

## Payment system ownership and access models

Comparative analysis of 13 countries

December 2015

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# Executive summary

## UK market is feature rich

### UK features and overall key findings

UK payment system infrastructures exhibit rich features in comparison with the other payment systems in scope and high product diversity. The UK is one of 6 countries that has a low-value real-time payment system. It is one of the few markets in scope that has had a competitive tender for central infrastructure provision.

The UK is typical in having a mix of regulatory and commercial drivers, but unusual in having both an active regulator and commercial impulses feeding new developments.

The UK's stated regulatory objective to promote competition is unique. There is no organization comparable to the Payment Systems Regulator in terms of promoting competition at the infrastructure level in any of the other systems examined in this report.

Key findings across all countries include:

- Competitive tenders for payment system infrastructures are rare.
- Innovation and competition can result from regulation, but regulation often aims at consumer protection & financial stability.
- The greatest diversity in core product offerings was seen in low-value bulk and ATM systems.
- The move to develop real-time payment systems is a major driver of change in many markets and can coincide with or influence decisions such as the adoption of ISO 20022 or the development of overlay services.

### Project scope

The Payment Systems Regulator (PSR) is reviewing access and ownership arrangements, specifically whether competition is effective in the provision of infrastructure services related to interbank payment systems and whether the supply of indirect access to payment systems is working well for service-users.

The PSR engaged Lipis Advisors to provide fact-based structural comparisons to payment systems in 12 countries and the UK. The interbank payment systems in scope for each country include high-value systems (typically RTGS), low-value bulk systems, low-value real-time systems (where present), and ATM systems.

The research focuses primarily on issues pertaining to ownership and governance of schemes, operators, and technical infrastructure providers; the provision of central infrastructure; access to payment systems, particularly indirect access; decision-making and drivers of change; and products, services, and quality and innovation indicators for each system in scope.

The report focuses on payments systems in 12 different countries and compares these to comparable payment systems in the UK. The countries in scope were carefully selected to ensure a high degree of relevance for the UK market based on criteria such as existence of modern and innovative payment systems, comparability to the UK (e.g. market structure, regulatory regime), and the features of the central infrastructure.

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# Project scope

Access, ownership, and functionality the focus in systems examined

## Background

The Payment Systems Regulator describes its objectives as:

- Ensuring that payment systems are operated and developed in a way that considers and promotes the interests of all the businesses and consumers that use them
- Promoting effective competition in the markets for payment systems and services between operators, PSPs, and infrastructure providers
- Promoting the development of and innovation in payment systems, in particular the infrastructure used to operate those systems

To these ends, the PSR is reviewing access and ownership arrangements, specifically whether competition is effective in the provision of infrastructure services related to interbank payment systems and whether the supply of indirect access to payment systems is working well for service-users.

The PSR engaged Lipis Advisors to provide fact-based structural comparisons to payment systems in 12 countries with UK payment systems. The interbank payment systems in scope for each country include:

- High-value systems (typically RTGS)
- Low-value bulk
- Low-value real-time (where present)
- ATM networks

## Focus topics

The research focuses on the following elements:

