-term strategic needs of the economy. Intraday liquidity management has become an important service in RTGS systems due to a number of external and internal drivers. From a systemic risk perspective, it can reduce the likelihood of 'gridlock' and delays in important payments caused by the lack of liquidity.

3.3.4 Regulatory changes have placed pressure on the willingness of banks to supply intraday liquidity. Following the financial crisis, the Financial Services Authority (now Prudential Regulation Authority) strengthened its liquidity regulations such that intraday payment liquidity would no longer count towards prudential liquidity requirements, meaning that banks would be incentivised to economise on intra-day liquidity. The UK's LSM improvements were intended to mitigate these pressures by allowing participants to use their liquidity more effectively, hence reducing intra-day liquidity requirements whilst improving the resilience of the payment system.

### Speed, timing and efficiency of clearing and settlement

3.3.5 There is a widespread focus globally on the development of real time or near real time payments infrastructure in order to meet the needs of modern customers, in particular to support mobile and e-commerce applications. Pressure for this has come in most instances from national legislators and regulators, and has been supported by industry groups. However there has also often been significant reluctance by some banks or PSPs to invest in many countries, because of the following reasons:

- Often low, or no differential pricing is explicitly charged for retail customer payment instruments.
- A business case has not been clearly demonstrated for those banks or PSPs that cannot easily recover their investment from their customers; for example where they do not have corporate customers (or other entities who would be prepared to pay for at least one side of these transactions).

3.3.6 The UK was an early leader in creating an end to end service user proposition where the customer has an expectation of timing of the transactions. In that context, FPS is perceived to be world leading. As an example, FPS has outpaced many European economies in delivering a service that offers a quicker customer experience than SEPA for immediate payments (albeit without extensive remittance data). FPS was a clear example where the UK banking industry responded with a market-driven solution to the requirement to improve the existing process. The innovative approach taken has changed the landscape and continues to drive the debate on the speed of payments. UK Faster Payments defined a

target ideal of a 15 second end to end customer proposition that has pushed the boundaries for many organisations and sets a high bar. There is significant pressure for it to be available for all service users to create a level playing field and facilitate wider innovation in the market.

3.3.7 FPS was initially designed as a customer service for internet and telephone banking. It is clear that the FPS capability is relevant for corporates, Government and other users, for sending but also for the receipt of payments. Many of these users do not currently have easy access to FPS, or it is available at a price that does not make it attractive to use relative to Bacs.

3.3.8 FPS is a world leading system, but requires continuous investment as it grows, and review to ensure it evolves, remains relevant and is fit for purpose. There may be a case for further investment to improve the capability and functionality of the service and to improve access to information for participants and service users.

3.3.9 A number of other economies are now following suit (to varying degrees) with recently completed or in-progress projects such as the Danish RTP system, the Australian New Payments Platform programme and Singapore's Fast and Secure Transfers (FAST).There is also significant interest amongst other jurisdictions to provide real time capability. The UK is often the benchmark for these countries from a core processing perspective. The way in which individual banks have implemented their connectivity and processing is perceived as a competitive issue with an understanding that there are a variety of approaches that have been taken by UK banks reflecting their customer focus or target market segmentation and internal IT capability.

3.3.10 Payment infrastructures globally may tend towards the immediate or near-immediate processing of retail payments, as customer expectations increase and regulators seek to ensure that national payments infrastructure are fit for purpose.

3.3.11 There is evidence the schemes are working together to migrate low value payments (where possible) from CHAPS to FPS as these are not systemically important payments and potentially could be processed at lower cost in FPS. There are other areas where the potential to migrate time sensitive customer payments of any kind to FPS, such as transfers for land and house purchases, could provide a platform for new innovative products and services to benefit the customer and improve the flow of information and data with the transfer of an asset (such as a house where conveyance details could be supplied) in what to a customer is a 'real time transaction'. This needs to be balanced with the appetite for competition in the wider market to operate 24/7 or to take on the additional data available to provide enhanced services.

3.3.12 Almost all of the new real time payment systems being implemented worldwide operate 24/7, with multiple intra-day clearing cycles, setting new expectations of payment system availability for customers.

### Ease of integration

3.3.13 Several international payment systems offer flexibility in the format that payment instructions are submitted. The infrastructures provide message translation facilities where appropriate to shield market participants from change to the core systems interfaces. These can be short term or long term offerings to insulate users from change. Examples exist for SEPA in Europe (STET is a good example) and in India to aid migration to the new infrastructures. In the UK, a number of service bureaux assist corporates who wish to use CGI ISO 20022 standard to access the UK and European payment systems.

3.3.14 ISO 20022 is being implemented in new real time infrastructures. Whilst a number of infrastructures (including the UK FPS) use the ISO 8583 cards standard for real time payments, many new infrastructures are adopting ISO 20022 messaging formats for payments. The motivation for this appears to be:

- Domestic standards convergence/interoperability, e.g. the Danish real time system will use the same messaging formats as the retail ACH system, allowing for cross-scheme integrity and load-balancing.
- Movement towards a single data or metadata model to reduce errors and reconciliation challenges.
- Compatibility with SEPA standards in use by banks for euro processing.
- Increased data capacity/flexibility – e.g. for remittance information.
- Strategic migration of payment systems to global standards to facilitate global interoperability and regional trade (e.g. Singapore, Australia).

### Mobile payments

3.3.15 Real time payment processing services are supporting mobile applications, both for cards based transactions and bank account to bank account without the use of cards. Support for overlay services has allowed the development of innovative industry initiatives (such as Paym and Swish) to enable mobile initiated bank account to bank account payments without the use of a card as a proxy.

3.3.16 The recent launches of services for mobile payments and e-commerce in the guise of Paym (Payments Council), Pingit (Barclays) and Zapp (VocaLink) to come later in 2014 utilising the FPS/LINK infrastructure are seen as a step forward in offering payments and collections capability at a potentially lower cost to merchants, corporates and customers to collect and make payments. These innovations require underlying speed of clearing and settlement and have been enabled by the creation of FPS.

3.3.17 Internationally, there has also been a focus on mobile services with products such as Swish in Sweden built upon similar styled real time payments capabilities. Mobile offers an opportunity to provide payment services to traditionally unbanked or under-banked populations, such as the introduction of the MPesa e-money service in Africa and Romania. Migrating an under-banked population to a secure system with depositor protection is also a key factor in allowing lending to flourish to enhance social mobility and secure financial services for more vulnerable groups.

### Easy customer access to funds and information

3.3.18 The planned introduction of the Payment Account Directive (PAD) in 2014 will potentially impact the UK payments market and the infrastructures. The EU legislative proposal for a Directive on Payment Accounts (2013) concerns three areas:

- Comparability of payment account fees: the aim is to make it easier for customers to compare the fees charged by banks and other PSPs in the EU on payment accounts.
- Switching between payment accounts: the aim is to establish a simple and quick procedure for changing from one payment account to another, with a different bank or financial institution.
- Access to payment accounts: the aim is to allow all EU customers, irrespective of their country of residence in the EU or financial situation, to open a payment account that allows them to perform essential operations (like receiving their salary or pension, transferring funds to another account, withdrawing cash or using debit cards).

3.3.19 The measures in the PAD on comparability of payment account fees allow customers to have a complete overview of the offers in the market, and the measures on switching make it easy for them to change their account if a better offer is available. All these elements aim to reinforce competition in the financial services market for the benefit of customers. However, to guarantee that as many customers as possible can really enjoy the benefits of these improvements, it is essential to ensure that every EU citizen has the right of access to basic payment account services.

3.3.20 Basic payment accounts are defined as accounts where no overdraft or lending facilities are provided. In this context, as charges are allowed for the provision of such accounts, it is likely that the infrastructures will be required to provide full transparency of the costs of

each transaction, so that a PSP providing such a payment account can demonstrate the origin of the cost base being applied to charges and fees on that account. This accounting and reporting functionality is likely to require some investment and capability development within the infrastructures.

## 3.4 Superior PSP efficiency

3.4.1 In order to ensure an efficient service can be provided by a PSP, the network required to deliver payments effectively often requires efficiency at the central infrastructure to support delivery of core capability. This reliance on the central processing efficiency – in terms of speed, quality and quantity can support innovation. The development of core infrastructure may mean PSPs can innovate and deliver new services ensuring payments reach their destination effectively and efficiently regardless of where that end beneficiary's account resides. The attributes that might provide for a high level of PSP efficiency could include: a low cost of connection, synergies with other schemes, and investment in sufficient resilience and capacity.

### Introducing cheque imaging

3.4.2 In the UK, HM Treasury has formally announced plans to migrate to electronic cheque clearing. Plans are being developed by C&CCC to implement a new system to allow customers access to funds from cleared cheques by D+1. Image-based cheque clearing (with cheques stored purely in electronic form) has been active in a number of international jurisdictions for a number of years already, demonstrating that with the appropriate legal framework, cheque clearing can be conducted safely and efficiently without the transport of paper documents.

3.4.3 Under US Check 21 legislation, enacted in Oct 2003 (after the experience post September 11, 2001 highlighted the practical challenge of flying cheques across the USA), 'substitute cheques' printed from electronic images carry the same legal status as originals, allowing them to be presented to organisations that do not yet support electronic processing. The Federal Reserve supports a collaborative industry standard known as the UCD (Universal Companion Document) for electronic imaging. The Federal Reserve System worked with industry to introduce Check 21 against an aggressive timetable to reduce the potential for economic gridlock in the US given the high volumes of cheques in use (Federal Reserve Banks, 2013).

3.4.4 The UAE has demonstrated that cheque clearing can be achieved intra-day using the centralised Image Cheque Clearing System (ICCS). In 2008, the central bank mandated the migration of all 23 national banks and 28 foreign banks to the new system, after a trial period of about a year. Cheques are a significant volume of the transactions in the UAE, both for cultural and historic reasons. There is a significant reluctance to delegate payments or allow delegated electronic authorisation of transactions in the region.

3.4.5 Electronic image standards need to be determined in the UK, but it is likely that it will follow the ISO 20022 standard. A consistent national standard for cheque imaging will need to be employed for effective and efficient electronic cheque clearing. Options included an extension of the existing IBDE standards, adoption of the US UCD standards, or an adaption of the international ISO 20022 standard.

### Moving toward real time settlement

3.4.6 In some countries, the requirement for speed of settlement in central bank money is a primary concern and this has driven some to make retail payments delivery available faster via the use of the RTGS system. This approach is generally less popular with commercial banks as it is often not as efficient from a treasury operations and liquidity management standpoint for the management of high volumes of retail payments. RTGS systems require significant collateral and liquidity to support daily operations. They are typically not open for retail settlement 24 hours per day.

3.4.7 Real time settlement (as a separate activity to clearing) is often the focus in economies experiencing high inflation where the payer or payee may experience loss in the duration of the transaction.

3.4.8 Several deferred net payment infrastructures have introduced additional clearing cycles to support faster intra-day settlement. Most real time or faster payments systems tend to settle multiple times a day over the RTGS as batch multilateral settlement to provide efficiencies to banks. This is the current model for FPS, which currently has three net settlement cycles per day. The FPS system could be re-configured with additional settlement cycles should the payment system operator or the Bank of England determine that this change would reduce risk, improve liquidity or the management of, or access to, the service. The customer can receive good funds almost immediately and the banks manage the settlement of outstanding net balances in the background.

3.4.9 To date, only the Swedish BiR real time system features real time finality of settlement, with a unique arrangement where the operator Bankgirot acts as the final settlement agent outside central bank operating hours. This system is designed for retail peer-to-peer mobile payments and currently operates at very low volumes. Australia is contemplating a similar model of line by line settlement over the RTGS system and a detailed design is currently underway. However, real time settlement does not appear to be a pressing requirement for the majority of high volume retail payment infrastructures in the near future and it does not appear to be a determinant of good outcomes for the service user, as in a pre-funded model, the user can benefit from immediate availability of good funds and the banks conduct settlement in the background. Where legal certainty exists in multilateral net settlement models, this prevents unwinding once the payment is committed to the central system, and so the customer could have immediate access to good funds.

### Improvements in ATM and Cash In Transit management

3.4.10 Approaches to the distribution of cash differ in almost every jurisdiction, depending on Government strategy and the size and scale of the black economy. In countries with a higher reliance on electronic payments, this is often as a result of concerted efforts to reduce the use of cash in the economy. In some instances, this is achieved via charging for ATM disbursements, or restricting the number and location of ATMs. In some countries in Scandinavia and in India, Nigeria and the U.S. the management of large parts of the ATM estate and in some countries a full outsource has been explored at a national level. ATM outsourcing reduces the capital costs borne by PSPs to manage remote locations and can assist with the development of new services on the network, as there is no requirement to wait for another organisation to upgrade its ATM estate. The UK ATM estate is mixed, with significant investment by some PSPs and IADs in new state of the art technology and a lack of investment by others. Generally, IADs (Independent ATM Deployers) have a vested interest in attracting customers, as they can charge a convenience fee per transaction that in some locations can be significant. From a volume perspective, the vast majority of transactions nationally are carried out on bank owned ATMs with no explicit upfront fee charged to the customer.

3.4.11 The SEPA process has also included a standardisation agenda for ATM cash cartridges across Europe and a move to outsource the management of cash distribution, Cash in Transit (CIT) from central banks to third party operators. As an example, in Sweden, the cash distribution companies and banks recently worked with the clearing house to enable the clearing of transactions related to CIT movements to be staggered to reduce the levels of security incidents on CIT handlers. Access to cash is also a common complaint, and in recent years the Bank of England has campaigned for better access to lower denomination notes in ATMs. The ATM operators have facilitated this move, which was deemed to be in the interests of financial inclusion and to enable customers to better manage their personal finances.

3.4.12 Pricing of access to cash has been challenged periodically by providers seeking to introduce fees. The LINK scheme does not control or set pricing of access to cash at machines, but previous attempts by individual organisations to charge more broadly for access to cash

have resulted in customer and public media complaints. The model in the UK is free cash withdrawals at point of withdrawal, except at 'convenience ATMs' owned and operated by Independent ATM Deployers (IADs). Major IADs include companies such as Hanco and Notemachine.

3.4.13 VocaLink actively competes with other providers in the market to provide commercial ATM managed services for banks and IADs, including driving (actual physical operation of the ATM) and switching of ATMs for over 28,000 ATMs out of a UK industry total of over 65,500 connected to the LINK ATM network. The supply of CIT services for cash replenishment and the supply of ATM hardware are commercially sourced by the PSPs and IADs providing these services to consumers. Companies such as G4S provide services for CIT and Wincor Nixdorf and NCR and others supply ATM hardware.

3.4.14 Innovation in ATM functionality follows the demand in the international market to drive revenues and increase marketing opportunities for banks and operators. In the UK, the LINK scheme supports additional convenience functionality such as mobile phone top-up facilities and donations to charities via the ATM. Recent innovations across mobile and ATM include options introduced by some banks to offer a service where a customer can be texted a code to enter on an ATM when they have lost or forgotten their card. This could also be extended to send payments to a beneficiary to be collected at an ATM.

### Consolidation of infrastructures and schemes

3.4.15 The consolidation of payment systems refers to the ability of a single infrastructure platform to offer multiple payment instruments traditionally offered by separate schemes. In France, the CORE system developed by STET (with the infrastructure operated by Cap Gemini) is an interesting alternative approach. As a modern technology platform designed for SEPA, it is capable of processing a diverse variety of payment instruments, including SEPA credit transfers, direct debits, cheque clearing and domestic non-SEPA (until the end date) retail payments. This has allowed the harmonisation of most French payment instruments under a single infrastructure.

3.4.16 The Swiss SIC4 system (currently under development) is another modern platform that is unusual in that it acts as both the RTGS system and the retail payment system for the Swiss franc, whereas most infrastructures have separate high value and retail systems, with the settlement of the retail schemes occurring in the RTGS. This is also enabled by the relatively low volume of franc transactions. Swiss Euro transactions are settled in Germany over TARGET2.

3.4.17 In Japan, the retail Zengin payment system is linked to the BOJ-NET RTGS platform, and has a setting to automatically route high-value payments to the RTGS for immediate settlement (as opposed to deferred settlement for retail payments) in order to reduce settlement risk.

3.4.18 Consolidation of payment systems can be seen to offer some advantages. It reduces the number of systems participants need to connect to, for instance, and allows central development of new capabilities. However, it may not be appropriate for all circumstances, particularly where the volumes in the retail environment are particularly high and where there are large numbers of market participants connected to the system. There is a strong counter argument for some segregation to ensure options for settlement in the event of a disruption, but this should not prevent interoperability.

## 3.5 Superior security and resilience

3.5.1 End to end security is a fundamental requirement within the payments infrastructure. With an increasing migration to online, e-commerce and m-commerce transactions, the service user is reliant on electronic identity and authentication management and the liability framework that underpins each system or scheme.

### Resilience to operational risks

3.5.2 RTGS systems serve a critically important role in national payments infrastructure, and as such must be highly resilient and fit for purpose. In the UK, investments have been made in MIRS, a SWIFT-run fallback alternative for the Bank of England RT processor, in order to improve operational resilience through geographic and technology platform diversity.

### Superior protection from security risks

3.5.3 The UK has robust security, identity and legal liability frameworks in place for all schemes. CHAPS employs SWIFT security protocols for both hardware and software. Robust security measures are in place for payments via the direct connectivity to VocaLink for Bacs, Faster Payments and LINK using world leading PKI and IP-VPN technology. When introduced, Bacstel-IP was the world's single largest PKI secured IP-VPN. Following the introduction of Faster Payments, and the spike in incidents of fraud attempted, many UK banks have adopted various approaches to secure online Single Immediate Payments involving a two factor authentication methodology.

3.5.4 Many banks and PSPs employ two factor authentication (2FA) for retail customers for internet banking. The cards schemes enforce the PCI Data Security Standards (as described earlier in this report).

3.5.5 In addition, Bacs and FPS operate under The Trust Service Code of Conduct. This code addresses compliance with the technical standards for the PKI-based security service. The liability frameworks for the operation of the schemes are contained across many additional documents. The Trust Service Code of Conduct is a mandatory element for direct participants. In addition, the current arrangements for these schemes involve a liability model, which underpins the funding of the processing of transactions.

3.5.6 Merchants using card based merchant payments infrastructure for Visa, MasterCard and Amex typically employ market based solutions such as VeriSign, 3D Secure and other security options to maintain confidence in Card Not Present (CNP)/online transactions. Good dispute management and the chargeback system are key attributes of the management of these schemes that benefit customers. Liability models are complex, but largely prioritise the protection of the cardholder.

### Improving consumer protection for online and mobile payments

3.5.7 At an EU level, there has been significant concern expressed about the potential for confusion and fraud perpetrated against online payments. The SecuRe Pay recommendations were developed by the European Forum on the Security of Retail Payments, SecuRe Pay (the 'Forum'). The Forum aims to address areas where major weaknesses and vulnerabilities are detected and, where appropriate, makes recommendations. The ultimate aim is to foster the establishment of a harmonised EU/EEA-wide minimum level of security. The European Central Bank has formally issued the SecuRe Pay findings. These are non-binding although the ECB recommends that states implement them on 1 February 2015. Given the experiences of regulators, legislators, PSPs and the general public that payments made over the internet are subject to higher rates of fraud than traditional payment methods, SecuRe Pay decided to develop recommendations for the security of internet payments. These reflect the experience of overseers and supervisors in their home countries and take into account the feedback obtained in a public consultation in 2012.

3.5.8 The recommendations, key considerations and best practices specified are applicable to all PSPs, as defined in the PSD, providing internet payment services, as well as to governance authorities (GA's) of payment schemes (including card payment schemes, credit transfer schemes, direct debit schemes, etc.). The recommendations are focused on a common outcome for the customer:

- As a general principle, the initiation of internet payments as well as access to sensitive payment data should be protected by strong customer authentication. For the purpose of the recommendations, sensitive payment data are defined as data which could be

used to carry out fraud. These include data enabling a payment order to be initiated, data used for authentication, data used for ordering payment instruments or authentication tools to be sent to customers, as well as data, parameters and software which, if modified, may affect the legitimate party's ability to verify payment transactions, authorise e-mandates or control the account, such as 'black' and 'white' lists, customer-defined limits, etc.

- Strong customer authentication is a procedure based on the use of two or more of the following elements categorised as knowledge, ownership and inherence:

  i) something only the user knows, e.g. static password, code, personal identification number;
  ii) something only the user possesses, e.g. token, smart card, mobile phone;
  iii) something the user is, e.g. biometric characteristic, such as a fingerprint;
  In addition, the elements selected must be mutually independent, i.e. the breach of one does not compromise the other(s).

- At least one of the elements should be non-reusable and non-replicable (except for inherence), and not capable of being surreptitiously stolen via the internet. The strong authentication procedure should be designed in such a way as to protect the confidentiality of the authentication data.

3.5.9 The ECB SecuRe Pay recommendations report outlines 14 recommendations to promote the security of internet payments. Each recommendation is specified through key considerations. Addressees are expected to comply with both the recommendations and the key considerations or need to be able to explain and justify any deviation from them upon the request of the relevant competent authority ('comply or explain' principle). In addition, the report describes some best practices which PSPs, Governing Authorities of payment schemes and the relevant market participants are encouraged to adopt.

3.5.10 From the Forum's perspective, PSPs with no or weak authentication procedures may not, in the event of a disputed transaction, be able to provide adequate proof that the customer has authorised the transaction. PSPs should implement effective processes for authorising transactions, as well as for monitoring transactions and systems in order to identify abnormal customer payment patterns and prevent fraud.

### Cyber security risk management and superior protection from security risks

3.5.11 The proposal of the European Commission for a revised PSD (PSDII)[4] which followed an independent report to the plenary of the European Parliament on the impact of the initial legislation, is a proposal to tackle issues raised by technological and market developments and by emerging new players.

3.5.12 A challenge remains in introducing further integration and more competition in the European payments market, where this could result in a potential detriment of payment security and customer protection. Good security is key to ensure confidence in electronic payments. Many EEA countries have national electronic ID schemes and bank mandated two factor authentication in place for electronic payments.

3.5.13 More specifically, the proposed European Commission text allows the sharing of credentials (e.g. passwords, PINs, Transaction Authentication Numbers (TANs)) with Third Party Providers. The PSDII calls for access for what it defines as Third Party Providers (TPPs) for account initiation and account servicing. In order to ensure the integrity of the payment system, many banks are calling for the prohibition of business models based on the principle that customers hand over their personal log-in credentials to a TPP, as this can manifest as a 'man-in-the-middle' attack on a customer's account.

3.5.14 The European Council working group in its current discussion introduces the distinction between 're-usable credentials' and 'non-re-usable credentials' and authorizes the sharing

[4] See Appendix 2 for legislation summaries.

of non-re-usable credentials. From a customer perspective, the distinction between different categories of credentials risks being confusing. From an IT security point of view, the sharing of non-re-usable credentials also involves risks and is potentially open to impersonated payments and fraud attacks such as 'man-in-the middle' or 'man-in-the-browser'.

3.5.15 When non-reusable credentials are shared, the proposals are clear that the ultimate liability sits with the Account Servicing Payment Service Provider, with recourse to the Third Party Provider. However, there are concerns that an ASPSP may not be able to successfully recover its exposure to a TPP in practise. The European Central Bank in its opinion on the European Commission proposal last February stated that: 'It is a core principle of IT security that credentials used to authenticate the payment service user are not shared with any third party'. At present if a customer shares their credentials with another party, they are deemed to be liable for any subsequent loss.

3.5.16 PSDII intends to regulate TPPs involved in payment initiation, such that they are only entitled to conduct funds checks (and not entitled to gain access to full customer online account information). However, it might also be appropriate to dictate that any access granted to TPPs, whether via an infrastructure or direct to a bank for payment initiation or account reporting, needs to adhere to a common set of agreed industry security standards for the UK.

# 4 Improving the UK payments infrastructure

4.1.1 There are a number of potential approaches to improve the UK payments infrastructure. The PSR's consultation process has also sought to explore some of these issues and opportunities. Dominant themes that have emerged from our research and industry consultation that deserve further analysis include:

- Account referencing and data management;
- Message standards convergence;
- Access regimes;
- Collaborative initiatives; and
- Infrastructure management and operation (consolidation).

Stakeholders were invited to a PSR consultation event to review some of these areas. The methodology used at that event to evaluate these focus areas is described in Appendix 5.

## 4.2 A strategic approach to data management

**The UK has a number of industry level challenges with account referencing.**

4.2.1 The addressing convention for bank accounts in the UK involves the use of a Business Identifier Code (BIC), a sort code (six digits) and account number (typically eight digits). Building Societies and other organisations commonly use a single sort code and account number for their agency account with a direct participant of the schemes and then roll numbers to identify their customers.

4.2.2 The structure of this system originates from the physical location of a branch and was not initially constructed to facilitate a migration of customers from one provider to another. Facilitating automated migration of an account adds significantly to the complexity as this is is similar to moving a physical location, but retaining the same physical address or postal code.

4.2.3 The EU adopted the International Bank Account Number – which can (for most UK account holders) be constructed relatively easily from existing BIC, sort code and account number details. In the case of non-bank financial institutions, PSPs, Payment Institutions or E-Money Issuers, the opportunity to open up further the addressing of accounts might prove a helpful step. Many other jurisdictions, for example the majority of countries in the Middle East, are moving to a domestic and regional adoption of IBAN to facilitate interoperability.

4.2.4 Many PSPs have implemented SEPA processing due to their exposure to the SEPA via customers and branches or entities overseas. The SEPA Regulation will apply to the UK from 31 October 2016 and affects euro payments only. It requires PSPs currently reachable for national euro credit transfers or direct debits to be reachable 'in accordance with the rules of a Union-wide payment scheme'. The European Payments Council's (EPC) SEPA schemes are the only schemes that are in use Union-wide. Existing national euro credit transfer and direct debit schemes will have to be replaced by the SEPA Credit Transfer (SCT) and SEPA Direct Debit (SDD) schemes. The SEPA Regulation imposes a requirement on PSPs to only require IBANs (and not require a BIC) within these payment messages submitted by service users for processing. All UK PSPs providing euro accounts are therefore required to provide routing instructions for IBANs to enable other EU organisations to reach UK service users for processing of a SEPA Credit Transfer, SEPA Direct Debit or SEPA B2B Direct Debit. This additional data requirement could also be factored into a more strategic future proofed approach, rather than building another standalone database separate to EISCD, Legal Entity Identifier (LEI) and others.

4.2.5 There is currently no central UK data source for SEPA specific routing data. The BIC is a key data element for routing payments. The banking and payments industry historically relies on a BIC for interbank messaging, including international payments and this approach is built into current processes. To ensure access for industry participants to accurate payment routing information, a central source is required. The Payments Council SEPA IBAN-Only project is identifying suitable solution options for the provision of a central, publically accessible source of payment routing data for the UK which will facilitate the straight through processing of SEPA payments.

4.2.6 A movement to international standards including International Bank Account Number (IBAN) instead of domestic sort code and account numbers and ISO 20022 could increase the potential for competition in the provision of systems and services both to PSPs and to service users and infrastructure companies. Retaining a proprietary national approach to these elements can reduce competition and also the ability of PSPs to source payments infrastructure components or software from international suppliers, and at a reasonable price.

4.2.7 In terms of corporate use of addressing data, the IBAN is already issued on bank stationery to service users and quoted widely on invoices and is required for all international payments. The E-invoicing Directive will require the use of IBAN. This is potentially an opportunity to harness this requirement to drive additional value for the UK economy.

4.2.8 There is a case for a comprehensive joined up review of the use of all reference data – sort codes, account numbering, IBAN, Business Identifier Code and creditor reference data. A strategic alignment to determine the future direction could provide long term benefits across the economy.

4.2.9 Specifically with reference to constraints perceived by corporates and Government in their use of the payment system, the adoption of a strategy to support wider use of creditor reference data is a topic that could be explored. The introduction of XML based payments and invoicing data has demonstrated benefits for the corporate, business and government sectors, both in the ability to reconcile data and the capacity to support additional information previously not included in the payment message. Much work has been done to define common structured reference data models to support e-invoicing (e.g. Finland) and even unstructured models that provide greater information to the service user. This is an area where the UK could benefit from a review of the role of the payment system in facilitating more efficient commerce and e-commerce. A host of reconciliation, trade finance and supply chain benefits can be associated with the introduction of more reference data in the payment messages. Consumers could benefit from faster reconciliation of account payments for services supplied and fewer complaints and penalties for late payments.

4.2.10 The Paym and CASS services could be extended in the future to shield retail consumers from experiencing significant disruption with any changes to their underlying bank account details. The concept of the alias proxy database used to populate the Paym service – whether distributed or centralised, provides a single golden source to associate an individual account to a mobile telephone number (or any other data element). This could be developed as a strategic asset. It has the potential to become a central national database and provide additional proxy and electronic identity services to consumers and businesses.

4.2.11 The global introduction of new data elements such as the proposed Legal Entity Identifier to aid financial reporting, risk management and reconciliation could also be incorporated into a strategic approach.

## 4.3 Message standard convergence

**The UK has a variety of message standards and could potentially benefit from convergence.**

4.3.1 Historically, fast switching of payment messages required message formats with limited data sizes and restricted formats. This is no longer necessarily a constraint and narrow

message formats such as ST18 now potentially limit the range of innovation possible in the longer term. Lack of interoperability between formats and standards can create inefficiencies. Convergence towards one standard or fewer standards could potentially simplify the service user experience, drive efficiencies in infrastructure and enable more cost effective connectivity.

4.3.2 Migration to a new standard for an existing service is a challenge and introduces risk into the processing environment, with a low return on this investment compared to the costs involved. The case for migration to a new standard is stronger when this co-incides with the introduction of a new system, functionality or service proposition. It would therefore be prudent to approach message convergence as a longer term goal, and identify the break points when step changes can be achieved to minimise risk and cost to the industry and least disruption to participants and service users. The new standard must reward the service user with greater functionality to incentivise successful and complete migration.

4.3.3 In recent years, almost all innovation globally in the collaborative payments domain has been constructed in ISO 20022. This is also true in the UK for ISA transfers and the CASS. There is a strong case for a strategic imperative to invest in the ISO 20022 methodology for all future innovation in the payments domain, to create a 'no regrets' investment strategy to future-proof the systems. Given the scale and timing of investment cycles in payments infrastructure, this would signal intent and create an environment where new products and services could emerge from smaller players without the concern that the standards will change/evolve in a different direction.

4.3.4 The long term benefits of message standard convergence need to be weighed against the short term, but potentially significant initial costs of migrating to new standards, both for Infrastructure Providers and Payment Service Providers, as well as for service users such as Government, corporates and small businesses.

4.3.5 The ISO 20022 standard for financial messaging is a global framework for developing industry messages that has seen recent traction in important markets worldwide, including European Union SEPA projects, Hong Kong, Singapore, Japan and Australia. A global, unified standard for messaging has the potential to enable efficient end-to-end processing across domains and geographies, promote STP and operational efficiencies in cash management, and overcome difficulties in handling multiple domestic and international standards. This could significantly benefit service users over the long term.

4.3.6 The most recent and most near shore example of a move to ISO 20022 is the Single Euro Payments Area (SEPA), where cost-benefit analysis demonstrates clear long term benefits, but one of the lessons learned has been a need to more tightly define message implementation guidelines (MIG) for services to reduce the number of unwanted variants that can emerge and hamper interoperability. Targeted industry co-ordination is required to achieve this objective and this is commonly driven via industry working groups. Any such working group should include a wide range of service user representation and incorporate an assessment of specific consumer and business requirements in the UK.

4.3.7 It is clear that there are two dominant standards emerging – ISO 20022 and ISO 8583 for payment messaging. ISO 8583 is the dominant standard internationally for card switching, to support online/in-flight authentication and so convergence may be towards two standards (ISO 8583 and ISO 20022), at least initially. The interaction between card switching for Point of Sale versus online use of cards and ATM usage means that any change to the cards processing environment must be considered in the international context and is unlikely in the short term.

4.3.8 Global and regional banks operating in Euro have already invested in ISO 20022 based messaging to support their activities in Euro clearing and settlement. With the move to ISO 20022 by TARGET2 and T2S in 2017 for high value payments and securities settlement, there is a momentum for a migration to ISO 20022 from current SWIFT MT and local messaging standards.

4.3.9 Many larger corporates have been investing in ISO 20022 based systems and have witnessed the improvements in data richness that this has delivered. A growing number now use the CGI (Common Global Implementation in ISO 20022) to deliver files of transactions to their banks for local delivery into systems such as Bacs and FPS. This trend is set to continue as the pace of adoption globally accelerates.

4.3.10 The impact of message standard convergence could include:

- Bacs: Service users would need to change their systems to migrate to new message standards. This could affect direct participants (16 banks) and over 48,000 directly connected service users (corporates and non-banks). There are an additional 60,000 who are using an approved service bureau, where, depending on the approach (some ERP systems may more easily support changes than others) those bureaux could support a change. Changes to the core Bacs payment engine may be required. There would also need to be changes to associated central infrastructure processing and information systems.
- Faster Payments: a move from the existing ISO 8583 standard would have a fundamental and significant impact to the overall operational design of FPS and to all participants. Changes to gateways, central infrastructure process and messaging design and reporting systems would be required. Similar systems in other countries are being constructed (e.g. Australia) or are live (e.g. Singapore) based on ISO 20022 XML messaging. Faster Payments does not at its core process card transactions. It adopted ISO 8583 to harness the speed and authorisation functionality of the messages designed for speed of switching. FPS is a hybrid approach where the interbank messaging for clearing is ISO 8583, but the deferred net settlement messages to the Bank of England are SWIFT MT messages.
- CHAPS: A number of high value payments infrastructure serving other countries/markets are moving to ISO 20022 including TARGET2 in 2017. CHAPS currently uses SWIFT MT format messages. The ISO 20022 XML message set for high value payments infrastructure is in development (SWIFT MX) and the case for a migration timing post TARGET2 could be stronger. The Bank of England would need to be able to handle inbound SWIFT MX messages (ISO 20022 XML) and facilitate the migration. MIRS would need to support MX messages.
- LINK: Interoperability with other card and ATM schemes including but not limited to UnionPay and Visa/MasterCard, could be significantly impacted. Migration of any of the card schemes would require extensive and detailed impact analysis, specifically around interoperability concerns. Any move would have to be co-ordinated with a much wider set of international stakeholders. Visa and MasterCard are unlikely to adopt ISO 20022 in the short term as it would cause significant disruption to the cards processing environment and ISO 20022 XML messages have not been developed to support card switching.

Figure 18: Message standard comparison.

| Message Standard | Infrastructures used | Typical usage | Attributes |
|---|---|---|---|
| **SWIFT MT** | CHAPS and settlement messages between Operators and the Bank of England | Inter-bank and corporate-to-bank messaging over SWIFTNet | ■ Established standard for interbank and corporate to bank messaging; includes ten distinct message families, with over a hundred message types managed by SWIFT.<br>■ Widely used in the international interbank community for domestic high value payments and foreign credit transfers over the SWIFTNet financial network.<br>■ Being slowly phased out in favour of SWIFT MX, an ISO 20022-based message standard also promoted by SWIFT. |
| **ISO 20022** | CASS, ISA Transfers, SEPA | Interbank and corporate-to-bank | ■ International framework for financial messaging, consisting of a shared 'repository' of financial objects that allows for consistent modelling of data across all message types. |

| Message Standard | Infrastructures used | Typical usage | Attributes |
|---|---|---|---|
| | | messaging | ■ A large range of messages have already been defined, covering payments, securities, trade services, cards, and foreign exchange.<br>■ New messages can be built from repository elements and submitted to the ISO 20022 Registration Authority (SWIFT).<br>■ Messages consist of a data model, which is most commonly implemented in the XML syntax for network transmission.<br>■ Messages are flexible in length and content, and tend to be much larger than MT messages. Data constraints are defined by the data model.<br>■ Can be used for bulk and single transfers.<br>■ Subsets of ISO 20022 messages are used in the SEPA and SWIFT MX standards. Local versions may be more restrictive than the overall standard whilst still being compliant.<br>■ SEPA ISO 20022 standards contain 140 characters of reference data; potentially unlimited for domestic variants. |
| **ISO 8583** | LINK, FPS, Visa, MasterCard | Card interaction | ■ International standard for card-based transactions, including payments, purchases, withdrawals, deposits, refunds, balance inquiries, amongst others.<br>■ Used by both Visa and Mastercard for their authorisation messaging in real time.<br>■ Messages tend to be compact, with a fixed number of variable, capped length fields.<br>■ Specific fields exist for national or local data fields.<br>■ The ISO 8583 message flow and content was modified for use in FPS (to be a credit push as opposed to a pull). |
| **Standard 18** | Bacs | Bacs only | ■ Domestic UK standard for banks and direct corporate access members participating in the Bacs scheme.<br>■ Compact, text-based format, supporting bulk credits and direct debits. Format consists of a header followed by repeated fixed-length account details.<br>■ Limited to 18 characters of reference data per transaction.<br>■ Companies can submit Bacs instructions directly to the infrastructure, or through their bank. |
| **IBDE** | Cheque and Credit Clearing | Cheque clearing | ■ IBDE (Inter Bank Data Exchange) formats are used to transmit cheque clearing information, captured from cheque deposits.<br>■ This information, exchanged bilaterally between clearing banks, allows settlment positions to be calculated for the purposes of cheque clearing.<br>■ Messages are transmitted over the secure IBDE MPLS network, which is provided by BT. |

4.3.11 Insight from other jurisdictions suggests that other countries have been extremely successful in utilising additional data within the payment messaging to reduce costs for corporates and Government. Many have embraced e-invoicing systems and enhanced data mechanisms to address these challenges. In Europe, Finland leads the way in this with the creation of the 'creditor reference data' standard for SEPA. This was pioneered by the corporate community after exercising pressure on the banks. The EU E-Invoicing Directive and Government policy towards a digital agenda points to a requirement at some stage to improve the levels of data within the payment system. In addition, compliance with Anti Money Laundering (AML) provisions within the Fourth AML Directive may be easier to demonstrate if the entire transaction was represented in the payment instruction message.

4.3.12 The availability of richer data could give Government and corporate customers enhanced remittance data end to end, and this could provide significant benefits. Some of these benefits include the reconciliation of invoices and inbound receipts, exchanging manual labour for automation, reduce costs and error rates for UK businesses. It could be linked to the move away from cheques with invoice remittance details as a method of payment for many businesses. The Government has introduced Real Time Information (RTI) as a first stage of its overall transition to richer data and is interested in the opportunities ISO 20022 or a richer data solution might bring to the ecosystem.

## 4.4 Overcoming technical access barriers

**Direct and indirect participants face complexity in accessing the payments infrastructure.**

4.4.1 Technical access to the payments infrastructure covers a myriad of different mechanisms and channels. Scheme members directly connected to infrastructures utilise a variety of different secure direct connections to communicate directly with the infrastructure platforms for the sending and receipt of payment instructions and for reporting purposes. In addition, bulk upload and download of files is possible via a variety of methods.

4.4.2 The nature of the construct of 'indirect access to the infrastructure' is predicated on the direct participant taking responsibility for the activities of its sponsored customers in the clearing and settlement processes. The service user relies on the systems and process capabilities of the PSP and the central infrastructures either to a greater extent where using a PSP channel or a lesser extent in the case of use of Direct Corporate Access to submit or receive transactions.

4.4.3 Payment infrastructures are in many cases recognised as critical national infrastructure and it is important that they meet technical, security and resilience standards to offer continuous, secure payment processing capability. However, the technical requirements to operate required internal systems and to gain access to infrastructure combine to create barriers to entry for potential new infrastructure providers and competing interoperable infrastructures.

4.4.4 Technology access barriers to payment infrastructures exist at two levels:

- For service users and PSPs, such as banks and new entrant providers, seeking to provide new services through accessing the existing payment infrastructures; and
- For potential competing infrastructure providers, who would like to provide alternative infrastructure for the processing of payments and related services.

4.4.5 Technical access to payment infrastructures is managed to meet international security and data integrity standards designed to preserve the security, resilience and operating capability of the infrastructure. Technical access barriers may be related to technical standards, systems or requirements (for financial institutions, new entrants and service users) to enable a user to submit and receive payment instructions and receive relevant management information from the infrastructure. Diverse message standards, complex connectivity and bespoke processing requirements could therefore create barriers to entry.

4.4.6 There are a number of potential options to improve technical access to the UK payments infrastructure, including the possible provision of an agency hub model. This would have the

benefit of allowing a single, accessible interface to PSPs to facilitate access and allow wider and more efficient use of payments infrastructures at potentially reduced complexity and cost. Allowing agency banks easier and cheaper access to infrastructure may also enable a redirection of investment to create more efficient services for service users.

4.4.7 Wider availability of Direct Corporate Access for FPS is also an immediate step that might remedy lack of provision in the market for corporate users. Currently only one sponsor bank proactively offers this connectivity to corporates to use this facility. Initially in the design of FPS, the consumer was the target service user. As the service has become more popular and retail payments innovation is focused on FPS, other types of users have emerged.

4.4.8 Corporates can apply to their bank to access Bacs via a secure channel direct to the central infrastructure to send files securely for processing, typically salary payments and Direct Debit collection files for customers paying recurring bills (e.g. insurance premiums, pay television subscriptions). These are usually monthly payments and collections and can involve high volumes and have a significant value per file. In addition, Government departments including the DWP and HMRC are directly connected for the disbursement of social benefits and the collection of taxation (including PAYE).

4.4.9 PSPs connect to VocaLink utilising Bacs approved software and connectivity and where these same organisations need to connect to the FPS and LINK infrastructure then this is via additional channels. There is evidence of some confusion in the market as to which entity controls/owns the connectivity (ETS, STS, Secure-IP or Bacstel-IP in particular) and a lack of clarity on the options that are available to market participants. Whilst for existing PSPs offering services to their customers, this may appear straightforward; there is a complex arrangement in place to gain access to these services, and a range of technology options available. New PSP entrants have reported there can be some confusion as to what role the Payment System Operators,VocaLink and BASS suppliers play in the provision of these services. The process does not appear to be simple to follow or straightforward for new entrants.

4.4.10 Bacs, FPS and LINK each require specialised gateway software to access the central infrastructures and this potentially increases the cost and complexity of a direct connection. FPS and LINK both require 24/7 capability as a baseline service capability to respond to the online authorisation nature of the messaging used.

4.4.11 It may be appropriate to conduct a review of the landscape of access mechanisms in place across the retail schemes to examine whether they remain fit for purpose, or whether a better framework could be deployed which might meet the needs of a wide range of stakeholders and reduce complexity and enhance the service offering. It is possible that a market solution could evolve and that the simplification of access would introduce competition in this segment.

**Review of technical access barriers may be required.**

4.4.12 A number of issues that have been raised that specifically reference access to FPS and cheque clearing.

- FPS has rich functionality and combined with the recent introduction of mobile payments, it is the preferred option for new entrants. However, the real time customer proposition comes with a set of robust requirements, e.g. the need to be online 24/7. The cost of complying with these requirements has deterred some participants from becoming direct members, and they have chosen instead to access the scheme through an agency bank arrangement. These arrangements do not always deliver the level of service sought. Interfaces and the format of messages and files can be specific to each sponsor bank. Challenges are common with posting and reconciliation of customer accounts 24x7. When SWIFT is used to exchange messages between the sponsor bank and the agency bank, SWIFT scheduled down time disrupts 24/7 availability on a weekend, when customers expect to be able to use both FPS and Paym services provided by their PSP.

- Agency banks: Switching sponsoring banks is disruptive for customers and agency banks due to the requirement to re-allocate sort codes, where a new sort code is required (primarily to correctly support the physical nature of cheque clearing). The agency bank has to advise customers of the new sort code, e.g. for electronic payments, and to print and issue new stationery including cheque books. The agency banks' customers would also need to contact their own counterparties to advise of changes to their sort codes. The migration to cheque imaging affords an opportunity to tackle this challenge as this is where the challenge appears to lie – as sort codes are largely portable for other types of payments. Alternatively, the industry could consider adopting a new approach towards bank and account identifiers to enable sort code portability.
- Corporate and Financial Institutions: Customers are typically reluctant to move without a clear short term business case and significant assistance to reduce the impact – particularly to their inbound transactions/receivables. In particular corporates are reluctant to take the risk and time/effort involved in moving, and new entrants often see this as a significant barrier to entry.

4.4.13 One potential solution is to provide technical access to central infrastructures via a utility or central aggregator to reduce the technical dependency on sponsor banks. This could be run as part of the central infrastructure and could allow access to multiple payment schemes. Alternatively, sponsor banks could be required to offer standard interfaces. This ease of connectivity could further improve competition for services for agency banks and corporates.

- Access to real time payments should be available at a reasonable cost.
- Agencies should have an ability to switch sponsor bank without inconveniencing their customers and at an acceptable cost. This would extend to paper instruments such as cheques, where the consequential impact on end customers is currently too high.

4.4.14 The costs and complexity for accessing services provided by multiple schemes should be appropriate, and should be mindful of integrity and innovation. In particular, agency and challenger banks noted that different schemes had different technical requirements, such as message standards and operational service levels, creating both cost and complexity for potential new entrants.

### Access barriers in becoming a Payment Service Provider.

4.4.15 Direct participants need to meet technical resilience, connectivity and performance requirements of payments infrastructure to ensure end-to-end performance. Several challenger banks have reported that the costs associated with joining a scheme and the complexity of the technology required to ensure compliance with the requirements of the scheme rules and to connect to the services are prohibitive. The costs depend very much on the gap between the current internal capability of the joining bank/PSP and the specific requirements of the scheme itself.

4.4.16 The capabilities required to support direct access to schemes as a full member can be stretching for new PSPs, but are fundamental requirements to manage process interactions with specific payment schemes:

- Direct participants in Bacs need to support CASS, 'A' services and Direct Debit mandate management.
- Direct participants in FPS need a capability to support 24/7 service and management information, and the ability to meet the customer proposition requirement to provide value within two hours.
- Direct participants in CHAPS need to be able to manage their intraday liquidity, SWIFT interfaces and reporting, as well as the ability to conduct dynamic intra-day management of a Bank of England settlement account.

4.4.17 Access for potential PSPs through indirect participation (agency relationships) is limited. Some challenger banks and agency banks have struggled to find a clearing bank to provide

services to meet their basic requirements for customers to have a current account and perform Credit Transfers, Direct Debits and to provide cheque and counter services. Additionally, in many cases where services can be procured, the pricing can result in an uneconomic model to provide services to end-customers:

4.4.18 The sponsoring market is extremely concentrated. A small number of sponsor banks support a large number of agency relationships into the clearings, so choice and range of technical connectivity options is limited. Additional direct participants have chosen not to offer these services, so it is not clear whether this is could be an attractive or highly competitive environment.

- The services offered may not include timely or appropriate/required management information and data required for a 24/7 or real time operation.
- The product range can be very limited – for example, some sponsor banks do not offer FPS connectivity for agencies as their own infrastructure cannot support this model effectively.
- Pricing varies dramatically and components of the price vary.
- Cheque clearing and settlement can be complex and expensive relative to other forms of payments. It is sometimes cost prohibitive to operate for consumer accounts where there are very limited cost recovery opportunities.

4.4.19 Several new entrants report that technical standards can form barriers to entry. Examples include the need to support multiple data standards such as ISO 8583, ST18, and SWIFT. This is also just to support consumer retail payments. If a new entrant wants to support corporate payments, then the complexity builds significantly. The number of legacy data models across the UK payment schemes imposes a significant burden on banks to maintain and operate separate complex payments infrastructure silos to connect to the central payments infrastructures. Furthermore, few of these options carry the type or amount of data now being requested by customers (the richer data or ISO 20022 challenge).

4.4.20 Banks and PSPs can achieve economies of scale as transaction volumes grow. In general, direct participation in schemes results in lower transaction costs but higher fixed charges, which may not be the preferred route for low-volume users.

### Access barriers for potential new Infrastructure Providers

4.4.21 Infrastructure providers need to achieve key performance indicators and rules for systems availability and accurate and timely processing of high volumes of messages. They must have security and resilience procedures that conform to UK data centre standards – typically ISAE 3402 and ISO 27001.

4.4.22 Access for potential new infrastructure providers is limited by the supply arrangements of the Payment System Operators. They may have established complex proprietary business processes, technical standards and ways of working which create an incumbent advantage. Suppliers must be prepared to invest in a high standard of IT infrastructure required.

## 4.5 Additional potential collaborative overlay initiatives

4.5.1 Investment in the central infrastructure commonly lags behind the investment in competitive offerings in the payments domain. There exists the potential to add capability onto the current UK payments infrastructure. Existing overlays include Paym for mobile bank account to bank account transfers. Overlays could be examined from a service user perspective developing use cases to explore potential for collaboration across the schemes to enhance the service user proposition.

4.5.2 There are a number of potential collaborative overlay initiatives:

- Enhancing mobile payments: This could include geo-location services and embrace the EU directive on E-ID and ECB SecuRe pay recommendations.

- Extension of the use of an alias ID: This initiative could extend the current mobile proxy database to provide broader services. An alias identifier could provide abstraction for the service users' banking relationships. This could also support the EU directive on E-ID requirement for a national scheme (or schemes).
- Lowest cost routing/single gateway for all schemes: Rather than submitting payment instructions to a specific scheme, a service user or corporate could submit a payment instruction which would then use the most appropriate route to effect the payment, based on previously defined business rules.
- Sort code management/account portability: Mechanisms could be provided to give agency banks sort code management and service users account portability. This might entail a revised EISCD or similar.
- Reference data: UK industry reference data could be re-engineered to rationalise the multiplicity of approaches (e.g. current work on the SEPA 'IBAN only' requirement).
- Authentication and anti-fraud measures: Collaborative work could reduce the cost to industry for authentication and fraud reduction.

## 4.6 Infrastructure management and operation (consolidation)

**Multiple systems and infrastructures can encourage silo activity and product development that may not necessarily deliver good service user outcomes.**

4.6.1 The UK payments infrastructure model is similar to a number of other jurisdictions, in that a number of distinct schemes and infrastructures have evolved over time. Those advocates of the complementary nature of the schemes believe the payment mechanisms are generally targeted at different requirements of service users. If that premise were true, and from the perspective of the service user the schemes and operators are not competing, then convergence of management priorities and objectives could drive convergence towards a smaller set of schemes, standards and architectures.

4.6.2 Consolidation of elements of schemes that deliver services with similar attributes may also provide efficiencies in terms of inter-operability, scale and cost reduction. These trade-offs and differential benefits may need to be considered. A holistic evaluation could be conducted to determine whether it is more efficient or economic to have multiple payment schemes and infrastructures or to migrate to more consolidated schemes with service level variants depending on speed of payment, or prioritisation, e.g. retail versus wholesale, or credit versus debit payments.

4.6.3 The existence of multiple Payment Systems Operators and infrastructures for retail payments contributes to cost and complexity. Customers may not have a very clear understanding of what payment services they are consuming; they are primarily concerned with meeting a set of business requirements; e.g. to deliver a given amount to a beneficiary within a certain timeframe, at minimal cost..

4.6.4 There are two fundamental characteristics of payment instruments that can be used to classify instrument types. One is the nature of initiation – a payment can be 'pull' (initiated by the payee) or 'push' (initiated by the payer). The second is the model of settlement used – Real Time Gross Settlement has immediate finality of settlement but requires a large amount of liquidity; deferred net settlement delays the settlement time and liquidity requirements but introduces settlement risk. Hybrid models of DNS and RTGS are also possible, that combine features of both for different risk-rated payments.

4.6.5 There are a number of possible scenarios for vertical and/or horizontal infrastructure management and operation. Three possible scenarios are outlined below:

- One push (credit) and one pull (debit) mechanism: This approach would be the end state where a payment is handled based on the type of payment, for instance a CT or DD. This approach might mean that all entities with a direct connection will ultimately have to support 24/7 processing or ensure a stand-in processing facility is available. This approach could also support settlement of cheque images.

- Two push (credit) and one pull (debit) mechanism: A variant scenario might be to retain a separate RTGS infrastructure that is reserved for very high value transactions. This approach has been followed to varying degrees elsewhere (Sweden, Mexico, Japan and Switzerland) and could bring consolidation, consistency, and unity to the UK payment infrastructure, potentially organising payments traffic, easing access, and supporting a robust national infrastructure.
- Legacy message management facility: This would be a capability to support legacy formats in order to ensure that innovation and any required migration is not constrained to the 'pace of the slowest'. For example, a message management facility could enrich a message for Entity A in a number of formats (ST18/ISO8583/ISO 20022 CGI or an ERP format) and send it on to Entity B in ISO 20022 XML, or vice versa. This approach could be an interim stage to facilitate a migration, to help overcome data management challenges and to reduce the IT change burden on industry participants. (This has been successfully implemented in many instances to support a migration to SEPA, including at STET in France).

4.6.6 There may be a case for further sharing of infrastructure based on network effects. Infrastructure consolidation may create concentration risk and also reduce the desirability of competitive tendering given the critical importance of that infrastructure and the risks associated with changing supplier.

- A potential approach to rationalise Bacs and FPS could enhance the service user experience with regards to connectivity, messaging and security protocols and would create one retail credit and debit system.

# 5 Looking ahead

5.1.1 Major infrastructure change or business process improvement often requires significant investment in long-term change programmes. It may therefore be beneficial for the industry and authorities to promote clear overarching objectives in support of the outcomes they wish to see.

5.1.2 There may be a desire to explore opportunities to effect change to deliver enhanced efficiency, more competition and better service user outcomes. The analysis of these opportunities could be segmented to assess the benefits to a range of stakeholders, and assess the impact of multiple changes to the service user, as a holistic exercise, rather than by instrument by instrument in isolation.

5.1.3 Several aspects of the UK payments infrastructure are considered to be world class, but there are clearly identified areas where further analysis and reform may be required, including (but not limited to):

- Account number structuring and centralised data management;
- Use and maintenance of reference data;
- Enablement of enhanced remittance data and transaction status reporting, e.g. via a 'Richer Data' solution;
- Electronic identity management;
- E-invoicing;
- Setting minimum security requirements for authorisation of payment instructions

5.1.4 Immediate priorities in the UK for many of the PSPs connected to the domestic payments infrastructures relate to the practical challenges involved regarding:

- Ring-fencing, and minimising the potential impact on customers;
- the introduction of PSDII, including access for TPPs;
- the impact of the regulation of MIF on their cards business models;
- the introduction of a new cheque clearing model based on the imaging of cheques;
- changes required to include more reference data to meet customer requirements; and
- the development of new products and services to compete effectively.

5.1.5 It will be important to understand the overall and combined magnitude of the portfolio of change involved for PSPs and other stakeholders. Desired outcomes could be aligned with PSR core objectives.

5.1.6 Concerns remain related to the cost and complexity of connectivity and technical access to the payments infrastructure. There is a case for a review of the current model in its entirety, given advances in technology and the introduction of new entrants (and TPPs) to determine whether the overall model remains fit for purpose from a service user perspective.

5.1.7 The central infrastructure related topics that could be prioritised in terms of further analysis and investigation include:

- setting a strategic direction for data management (including message formats);
- rationalisation of technical access requirements;

5.1.8 Each of these could improve interoperability, enable the provision of enhanced and consistent payment data, and lower costs to both participants and service users. Standardisation should be focused on positive long term service user outcomes.

5.1.9 There is an opportunity to create a strategic direction for data management and a standardisation (or further convergence over time) of message formats. There are numerous potential business drivers and international developments that may support the

case for the UK developing a formal plan to converge towards global standards, thereby building upon the recent industry decision to adopt ISO 20022 as the default standard for any new scheme developments. Alignment with international standards could better enable UK domiciled market participants and infrastructure providers to compete on a more level playing field in international markets. However, the costs and benefits of message standard change will differ in the case of each scheme or application, and would also be significantly affected by the lead-time and the migration duration and approach.

5.1.10 The technical requirements and standards for connecting directly to payment infrastructures (whether directly or indirectly) are perceived to be prohibitively high for 'challenger' banks and those PSPs who have lower payment volumes, hindering their ability to provide as full and comparable set of payment services (and service levels) as larger, established players. This could have an adverse impact on market competition for payment services and wider retail banking services. Furthermore, the architectural complexity of the current UK payments infrastructure means that there can be particularly high costs for a new PSP seeking to connect to multiple payment infrastructures. The use of multiple standards and infrastructures generally requires the establishment and maintenance of multiple, scheme-specific, connections, operations and expertise internally to support day to day business as usual activities.

5.1.11 Often potential solutions are debated, but where these can result in a cost to the industry, sometimes to address a small subset of customer needs and with no clear short term revenue, the lack of clear direction often impedes progress. The cumulative result of a lack of investment to address small issues can result in a long term gap in functionality when contrasted with other countries' payments infrastructure which is co-ordinated centrally.

5.1.12 The costs and benefits for provision of payment services are unevenly distributed across the market, particularly for retail payments. In order to achieve desired outcomes for service users, the drivers and barriers across a mix of supply-side organisations would need to be understood and acknowledged. There is no one size fits all approach for payments, as the demand side of the market is extremely diverse and ranges from multinationals and Government to the needs of a vulnerable individual.

5.1.13 Industry stakeholders recognise there can be merit in taking a collaborative approach to some payment systems initiatives. Priority areas for future collaborative work could be clearly identified in terms of common mutual benefit, and differentiated from areas that should remain in the competitive domain.

5.1.14 Investment in infrastructure can be extremely expensive. When investment is required in areas of common mutual benefit this has often required regulatory intervention or direction, to ensure the outcome is not determined by the pace of the slowest network participant's development capability or capacity to implement change.

5.1.15 The expansion in number and diversity of new entrants will put pressure on the core infrastructure , where the complexity or sophistication of their IT infrastructure or business process model may not be comparable to those of an incumbent (e.g. automation of exceptions handling). A balance may need to be achieved to enable competition, but retain a high degree of stability and functionality for existing services.

5.1.16 Specific network requirements such as bank account identifier databases also require significant ongoing collaboration and development to ensure relevance, resilience across the network; and ensure continuing reach for service users. In the same way that domestic payment services have expanded to incorporate overseas transactions, it could be anticipated that mobile and e-commerce solutions could develop (for example to enable tourists to pay by mobile).

5.1.17 As described in Appendix 2, there are many regulations and regulatory initiatives that may affect future infrastructure requirements. The revisions to the EU Payment Services Directive (PSDII) introduce a new class of institution, the Third Party Provider (TPP), into the ecosystem. Access for new TPPs – for payment initiation or payment information – directly into the ecosystem could have far reaching impacts for PSPs and service users. There is

potentially a case to develop an access regime with a coordinated approach to reduce complexity for new entrant TPPs and also to reduce the burden of complexity on the existing service providers. The PSR may want to further understand the potential role of TPPs and the implications of other regulatory measures, with regard to their potential impact on the UK payment systems, participants and service users, before reaching any conclusions.

# Appendix 1: Infrastructure comparison

## Retail payment system comparison

Figure 19: UK versus other retail payment system comparison.

| System | Operator/country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **Bacs** | Bacs Payment Schemes Ltd (UK) | Multilateral deferred net settlement (D+2) | Bulk credit transfer, Direct Debit | ■ Submitted online via Bacstel-IP, with tracking of payment status.<br>■ 5.7 billion transactions in 2013, with total value of £4.2 trillion. |
| **Bankgiro** | Bankgirot (Sweden) | Intra-day multilateral and bilateral net settlement | SEK/EU credit transfers, direct debits | ■ Payments are addressed using a portable Bankgirot number. |
| **BI-COMP** | SIA SBB (Italy) | Multilateral deferred net settlement (intraday via TARGET2) | Domestic and SEPA transfers, cheque clearing | ■ BI-COMP can also bilaterally clear SEPA SCTs with participants in Austria's CSI system and SCT/SDDs with the Dutch Equens system. |
| **CORE** | STET (France)<br>STET (Belgium) | Intra-day multilateral deferred net settlement | SEPA & non-SEPA transfers, direct debits, card and cheque clearing | ■ Service-orientated architecture platform that can support multiple CSMs.<br>■ As of March 2013, STET now also operates Belgium's retail payment infrastructure on the same platform.<br>■ Accepts both legacy and modern ISO 20022 messaging.<br>■ Two-tiered access structure. |
| **ICS** | NETS (Denmark) | Intra-day multilateral deferred net settlement | Same-day low value credit transfers | ■ ISO 20022 XML compliant retail system, introduced in 2013.<br>■ Multilateral information exchange facilitated by a central hub, as opposed to the bilateral exchanges in the legacy Sumclearing system.<br>■ Two-tiered access structure. |
| **SIC** | SIX (Switzerland) | Final real time settlement, overnight (D+1) | CHF/SEPA transfers, direct debits, cheques | ■ SIC processes both RTGS and retail payments for the Swiss Franc. Euro payments can be made through the euroSIC module to be settled through STEP 1 or STEP 2.<br>■ All payment instructions arrive through a single online channel via SWIFT or SIC messaging.<br>■ Currently undergoing migration to Swiss ISO 20022 standards. |
| **SILOC** | CIP (Brazil) | Multilateral deferred net settlement (D+1) | Retail transfers, direct debit, limited card clearing | ■ Projects underway to implement mobile payments, and to incorporate IPF and additional card scheme settlement. |

## High-value payment system comparison

Figure 20: UK versus other high value payment system comparison.

| System | Operator/country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **CHAPS** | CHAPS Clearing Company Ltd. (UK) | Real time immediate settlement<br>Operating hours: 06.00-16.30 GMT | High-value GBP payments | ■ Uses SWIFT MT messaging.<br>■ Liquidity Saving Mechanism (LSM) provides matchings and queuing functionality.<br>■ SWIFT-supplied MIRS solution provides resilience.<br>■ Pricing: £0.175/transaction plus £15,000 fixed fee. (CHAPS Co, 2014)<br>■ 35.0 m payments in 2013, with value totalling £70 trillion. (Payments Council, 2013). |
| **TARGET2** | European Central Bank (Europe. | Real time immediate settlement.<br>Operating hours: 07.00-18.00 CET | High-value EUR payments | ■ Pan-European settlement system; second largest globally.<br>■ State-of-the-art liquidity management tools, including prioritisation, queue management, pooling and liquidity reservation.<br>■ Information and control module for participants.<br>■ Pricing: €0.80-€0.20/transaction (£0.64-£0.16) depending on volume plus fixed fee. (ECB, 2012)<br>■ ISO 20022 XML (SWIFT MX) migration scheduled for 2017.<br>■ 92.6m payments in 2013, with value totalling €493 trillion (~£394 million). (ECB, 2014). |
| **EURO1** | European Banking Association (Europe) | Real time immediate settlement.<br>Operating hours: 07.30-16.00 CET | High-value EUR payments | ■ Private-sector alternative to TARGET2; legal structure guarantees finality of payments.<br>■ End-of-day positions settled within TARGET2.<br>■ Offers 'Liqidity Bridge' for intra-day liquidity managements, and sub-participation arrangements for subsidiaries.<br>■ ISO 20022 XML migration planned alongside TARGET2.<br>■ 66.6m transactions in 2012, with value totalling €57.9 trillion (£46.3 trillion) (ECB, 2014). |
| **Fedwire** | US Federal Reserve System<br>FRB of New York | Real time immediate settlement<br>Operating hours: 21.00 (preceding day) – 18.30 ET | High-value USD payments | ■ 134.2m transactions in 2013, with value totalling $713 trillion (£417 trillion) (Federal Reserve, 2014). |

| System | Operator/country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **CHIPS** | The Clearing House (US) | Bilateral/ multilateral real time settlement<br>Hybrid system<br>Finality over the Fedwire RTGS system | High-value USD payments | ■ Privately owned intra-day clearing system.<br>■ Transactions are continually monitored, matched between participants.<br>■ Extremely efficient liquidity management. |
| **RIX** | Riksbank (Sweden) | Real time immediate settlement | High-value SEK payments | ■ Queuing and liquidity management functionality.<br>■ Central bank liquidity provided (with collateral).<br>■ Separate liquidity accounts for individual payment schemes. |
| **BOJ-NET** | Bank of Japan (Japan) | Real time immediate settlement | High-value JPY payments | ■ Queuing and liquidity management functionality.<br>■ Central bank liquidity provided (with collateral).<br>■ High-value payments are automatically routed to BOJ-NET by the single-channel Zengin platform.<br>■ Migration to XML messaging (including some ISO messages) in 2015. |

## Real time and mobile payment system comparison

Figure 21: UK versus other real time/mobile payment system comparison.

| System | Operator/ country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **Faster Payments Service (FPS)** | Faster Payments Service Ltd. (UK) | Real time MDNS.<br>24/7/365 operation | Credit transfers, Standing Orders, corporate bulk payments in sterling | ■ Payment guaranteed to arrive within two hours, but 95% finished in 10s.<br>■ Three daily settlement cycles.<br>■ Free for customers, corporates/FI's pay a per transaction.charge.<br>■ Uses ISO 8583 message standard.<br>■ 968 million transactions in 2013, with total value £771 billion. |
| **Paym** | Payments Council (UK) | Real time, over FPS | Person-to-person mobile credit transfers | ■ Introduced in 2014, allows payments to current accounts associated with mobile numbers.<br>■ Payments are made through FPS. |
| **BiR/Payments in Real-time** | Bankgirot (Sweden) | Real time gross settlement<br>24/7/365 operation | Credit transfers in SEK.<br>Swish (mobile payments) | ■ Final settlement as opposed to deferred settlement.<br>■ Pricing at Bankgirot set by membership; customer charges set by bank, but will be 1-2 SEK/transaction for SWISH.<br>■ ISO 20022 XML and proprietary standards used. |

| System | Operator/ country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **Danish Real-time Payments** | NETS (Denmark) | Real time MDNS. | Credit transfers in DKK | ■ To be completed in 2014. All parties are billed by central infrastructure. cISO 20022 XML messaging compliant.<br>■ Interoperable with new Danish ACH. |
| **ExpressElixir** | KIR SA (Poland) | Real time MDNS. 24/7/365 operation | Credit transfers in zloty | ■ Customer pricing set by banks, typically at 5 zl. Priced more expensively than standard transfers.<br>■ Participation hours are individual depending on bank e.g. some are business day only. |
| **G3** | BCS (Singapore) | Real time MDNS | FAST | ■ ISO 20022 XML compliant. |
| **Mobilpenge** | NETS (Denmark) | | Mobile P2P in Danish kroner | ■ Introduced in 2012 based on SMS.<br>■ Allowed payments for transport, entertainment and retail products from a mobile phone via the Dankort network.<br>■ Discontinued in 2014. |
| **NPP** | APCA (Australia) | Real time MDNS | | ■ Currently under development.<br>■ Messaging will be ISO 20022 XML compliant. |
| **Real Time Clearing (RTC)** | BankservAfrica (South Africa) | Real time MDNS. 24/7/365 availability | Credit transfers in ZAR | ■ 10 daily clearing cycles.<br>■ Customer pricing set by banks, priced as a premium service (~R11plus 0.95% at one bank) compared to free EFT service.<br>■ Uses ISO 8583 cards standard. |
| **Swish** | Swish (Sweden) | Real time, over BiR | Person-to-person mobile credit transfers | ■ Launched in 2012, initially with six Swedish banks.<br>■ Payments are made to mobile numbers associated with a current account, over the BiR system in real time. |

Cheque clearing system comparison

Figure 22: UK versus other cheque clearing system comparison.

| System | Operator/country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **Cheque and Credit Clearing** | Cheque and Credit Clearing Company. (UK) | Final settlement (T+2) | GBP/Euro cheque clearing/USD cheque clearing | ■ Electronic interchange of cheque information over the IBDE network.<br>■ 2-4-6 day promise on interest, withdrawal and fate respectively.<br>■ Paper and digital data required for settlement.<br>■ 566 million transactions in 2013, with total value of £558 billion. |

| System | Operator/country | Execution mode(s)/speed | Products supported | Distinguishing features |
|---|---|---|---|---|
| **US Check 21** | Federal Reserve Bank System (US) | Final settlement (T+0-4) | USD cheque clearing | ■ US Check 21 Act, Oct 2003 enabled electronic truncation of cheques.<br>■ Settlement time depends on the location and value of the cheque deposit.<br>cIndustry-defined Universal Companion Document (UCD) cheque format. |
| **Image Cheque Clearing System** | UAE Central Bank (UAE) | Intra-day final settlement | AED cheque clearing | ■ Uses secured electronic cheque images to settle cheques in four hours.<br>■ New system was launched in 2008.<br>■ Two clearing and settlement cycles daily. |

### ATM network comparison

Figure 23: UK versus other ATM network comparison.

| System | Operator/country | Distinguishing features |
|---|---|---|
| **LINK** | VocaLink (UK) | ■ Single ATM interoperability model under the LINK scheme offers customer choice and coverage/access nationally. |
| **Eufiserv** | (Belgium) | ■ Full separation of scheme and operator. |
| **Bankomat** | (Sweden) | ■ National outsource of ATM operations to a third party provider with ubiquitous access and national coverage. |
| **Multiple – bank branded** | US, South Africa, and multiple other jurisdictions | ■ No single scheme, multiple single bank and third party operator centric systems with limited interoperabiity (other than via Visa/MasterCard links) and characterised by usage costs at the ATM for customers. |

## Selected insights from payment infrastructure approaches in other countries:

### Brazil: CIP (Brazil Government, 2014)

There are two major fund transfer systems in Brazil – the near-real time SITRAF system for priority transfers and the deferred net settlement SILOC system for low-value customer payments. Both systems are operated by CIP (Interbank Payment Clearinghouse).

The SITRAF system operates on technology similar to the STR RTGS system. Payments orders are sorted into either gross or net settlement routes depending on the value of the transfer, with queuing available for liquidity management. As such, SITRAF is considered a 'hybrid' system, with clearing cycles occurring every five minutes. Funds are deposited by participating institutions at the beginning of each day and can be topped up during the day. Final settlement in STR (the national RTGS) occurs at the end of the day, but transfers in SITRAF are deemed as final due to the pre-funding approach.

The SILOC system is a multilateral netting system that settles twice daily, with intraday settlement for TEC (Special Credit Transfers) and T+1 settlement for all other instruments. It is restricted to payments of BRL 5000 or below. As a batch settlement system, the pricing structure for SILOC transfers are commensurately lower compared to SITRAF. SILOC is used to support retail transfers, a limited number of card transactions and direct debit activity. Current projects include the clearing and settlement of mobile payments; the expansion of Direct Debit Authority to include utilities; the

possible membership of the International Payments Framework (IPF) to achieve interoperability internationally with other ACHs and the provision of settlement services to card schemes (such as MasterCard).

### Denmark: Intraday Clearing System

### Betalingsservice (Direct Debits).

A new *Intraday Clearing System (ICS*) was introduced in 2013, with adaptable configuration for the number of daily clearing cycles. Initially, this has been set at one nightly and three daily clearing cycles (with an additional technical back-up cycle). Clearing and settlement is handled at a central hub by the payment service provider Nets. Nets processes all transactions and distributes them to the receiving agents. There is no bilateral communication between agents. The system handles all account-to-account transactions in Denmark and contains the following transaction types: account to account (with and without) structured remittance advice (Structured Creditor Reference); cash handling and national transmission of international credit transfers.

The clearing system is fully ISO 20022 compliant, prepared for SEPA, and includes functionality to supports ISO 9362, ISO 11649 and ISO 13616.

ICS Nets processes approximately 180 million credit transfer transactions a year.

### Denmark: Dankort

Domestic Danish debit card system, tied to bank accounts with a very high (90%) penetration in the local retail market. Dankort was originally instigated in 1983, with successively modern cards being introduced in 2004 that include chip-and-pin functionality. Dankort differs from international card schemes (such as Visa) in that there is strong domestic regulation over merchant and interchange fees, consisting only of an annual fee based upon overall transaction volume. The low interchange fees mean that Dankort is highly favoured by domestic retailers, to the exclusion of international card schemes. More recently, dual-branded cards (e.g. Visa/Dankort) have offered a compromise between domestic usage and international compatibility.

### Denmark: Real Time Payments

This clearing system is a real time system for low-value credit transfers. In principle, it contains the same functionality as the ICS and can therefore offer further resilience for the clearings in Denmark, but initially, it will only be used for urgent customer initiated account-to-account credit transfers under DKK 500.000. In addition to the intraday system, the real time system also handles credit transfers as a result of mobile payments, especially supporting P2P (Person-to-Person) mobile payments, fueled by the increasing demands by service users for immediate, reliable, and 24/7 payments. These are new payments' instruments in Denmark and will enable the banks to implement new enhanced premium services to satisfy both corporate and customer expectations—as well as deliver the capability to banks to meet the future requirements triggered by the introduction of real time payments to the market.

The real time system is based on the same ISO 20022 standards as the ICS. Settlement follows the same cycles as the intraday clearing and is also handled by a central hub. The real time system is 24/7/365 and uses synchronous web service communication.

With regard to the migration consisted of two weeks of coexistence between existing legacy clearing and ICS, otherwise a big bang approach moving all account-to-account transactions. Real Time Payments is a new clearing system, so no migration is needed, but extensive testing is required.

### Denmark: Mobilpenge

Mobilpenge was a mobile payments service introduced by Nets in 2012. It is connected directly to a user's bank account (as opposed to the mobile service provider) and can be used to pay for transport, entertainment tickets and other products. In 2014, Nets suspended Mobilpenge as a standalone product as it was based on the use of SMS technology.

### Europe: TARGET2

TARGET2 is the real time gross settlement (RTGS) system owned and operated by the Eurosystem. TARGET stands for Trans-European Automated Real time Gross settlement Express Transfer system. TARGET2 is the second generation of TARGET.

TARGET2 is based on the Single Shared Platform (SSP), developed by Banca d'Italia; Banque de France; and Deutsche Bundesbank. These three central banks operate the system on behalf of the Eurosystem. Direct participants such as supervised credit institutions, treasury department of central or regional Governments, public sector bodies, authorized and supervised investment firms as well as overseen clearing and settlement organizations can access the SSP via the SWIFTNet Network, the Internet, CoreNet, and related services.

Payment transactions in TARGET2 are settled one by one on a continuous basis, in central bank money with immediate finality. There is no upper or lower limit on the value of payments. TARGET2 settles payments related to monetary policy operations, interbank and customer payments, and payments relating to the operations of all large-value net settlement systems and other financial market infrastructures handling the euro (such as securities settlement systems or central counterparties).

Based on a consultation with the banking community in 2010, the Eurosystem decided that all SWIFT FIN MT standards currently used in TARGET2 for payment purposes will be replaced by their MX equivalent. All message types will be replaced at the same time with the SWIFT standard release in November 2017. There will be no coexistence between the 'old' MT and 'new' MX standards and TARGET2 will not offer any conversion features. This migration to ISO 20022 XML is a significant step for European banks and requires investment across the market to migrate these payment transactions to the new format.

### France: STET CORE system (STET Brochure, 2014)

STET is the French national payment systems operator, and operates the state-of-the-art CORE platform, which was released in January 2008. CORE's key propositions include a high-performance service orientated architecture (supporting well over 200m transactions daily), the use of flexible internal XML-based messaging and the ability to support multiple CSM's on the same technical platform with near real time payments capability.

CORE has successfully harmonised French domestic payments (including SEPA, non-SEPA, debits, card and cheque clearing) under a single platform, accepting both legacy and modern ISO 20022-based messaging. Payments are matched and positions calculated on a real time basis with multilateral netting. STET effects settlement over TARGET2 via the Banque de France.

STET's multiple CSM capability was demonstrated in March 2013 with the launch of the Belgian national CSM on the same CORE infrastructure platform. Their stated strategy is that of offering technical consolidation – alignment of CSM's to the same technology platforms – as an intermediary before the functional consolidation of regional CSMs.

### Italy: SIA SSB (Banca d'Italia, 2014)

SIA SSB is the operator of BI-COMP, Italy's national payment systems for retail and paper-based payments. The two sub-modules of BI-COMP, for paper and electronic payments respectively, are individually cleared multilaterally three times a day, with balances submitted to a National Clearing process that totals an overall national account balance and transmits them to TARGET2 for settlement.

More recently, BI-COMP has been extended with functionality to support SEPA ISO 20022 XML-based message formats, and has been integrated with other European CSMs, including CSI in Austria, Equens in the Netherlands and STEP2 in France. The majority of Italian banks are using EBA Clearing for low value SEPA transactions and SIA SSB provides the platform for this payment system (EBA Clearing operates a pan European ACH (D+1) and a private sector RTGS that settle over TARGET2).

### Japan: BOJ-NET

The *BOJ-NET Funds Transfer System* (BOJ-NET FTS, or BOJ-NET) functions as the central RTGS system for the Japanese Central Bank (Bank of Japan). As of 2010, there were 347 online participants in the BOJ-NET system, all of whom also hold current accounts with the central bank. The BOJ-NET is used for final settlement of transactions and settles both interbank transfers and daily net balances from the national private clearing systems.

In 2011, the Bank of Japan completed the Next-Generation RTGS (RTGS-XG) project, introducing liquidity-saving features and shifting large-value payments (>¥100m) previously processed by Zengin and FXYCS onto BOJ-NET. Queuing and offsetting accounts offer allow transactions to be queued if funds are not yet available and for queued transactions to be offset against incoming instructions. BOJ-NET typically operates between 09.00-17.00, and the Bank of Japan provides a collateralized overdraft to facilitate intraday liquidity.

### Sweden: RIX

RIX is the Swedish national RTGS system, operated by the Riksbank, and is the final point of settlement for transactions in Swedish kroner (SEK). It is open to domestic and remote participants and consists of a number of banks, investment institutions and clearing bodies.

RIX is nominally an RTGS system, but is a hybrid as it includes a number of liquidity-saving operating modes that allow payment orders to be queued, reordered and in the case of gridlock, netted against each other. Four liquidity processes are dedicated to specific clearing systems (including Bankgirot), and have separate accounts to basic real time settlement. The Riksbank can provide intraday credit to participants to further support liquidity, if sufficient collateral is provided. The RIX system was re-platformed in recent years and is a bespoke implementation of a SIA SSB Perago RTGS system. The Riksbank and the Norwegian Central Bank Norges Bank, both separately moved to the same java-based payment system to future proof their environments.

### Sweden: Bankgirot

Bankgirocentralen BGC AB (BGC) is the operator of the ACH in Sweden, which processes a number of payment products on its technical platform. BGC is jointly owned by eight Swedish banks.

The Bankgirot platform processes Swedish credit transfers and direct debits, which are known as Bankgiro products. In addition, non-Bankgiro payment products are also cleared by the system, including credit transfers, paper-based payments, ATM withdrawals, cards and cash handling payments The Autogiro (Direct Debit) system and the credit transfer platforms are domestic proprietary standards and not currently ISO 20022 compliant, although the overall plans for the payment system do include a migration in the future. BGC outsourced the processing of these transactions to VocaLink in 2010.

Bankgiro accepts payments in both Swedish kroner and the euro, which are settled in RIX (the national RTGS) and TARGET2 respectively. Customers have a single window to submit payment instructions and the infrastructure routes these accordingly.

Recently, BGC has also introduced the payments in Real Time (PRT) system as the technical infrastructure for payments to be settled in real time, 24/7. Unlike Bankgiro, when the Riksbank is not open for settlement, BGC acts as the settlement body for Swedish faster payments under a complex agreement with the Riksbank where BGC operates a shadow accounting mechanism of the settlement accounts in a secure environment and synchronises with the Riksbank upon opening and closing. Bankgiro payments are performed using a *Bankgiro* number, which acts as a proxy to a bank account numbers for corporates. Individuals do not use a Bankgirot number, so this form of account portability is restricted to corporates.

### Sweden: BiR (Payments in Real Time)

BiR – Payments in Real Time is the new Bankgirot operated scheme in Sweden. This system operates in ISO 20022 compliant messages and supports mobile initiated real time payments (Swish). All communication in the BiR payment flow uses ISO 20022, whereas the financial flow between BiR and RIX (settlement) uses SWIFT category 2 messages. Bankgirot has built their own

proprietary message standard built on available ISO 20022 elements. This has primarily been based upon the ISO 20022 pain.001 initiation message, but in several cases new Swish messages and elements have also been designed. Average total execution time from mobile through to BiR and back is around 1-2 seconds, with split-second execution time within BiR itself.

### Sweden (Swish)

Swish was introduced in December 2012 as a mobile payments system in Swedish kroner, supported initially by six banks (Danske Bank, Handelsbanken, Länsförsäkringar Bank, Nordea, Swedbank and SEB) that own and operate the service. Skandiabanken joined Swish in 2013, and further banks are also expected to join.

Swish is based on a mobile app, using mobile numbers to identify recipients for credit transfers (with a mobile ID and recipient details for authentication and verification respectively). Banks compete within Swish on terms and conditions/price (e.g. Swedbank – 5 SEK annually with 1 SEK/transaction). Currently Swish only allows P2P mobile payments, although there are plans to introduce a real time mobile payments service for business as well.

# Appendix 2: Current and forthcoming legislation

Figure 24: Current and forthcoming legislation that may impact payment systems.

| Name of legislation | Description | Date of publication |
|---|---|---|
| **EU Directive on Consumer Rights** | The Directive on Consumer Rights was passed on 13 June 2014 to replace previous directives on distance and doorstep selling.<br>The purpose of the Directive is to achieve a high level of customer protection across the EU and to contribute to the proper functioning of the internal market by approximating certain aspects of Member States' laws, regulations and administrative provisions concerning contracts concluded between consumers and traders.<br>In the UK, the Consumer Rights Bill currently in the legislative process will incorporate this EU Directive and address these areas. | 13 June 2014 |
| **(UK) Cheques Legislation** | In May 2014, HMT published a consultation document, 'Speeding up cheque payments' inviting responses on proposed legislation to allow for the introduction of cheque imaging, an innovation to speed up cheque clearing times by sending an electronic image of the cheque for clearing, rather than the piece of paper itself. A draft Bill has been introduced into Parliament for debate, to introduce cheque imaging in due course. HMT will agree an implementation date with the industry.<br>The intent is:<br>■ A cheque could be presented by providing an electronic image that clearly reproduces the front and back of the cheque;<br>■ to remove the right of the paying bank to require physical presentment and delivery of the original paper cheque;<br>■ to allow banks' customers to create these electronic images themselves – customers can capture cheque images by smartphone, scanner or other devices and pay them in remotely. | 25 June 2014 |
| **E-Money Directive** | The E-Money Directive was implemented in April 2011.<br>The Directive seeks to:<br>■ Enable new, innovative and secure electronic money services.<br>■ Provide market access to new companies.<br>■ Foster real and effective competition between all market participants.<br>■ The E-Money Directive is currently being reviewed and a new version (EMDII) is expected in the next Parliamentary session. | In force since 30 April 2011 |
| **E-ID Directive** | The European Commission adopted the Regulation on Electronic Identification and Trust Services for Electronic Transactions in the internal market, in June 2012. On 3 April 2014 the European Parliament adopted its position at first reading and communicated it to the Council for approval and adoption by the co-legislators.<br><br>The regulation ensures that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where e-ID is available. | 3 April 2014 |

| Name of legislation | Description | Date of publication |
|---|---|---|
| **E-invoicing Directive** | ■ Draft Directive on e-invoicing in public procurement, accompanied by a communication setting out its vision for the full digitisation of the public procurement process, so-called 'end-to-end e-procurement.' The Commission believes that e-invoicing is an important step towards paperless public administration (e-Government) in Europe, which is one of the priorities of the Digital Agenda, and offers the potential for significant economic as well as environmental benefits. The Commission estimates that the adoption of e-invoicing in public procurement across the EU could generate savings of up to €2.3 billion. | 26 June 2013 |
| **Foreign Account Tax Compliance Act (FATCA)** | The Internal Revenue Service (IRS) of the United States of America passed the Foreign Account Tax Compliance Act (FATCA) as law in March 2010. FATCA seeks to prevent tax non-compliance by U.S. taxpayers with foreign accounts.<br>FATCA focuses on reporting transactions:<br>■ By U.S. taxpayers – certain foreign financial accounts and offshore assets;<br>■ By foreign financial institutions about financial accounts held by U.S. taxpayers or foreign entities in which U.S. taxpayers hold a substantial ownership interest.<br>The objective of FATCA is the reporting of foreign financial assets to aid the IRS to identify sources of funds liable to US taxation. | March 2010 |
| **Fourth Anti Money Laundering Directive** | European Commission proposed a Fourth Anti Money Laundering Directive. The measures proposed strengthen the Internal Market by reducing complexity across borders, safeguarding the interests of society from criminality and terrorist acts, safeguarding the economic prosperity of the European Union. They measures ensure an efficient business environment, contributing to financial stability by protecting the soundness, proper functioning and integrity of the financial system. | February 2013 |
| **Know Your Customer (KYC)** | The Financial Conduct Authority defines Know Your Customer (KYC) as important anti-money laundering controls. All regulated bodies are expected to obtain and use information about a customer over and above the basic identification information, and to monitor that customer's use of a firm's products and services in order to prevent any activity of money laundering.<br>Know Your Customer requirements oblige all regulated bodies to determine the identities of the account holders of a respondent bank in a correspondent banking relationship or of the sub-account holders of a payable-through account. | Part of the Money Laundering Regulations in force since 2007 |
| **Network and Information Security Directive.** | The European Commission proposed the NIS Directive in February 2013, which focuses on protecting critical infrastructure in the energy, transport, financial services and health sectors. While the provisions are aimed at Member State Governments (e.g., to improve cyber security capabilities and cooperation to prevent and respond to cyber-attacks), the Directive also targets enablers of key internet services, such as providers of cloud computing services, app stores, e-commerce platforms, internet payment gateways, search engines and social networks.<br>The two main requirements on private sector companies under the Directive are (i) to implement security measures to guarantee a level of security appropriate to the risk presented... having regard to the state of the art, and (ii) to notify competent national authorities of any security incident that has a significant impact on the continuity of core services they provide. | Proposed in February 2013, negotiations in progress for final text |

| Name of legislation | Description | Date of publication |
|---|---|---|
| **EU Regulation on Multilateral Interchange Fees** | The Regulation on Multilateral Interchange Fee (MIF) is designed to complement PSD2 by removing obstacles to achieving a single card payments market, improving transparency of pricing, and addressing competition concerns that the European Commission has been investigating for many years.<br>The MIF will take effect immediately although the key proposals for capping interchange will not come into effect for two months (for cross-border transaction) and two years for domestic transaction). | 24 July 2013<br>Awaiting ECON decision |
| **Payment Account Directive and Account Switching** | On 15 April 2014, the EU Institutions adopted the Payment Account Directive.<br>The Directive concerns the following:<br>■ Access to payment accounts: these provisions provide all EU customers, without being resident in the country where the credit institution is located and irrespective of their financial situation, with a right to open a payment account that allows them to perform essential operations, such as receiving their salary, pensions and allowances or payment of utility bills.<br>■ Comparability of payment account fees: by making it easier for customers to compare the fees charged for payment accounts by PSPs in the EU.<br>■ Payment account switching: establishing a simple and quick procedure for customers who wish to switch their payment account to one with another payment service provider within the same Member State and to assist customers who hold a payment account with a bank and want to open another account in a different country. | 15 April 2014 |
| **Payment Services Directive (PSD and PSD II)** | ■ The EU Directive on Payment Services (PSD) provides the legal foundation for the creation of an EU wide single market for payments. The PSD aims to establish a modern and comprehensive set of rules applicable to all payment services in the European Union. The target is to make cross-border payments as easy, efficient and secure'as 'nati'nal' payments within a Member State. The PSD also seeks to improve competition by opening up payment markets to new entrants, thus fostering greater efficiency and cost-reduction.<br>■ On 24 July 2013, the Commission proposed a revised Payment Services Directive (PSDII) and a Regulation on Multilateral Interchange Fees (MIFs) which will shape the payments framework to better serve the needs of an effective European payments market. It aims for a payments environment which nurtures competition, innovation and security to the benefit of all stakeholders and service users. | PSDII – 24 July 2013<br>Currently in legislative process awaiting ECON decision |

| Name of legislation | Description | Date of publication |
|---|---|---|
| **SecuRe Pay Recommendations** | The European Central Bank (ECB) released a comprehensive set ofRecommendations for the security of internet payments', following a two-month public consultation carried out in 2012.<br>■ The recommendations represent the first achievement of the European Forum on the Security of Retail payments (SecuRe Pay), a voluntary cooperative initiative between relevant authorities from the European Economic Area (EEA) – supervisors of PSPs and overseers in particular –formed with the objective of facilitating common knowledge and understanding of issues related to the security of electronic retail payment services and instruments and, where necessary, issuing recommendations.<br>The main recommendations:<br>■ Protect the initiation of internet payments, as well as access to sensitive payment data, via strong customer authentication;<br>■ Limit the number of log-in or authentication attempts, define rules for internet payment services session 'time out' and set time limits for the validity of authentication;<br>■ Establish transaction monitoring mechanisms designed to prevent, detect and block fraudulent payment transactions;<br>■ Implement multiple layers of security defences in order to mitigate identified risks;<br>■ Provide assistance and guidance to customers about best online security practices, set up alerts and provide tools to help customers monitor transactions. | 31 January 2013<br><br>Implementation 1 February 2015 |
| **Single Euro Payments Area (SEPA)** | ■ In March 2012 the European Central Bank adopted Regulation No 260/2012, which is also commonly referred to as the 'SEPA Regulation'. The regulation lays down rules for the initiation and processing of credit transfer and direct debit transactions denominated in euro within the European Union. The regulation defines a clear timeline by when these rules need to be implemented in all Member States. For the euro area, the final deadline is now 1 August 2014 (originally 1 Feb 2014). The deadline for euro-denominated payments in non-euro area countries will be 31 October 2016.<br>■ Key dates are as following:<br>■ 1 August 2014: End of six month grace period for migration to SEPA instruments in the euro area;<br>■ 1 February 2016: No BIC to be required for cross-border payments; niche products migration complete;<br>■ 31 October 2016: SEPA Credit Transfer and SEPA Direct Debit deadline for non-euro area countries;<br>■ 1 February 2017: National transaction MIFs (multilateral interchange fees) to be eliminated for SEPA Direct Debits. | Adopted in March 2012, deadline October 2016 |
| **Wire Transfer Regulation** | The European Commission passed regulation No 1781/2006 on information on the payer accompanying transfers of funds. This regulation lays down rules for PSPs to send information on the payer throughout the payment chain. It requires PSPs to ensure all wire transfers include complete information on the payer.<br>The Regulation transposes Special Recommendation VII (SRVII) of the Financial Action Task Force (FATF) into EU law and is part of the EU Plan of Action to Combat Terrorism.<br>A new regulation on this subject is in development. | Adopted in November 2006, revised in 2013 |

# Appendix 3: Payments Council activities

The Payments Council has listed the following amongst its activities related to the payments infrastructure:

For design and delivery of strategic industry services:

- Engagement, consultation and research to identify customer needs and requirements and along with industry expertise to define strategy.
- Formal project management to deliver small and large-scale programmes, with appropriate governance structures in place.
- Integrated central communication campaigns to accompany programme implementation.
- Strategic development of innovative industry services.

Cross industry activities include:

- Developing and setting common standards which facilitate inter-operability across the sector.
- Developing best practice guidance, industry codes of conduct, customer guarantees and minimum service levels.
- Collaborative investment in new infrastructure and payments services that deliver critical mass and support large and small PSPs alike.
- Researching and understanding the needs of all customers groups (e.g. the elderly, vulnerable customers) and developing solutions to deliver inclusive payment services.

Examples of proposals that are currently being researched as potential strategic deliverables include:

- Challenger access, including Third Party Payment service provider (TPP) access.
- Cyber security, Richer Data.
- Technical standards, including ISO 20022.
- Ring-fencing, including impacts on payments routing data.
- SEPA 'IBAN only' requirement.

Recently completed infrastructure projects include:

- CASS, Paym, Misdirected Payments.
- Multiple authorisation and re-tries (the implementation of a minimum service level for the re-tries of pre-notified payments on the day of payment due).

Alignment of industry and UK positions for European and Global regulation by: analysing the implications and formulating views and influencing; and where applicable, providing guidance on implementation and coordinating collaborative actions for:

- Payment Services Directive (PSD2);
- Bank Account Directive (BAD);
- SEPA and the European Payments Council (EPC);
- Liquidity Management Group (LMG);
- Ring-fencing Working Group;
- Information Security Advisory Group (ISAG);
- E-invoicing Group, Standards Policy Group/Legal Entity Identifier Group.

# Appendix 4: List of stakeholders consulted

Figure 25: Stakeholders consulted during this report research process.

| Stakeholders consulted: | |
|---|---|
| American Express Company | JP Morgan Chase and Co. |
| Bacs Payment Schemes Ltd. | Lloyds Banking Group Plc. |
| Bank of America Corporation | LINK Interchange Network Ltd |
| Bank of England | MasterCard Worldwide |
| Bank of Ireland | Metro Bank Plc. |
| Barclays Bank Plc. | Nationwide Building Society |
| Bank of New York Mellon Corporation | Payment Systems Regulator |
| Bottomline Technologies Ltd. | The Royal Bank of Scotland Group Plc. |
| Cardtronics. | Santander UK Plc. |
| CHAPS Clearing Company Ltd. | Svenska Handelsbanken AB. |
| Cheque and Credit Clearing Company Ltd. | S.W.I.F.T. scrl. |
| Citibank N.A. | Tesco Personal Finance Ltd. |
| Clydesdale Bank Plc. | TSB Banking Group Plc. |
| Experian Plc. | Turkish Bank (UK) Ltd. |
| Faster Payments Scheme Ltd. | Unisys Corporation |
| Financial Conduct Authority | Virgin Money Plc. |
| First Data Corporation | Visa Europe Ltd. |
| HSBC Bank Plc. | VocaLink Ltd. |
| Intelligent Processing Solutions Ltd. (IPSL) | WorldPay UK Ltd. |

# Appendix 5: Methodology

The methodology employed to reach the findings within this report has been designed around the research questions posed to ensure robust validation of hypotheses and triangulation of findings. Emphasis in particular has been given to designing methodology in line with the PSR's consultative approach to payment system stakeholders. Findings in this report are based on:

- Research on existing architecture, international payments system innovations and utilizing external sources (including the PSR's Call for Inputs) and the existing collateral and intellectual property of KPMG payments subject matter experts in our Global Payments Centre of Excellence.
- A request for information.
- 20 stakeholder interviews conducted with banks, schemes and other service providers to discuss infrastructure and options to increase efficiency and economy. Parties consulted are included in Appendix 4.
- A stakeholder event which developed and evaluated scenarios for efficiency in future UK infrastructure with 96 participants representing schemes, payment services providers, infrastructure providers and banks.

### Research

Comprehensive research on the payments infrastructure has included desk-based analysis on the following topics:

- The responses to the PSR Call for Inputs (where available).
- The current ecosystem, its key actors (including Payment Services Providers, Payment System Operators, infrastructure providers, banks and service users).
- Current volumes and operating standards of the payment system.
- Major regulatory drivers, including EU, international and national legislation.
- Technology trends driving future scenarios.

A variety of internal and external public sources have been analysed to source this information.

### Request for information

A request for information was sent to certain stakeholders to understand key attributes, products and service provision.

### Interviews

Stakeholder interviews were conducted to identify key themes for further exploration.

### Stakeholder event

A stakeholder event was held on 16 June, 2014 on behalf of the PSR. The purpose of the event was to further explore and evaluate some focus areas identified in early research and stakeholder interviews, and to evaluate potential approaches that could contribute to a world leading payments infrastructure. The event was designed as an information gathering exercise to further understand the issues raised and inform the PSR's future thinking on infrastructure.

The objectives of the event were to:

- Explore and understand the technical and functional outlook for the UK market infrastructures (payment systems).
- Consider possible future infrastructure scenarios taking into account the strategic objectives of the PSR (competition, innovation and service user outcomes); costs and benefits; risk/ease of implementation; and relative impact on stakeholder groups.
- Discuss the role that the PSR could play in regulating the UK's payment infrastructures.

The focus areas were derived from analysis of the responses to the PSR's 'Call for Inputs' and interviews with the stakeholders. Stakeholders were led through a structured process to identify the costs, benefits, implementation risks and impacts using the following evaluation framework, at the stakeholder event.

Figure 26: Focus area evaluation criteria.

| Evaluation criteria | |
|---|---|
| **Relative economic cost and benefit** | Options will have differential costs depending on the scope and scale of their impact, as well as differential benefits depending on their efficiencies and functionality for service users. Any economic benefit to one group may result in loss for another which will be passed on in another way to the service user. Customers largely obtain free/subsidised payment services to promote adoption and wider financial inclusion and facilitate efficient corporate collection of outstanding obligations. |
| **Risks and ease of implementation** | While some options may be exceptionally desirable in terms of benefit, they may carry high levels of economic operational risk. Specifically for the PSR, reputational and implementation risk exist if they are challenging to implement or enforce, or if they potentially contravene existing payment systems practice and law in other jurisdictions. Therefore, risk and ease of implementation are important evaluation criteria. In addition, it will be important to consider the implementation risk associated with systemically important systems/schemes, which have the potential to affect the wider payment ecosystem and the economy as a whole. |
| **Relative impact on different stakeholder groups** | It is important to assess the impact of options on different stakeholder groups, including the PSR, core banks, challenger banks, Infrastructure Providers and schemes, third party operators, service providers and service users. Some options may benefit incumbents while others may positively impact new entrants; it will be important to discern these differential impacts. |

# Appendix 6: Glossary

| Term | Definition |
|---|---|
| **Access** | The right of or opportunity for an institution to use the services of a particular payment system to settle payments on its own account or for customers. |
| **Acquirer** | The entity or entities that hold(s) deposit accounts for merchants and to which the card issuing institution transmits data relating to the transaction. The acquirer is responsible for the collection of transaction information and settlement with the card issuing institution. |
| **Agency agreement** | An agreement whereby 'indirect PSPs' obtain access to payment systems through a 'sponsoring bank'. |
| **Agency bank** | A credit institution that is an indirect payment service provider (see definition of 'Indirect payment service provider'). |
| **Agency Relationship** | A contractual relationship in which one party, the agent, acts on behalf of another party, the principal. The agent may execute trades for the principal but is not responsible for performance by the principal. |
| **Asynchronous payment** | An asynchronous payment is one which is not time bound, where potentially one party is not online 24/7, has throttled payments outbound, or has a stand in service in place to manage receipt of payments when the internal systems of the organisation are not online to support immediate processing. |
| **Authentication** | A procedure that allows the PSP to verify a customer's identity. |
| **Authorisation** | A procedure that checks whether a customer or PSP has the right to perform a certain action, e.g. the right to transfer funds, or to have access to sensitive data. |
| **Batch** | The transmission or processing of a group of payment orders and/or securities transfer instructions as a set at discrete intervals of time. |
| **CASS** | Current Account Switch Service. An automated service to effect a full switch of a customer current account. |
| **Cheque** | A written order from one party (the drawer) to another (the drawee, normally a bank) requiring the drawee to pay a specified sum on demand to the drawer or to a third party specified by the drawer. Cheques may be used for settling debts and withdrawing money from banks. |
| **Clearing** | The process of transmitting, reconciling and, in some cases, confirming payment orders or security transfer instructions prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement. Sometimes the term is used (imprecisely) to include settlement. |
| **Clearing system** | A set of procedures whereby financial institutions present and exchange data and/or documents relating to funds or securities transfers to other financial institutions at a single location (clearing house). The procedures often also include a mechanism for the calculation of participants' bilateral and/or multilateral net positions with a view to facilitating the settlement of their obligations on a net or net net basis. |
| **Credit cards** | A card indicating that the holder has been granted a line of credit. It enables the holder to make purchases and/or withdraw cash up to a prearranged ceiling; the credit granted can be settled in full by the end of a specified period or can be settled in part, with the balance taken as extended credit. I nterest is charged on the amount of any extended credit and the holder is sometimes charged an annual fee. |
| **Credit risk/exposure** | The risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter. In exchange for value systems, the risk is generally defined to include replacement cost risk and principal risk. |
| **Credit transfer** | A payment order or possibly a sequence of payment orders made for the purpose of placing funds at the disposal of the beneficiary. Both the payment instructions and the funds described therein move from the bank of the payer/originator to the bank of the beneficiary, possibly via several other banks as intermediaries and/or more than one credit transfer |

| | |
|---|---|
| | system. |
| **Current account** | A bank account that is a vital part of everyday life. It allows customers to receive salaries, benefits and other payments and to withdraw their money in cash on demand, either over the counter, through an Automated Teller Machine (ATM) or via Point of Sale (POS) purchase. It also enables customers to organise their finances more efficiently through the use of direct debits and Standing Orders. It gives the ability to pay other people and businesses via debit card payments and cheques. Lastly it provides customers with a gateway to additional financial products and services such as savings accounts and investments, mortgages and other personal loans, credit cards and more visible elements of current accounts – such as withdrawals from ATMs'. Internet and telephone banking have also made it easier for customers to manage their account. |
| **Data encryption standard** | A symmetric cryptiographic algorithm (ANSI standard) that is widely used, in particular in the financial industry. Triple DES consists of applying the cipher algorithm three times to each data block of data (encrypting-decrypting-encrypting) using a double-length DES key to prevent brute force attack. |
| **Debit card** | Card enabling the holder to have their purchases directly charged to funds on their account at a deposit-taking institution (may sometimes be combined with another function, e.g. that of a cash card or cheque guarantee card). |
| **Debit transfer system** | A funds transfer system in which debit collection orders made or authorised by the payer move from (the bank of) the payee to (the bank of) the payer and result in a charge (debit) to the account of the payer; for example, cheque-based systems are typical debit transfer systems. Also called debit collection system. |
| **Direct Credit** | Preauthorised credit on the payer's bank account which transfer to payee's bank account initiated by the payer. |
| **Direct Debit** | Preauthorised debit on the payer's bank account initiated by the payee. |
| **Direct member bank** | A payment services provider that accesses the payment systems directly through membership of a scheme run by a Payment System Operator (without sponsorship or agency agreement with other bank/payment services provider). |
| **Direct participant** | A participant in an interbank funds transfer system (IFTS) who is responsible to the settlement agent (or to all other direct participants) for the settlement of its own payments, those of its customers and those of the indirect participants on whose behalf it is settling. |
| **Distributing institution** | An institution which distributes (as an agent) or sells (as the issuer or an underwriter) the electronic money to the customer. |
| **EISCD** | Extended Industry Sort Code Directory combines a number of key databases and contains information about all banks/building societies connected to any of the UK clearing systems: Bacs, CHAPS and Cheque and Credit Clearing. The directories contain a record for each bank/building society branch and other financial institutions involved in the UK payment systems. They include the sorting code, branch details and details of the bank that settles transactions for the branch in each of the clearings. The EISCD includes fields in its information relating to the Faster Payments Service |
| **Electronic money** | Value stored electronically in a device such as a chip card or a hard drive in a personal computer. |
| **Encryption** | The use of cryptographic algorithms to encode clear text data (plaintext) into ciphertext to prevent unauthorised observation. |
| **End-of-day gross settlement system** | Funds transfer system in which payment orders are received one by one by the settlement agent during the business day, but in which final settlement takes place at the end of the day on a one by one or aggregate gross basis. This definition also applies to gross settlement systems in which payments are settled in real time but remain revocable until the end of the day. |
| **Forward dated payment** | Forward-dated payments are one-off payments sent and received on a pre-arranged date, set-up by the customer in advance. Although forward dated payments can be sent at weekends and on other non-bank working days, some organisations only process incoming payments on working days. |
| **Future dated payment** | A future dated payment is a term used to denote payments submitted into the Bacs system. The Bacs system is capable of storing payments in advance (up to 70 days) to release into the payment cycle on the appropriate date. |

| | |
|---|---|
| **IBAN** | International Bank Account Number. |
| **Indirect payment service provider** | A payment services provider that accesses the payment system though an agency agreement (i.e., sponsorship) with a direct member. |
| **Infrastructure** | The hardware, software applications, networks and processes required to allow the clearing and settlement of payments from a payer (usually the sender) to a payee (usually the beneficiary). |
| **Infrastructure provider** | Any entity that provides or controls any part of the infrastructure used for operating the payment system. |
| **Interchange fees** | A transaction fee payable in the context of a payment card network by one participating financial institution to another to re-imburse costs.<br>Example 1: for ATM interchange the card issuing bank pays a fee to the acquiring bank or IAD for providing a service to its customer.<br>Example 2: For a credit card transaction, the interchange is a charge paid to a cardholder's bank (the 'issuing bank') from a merchant's bank (the 'acquiring bank') for each sales transaction made at a merchant outlet with a payment card. |
| **ISAE 3402** | International Standard for Assurance Engagements (ISAE) 3402 deals specifically with assurance reports on controls at a service organisation. |
| **ISO 20022** | ISO 20022 is an international financial messaging standard that is being introduced in a number of payment systems. Please refer to 'Figure 16 – Message Standards Comparison' in the document for further information. |
| **ISO 27001** | ISO 27001 is an international information security management standard. According to the standard itself: 'ISO 27001 specifies the requirements for establishing, implementing, maintaining and continually improving an information security management system within the context of the organization. It also includes requirements for the assessment and treatment of information security risks tailored to the needs of the organization.' |
| **Know Your Customer** | Know Your Customer (KYC) is the due-diligence and regulations that financial institutions must perform to identify their customer and ascertain relevant information from them to perform business with them. KYC controls are designed to prevent identity fraud, money laundering and terrorist financing. |
| **Man in the middle attack** | A man-in-the-middle (MITM) attack is a form of eavesdropping where communication between two users is monitored and modified by an unauthorized party. Generally, the attacker actively eavesdrops by intercepting a public key message exchange and retransmits the message while replacing the requested key with his own. In the process, the two original parties appear to communicate normally. The message sender does not recognize that the receiver is an unknown attacker trying to access or modify the message before retransmitting to the receiver. Thus, the attacker controls the entire communication. |
| **Man-in-the-Browser attack** | The Man-in-the-Browser attack is the same approach as man-in-the-middle attack, but in this case a Trojan horse is used to intercept and manipulate calls between the main application's executable (ex: the browser) and its security mechanisms or libraries on-the-fly. The most common objective of this attack is to cause financial fraud by manipulating transactions of Internet Banking systems, even when other authentication factors are in use. A previously installed Trojan horse is used to act between the browser and the browser's security mechanism, sniffing or modifying transactions as they are formed on the browser, but still displaying back the user's intended transaction. The victim must be smart in order to notice a signal of such attack while accessing a web application like an internet banking account, even in presence of SSL channels, because all expected controls and security mechanisms are displayed and work normally. |
| **Misdirected payments** | Service to locate and investigate payments sent in error to a beneficiary. |
| **MPLS** | Multi Protocol Label Switching (telcommunications protocol), that enables a variety of messaging protocols to be transported across a secure network. |
| **Mobile payment service** | Payment service made available by software/hardware through a mobile device. |
| **Other payment service providers** | Includes non-banks and other service providers that use the payment systems to provide payment services to customers or service-users. This could include overlay services, such as a mobile phone payment service that enables payments to be made with mobile phones over the Faster Payments Service. |

| | |
|---|---|
| **Participant** | Participants within designated payment systems will include all payment system operators, PSPs and infrastructure providers. |
| **Payer** | A natural or legal person who holds a payment account and allows a payment order from that payment account, or, where there is no payment account, a natural or legal person who gives a payment order. |
| **Payment gateway** | A service operated by a beneficiary's PSP or a trusted third party that manages the authorisation of payments for merchants. It facilitates the transfer of information between the payment portal (such as a website or mobile device) and the beneficiary's PSP. |
| **Payment hub** | An intelligent and central engine, enforcing the capture and mapping of payment information, as well as the rules for all the different workflows, clearing and settlement routes and risk mitigation procedures, acting as the 'middleman' between payment origination, settlement systems, payment services and support, and payment processing. It contains routing functionalities, handles repair and exception, processes flow control and monitoring, and contains an audit logging and security features. |
| **Payment processing** | The transmission of information between two unrelated entities to affect the transfer of funds from a payer to a payee within a payment system. |
| **Payment services** | Any service provided by any stakeholder within the UK payments industry that enables the transfer of funds. |
| **Payment Service Provider (PSP)** | A entity that provides payment services to other entities in a payment system to enable the transfer of funds (e.g., bank providing payment services for customer). |
| **Payment system** | A system operated by one or more entities to enable the transfer of funds. |
| **Payment System Operator** | An entity responsible for managing and operating a payment system (e.g. a payment scheme company such as BPSL, commonly known as Bacs). |
| **Payments industry** | A phrase to represent of all the broad range of relevant stakeholders that participate in the payment systems. |
| **Payments scheme** | A payment scheme is the set of membership rules, common standards and procedures related to operation of a payment system. |
| **PCI DSS** | PCI Security Standards are technical and operational requirements set by the PCI Security Standards Council (PCI SSC) to protect cardholder data.<br>The Council is responsible for managing the security standards, while compliance with the PCI Security Standards is enforced by the payment card brands. The standards apply to all organizations that store, process or transmit cardholder data, with guidance for software developers and manufacturers of applications and devices used in those transactions. |
| **PKI** | PKI is a computer technology for secure exchange of information amongst individuals and computer systems. It allows a trusted organisation, such as a bank, to issue digital certificates to people and organisations that need to trust each other. It is generally used in conjunction with Internet protocol (IP). The certificates are used by their holders to prove their identity and to digitally sign documents and transactions. The signature proves the authenticity of the transaction and that the data exchanged has not been modified or tampered with. Digital signatures are now acceptable in a court of law. The same technology is also used to encrypt data in transit so only the intended recipient can read it |
| **Pull scheme** | A payment system where the receiver requests fixed or variable payments from a payee. |
| **Push scheme** | A payment system where the payee makes a fixed or variable payment to a receiver. |
| **Real time Gross Settlement** | The continuous (real time) settlement of funds or securities transfers individually on an order by order basis (without netting). |
| **SEPA** | SEPA stands for the Single Euro Payments Area. It is the area in which individuals and businesses can make and receive card and electronic payments in euros, across the European Economic Area, simply, cheaply and efficiently, regardless of their location. |
| **Service user** | Those who use, or are likely to use, services provided by payment systems. |
| **Settlement Finality Directive** | The EU Directive on Settlement Finality in Payment and Securities Settlement Systems (Directive 98/26/EC) was implemented into UK law by the Financial Markets and Insolvency (Settlement Finality) Regulations. The Bank of England is the United Kingdom's designating authority. Designated systems receive protections against the operation of normal |

| | |
|---|---|
| | insolvency law in order to ensure that transactions that have been submitted in the system are irrevocable, to reduce the likelihood of legal challenge to the finality of settlement and to ensure the enforceability of collateral security. |
| **Single Immediate Payment (SIP)** | Single Immediate Payments are a product offered by the Faster Payments Scheme that allows a near-real time payment to be executed immediately. Payments can be sent 24 hours a day, seven days a week (subject to the service offering of the bank). |
| **Sponsoring bank** | A credit institution that is a 'direct payment service provider' providing access to other PSPs within payment systems. |
| **Straight-Through-Processing (STP)** | The completion of clearing and settlement processes based on data that is manually entered only once into an automated system. STP is designed to reduce re-keying errors that can occur in processing as a result of manual intervention. |
| **SWIFT/S.W.I.F.T. scrl** | Society for Worldwide Interbank Financial Telecommunication: a cooperative organisation created and owned by banks that operates a network which facilitates the exchange of payment and other financial messages between financial institutions (including broker-dealers and securities companies) and eligible corporates throughout the world. A SWIFT payment message is an instruction to transfer funds; the exchange of funds (settlement) subsequently takes place over a payment system or through correspondent banking relationships. |
| **Synchronous payment** | The payment action is handled in the same transaction as the order process. |
| **Third Party Service Providers** | Third-party service providers provide services across the value chain to facilitate the processing, acceptance, management and/or transmission of payments (e.g. technology providers, telecommunication providers, payment gateways/platforms, point of sale terminal providers, fraud management services). |

Glossary sources: KPMG LLP, Payment Systems Regulator, Bacs, Bank for International Settlements, FPS, Office of Fair Trading, European Payments Council, European Commission, European Central Bank., International Standards Organisation

# Appendix 7: Bibliography

*Banca d'Italia.* (2014). Retrieved July 2014, from http://www.bancaditalia.it/sispaga/servpag/bicomp;internal&action=_setlanguage.action?LANGUAGE=en

Bank of England. (2013, October). *A Guide to the Bank of England's Real Time Gross Settlement System.* Retrieved from Bank of England: http://www.bankofengland.co.uk/markets/Documents/paymentsystems/rtgsguide.pdf

Bank of England and SWIFT. (2011). Increased Resilience for Payment Market Infrastructures. *SIBOS.* Bank of England and SWIFT.

*Brazil Government.* (2014). Retrieved July 2014, from Interbank Funds Transfer: http://www.bcb.gov.br/pom/spb/Ing/InterbankFundsTransfer/CIPIngles.asp?idpai=settlement

CHAPS. (n.d.). CHAPS Technical Requirements.

CHAPS Co. (2014). *Participation Costs*. Retrieved from Chaps Co: http://www.chapsco.co.uk/participation/participation_costs/

Cheque and Credit Clearing Company. (n.d.). *Cheque Clearing Timescales Explained*. Retrieved 2014, from Cheque and Credit Clearing: http://www.chequeandcredit.co.uk/cheque_and_credit_clearing/cheque_clearing_timescales_(2-4-6)/

Council, P. (2013). Retrieved July 2014

Dent, A., & Dison, W. (Q3 2012). *The Bank of England's Real-Time Gross Settlement Infrastructure.* Retrieved from Bank of England: http://www.bankofengland.co.uk/publications/documents/quarterlybulletin/qb120304.pdf

ECB. (2014). *TARGET/Euro LVPS Statistics*. Retrieved from European Central Bank: http://www.ecb.europa.eu/stats/payments/payments/html/13_table2.en.html

ECB. (2012). *User Information Guide to the TARGET2 Pricing.*

Federal Reserve Banks. (2013). *Payment System Improvement - Public Consultation Paper.* Retrieved from http://fedpaymentsimprovement.org/wp-content/uploads/2013/09/Payment_System_Improvement-Public_Consultation_Paper.pdf

Federal Reserve. (2014). *FedWire Services Volume and Value Statistics*. Retrieved from Federal Reserve Bank Services: http://www.frbservices.org/operations/fedwire/fedwire_services_volume_value_statistics.html

LINK. (n.d.). *LINK Statistics*. Retrieved 2014, from http://www.link.co.uk/AboutLINK/Statistics/Pages/Statistics.aspx

MasterCard. (2013). Retrieved from MasterCard Annual Report: http://investorrelations.mastercardintl.com/phoenix.zhtml?c=148835&p=irol-reportsannual

MasterCard. (2013). *MasterCard Authorization Platform.*

MasterCard. (2014). *Overview of GCMS.*

Payments Council. (2013).

Payments Council. (2013). *Annual Summary of Payment Clearing Statistics.* Retrieved July 2013, from http://www.paymentscouncil.org.uk/files/payments_council/publications_2013/annual_clearing_statistics_2013.pdf

Payments Council. *Cheque Processing: Driving Change in UK Payments.* Payments Council.

*STET Brochure.* (2014). Retrieved July 2014, from http://www.stet.eu/assets/files/Brochures-electroniques/STET-BROCHURE-MARS2014-OK-WEB.pdf

The UK Cards Association. (2014). *UK Cards Association* . Retrieved from Card Expenditure Statistics : http://www.theukcardsassociation.org.uk/2014-facts-figures/index.asp

*UK Government Legislation.* (2009). Retrieved July 2014, from http://www.legislation.gov.uk/ukpga/2009/1/contents

VocaLink. (2014). *VocaLink - PSR Infrastructure and Access.*

## Contact us


**Sam Subesinghe**

**Partner, Management Consulting**
**KPMG LLP**

**T** +44 (0)7966 193952
**E** sam.subesinghe@kpmg.co.uk

**Liz Oakes**

**Associate Director, Management Consulting**
**KPMG LLP**

**T** +44 (0)7867 372456
**E** liz.oakes@kpmg.co.uk


**http://www.kpmg.com**

**KPMG Thought Leadership App**




KPMG