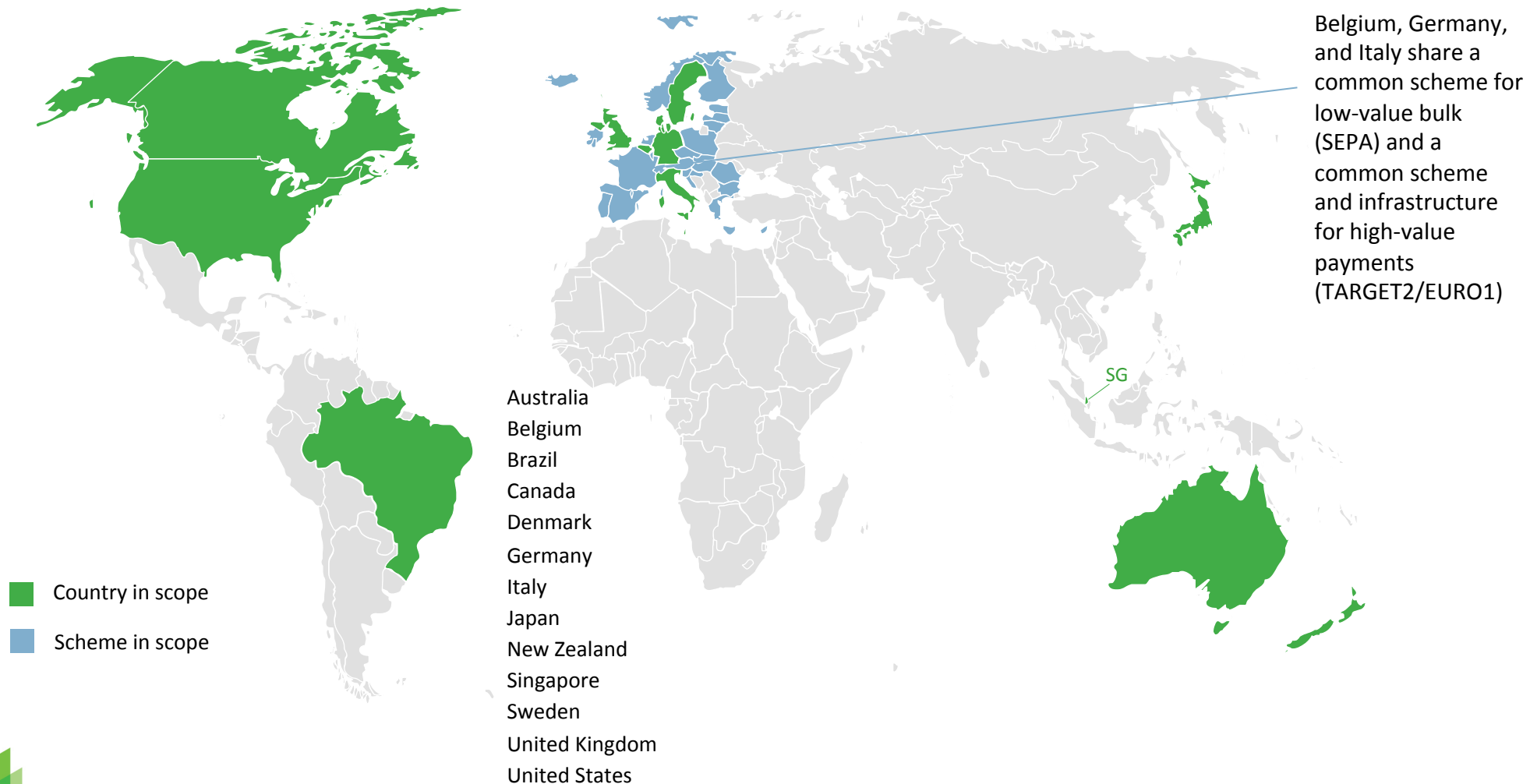
- Ownership and structure of each payment system in scope, including governance arrangements and regulatory regimes
- Provision of central infrastructure and the tendering of infrastructure provision (where applicable)
- Ownership and structure of scheme management, operation, and infrastructure provision in each system
- Provision and pricing of indirect access
- Communication between central infrastructures and participating PSPs
- Detailing how decisions are made in each market or for each system and the motivations behind them
- Products and services for each payment system, including settlement arrangements, refund rights, and overlay services
- Quality and innovation indicators dealing with security and resiliency, infrastructure innovations, and future plans for change

The countries in scope were carefully selected to ensure a high degree of relevance for the UK market based on criteria such as existence of modern and innovative payment systems, comparability to the UK (e.g. market structure, regulatory regime), and the features of the central infrastructure.

# Comparing the UK to 12 other countries

## Countries in scope

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# Comparing the UK to 12 other countries

## Systems in scope

	Low-value bulk	Low-value real-time	High-value	ATM
Australia	BECS	NPP	RITS	various
Belgium	SEPA, CEC	nap	TARGET2 & EURO1	BCMC
Brazil	SILOC	SITRAF	STR	various
Canada	ACSS	nap	LVTS	Interac
Denmark	Sum & Interday	RealTime 24/7	KRONOS	Dankort
Germany	SEPA, STEP2, Bundesbank	nap	TARGET2 & EURO1	DK
Italy	SEPA, ICBPI, SIA	nap	TARGET2 & EURO1	Bancomat
Japan	nap	Zengin	BOJ-Net	MICS
New Zealand	BECS	nap	HVCS	various
Singapore	IBG	FAST	MEPS+	various
Sweden	Bankgirot & DCL	PIR / BRT	RIX	Bankomat
United Kingdom	Bacs	Faster Payments	CHAPS	LINK
United States	NACHA, The Clearing House, FedACH	nap	Fedwire & CHIPS	various

# Methodology

Project relies on in-depth research and trusted frameworks

## Sources and methods

The data for the comparative analysis and country profiles is compiled from multiple sources prior to the detailed analysis. Key aspects include:

- Research relying heavily on an internal information database as well as primary sources in each country in scope
- Over 50 executive interviews completed with senior representatives from banks, payment processors, payment associations, infrastructure providers, and software vendors in each country in scope
- A variety of frameworks were used to analyze the data and perform cross tabulations to examine the relationships between different data points.
- Payment system characteristics such as governance structure, ownership, access, and system features were captured and represented in a payments system typology.
- For a detailed description of the methodology, please see the appendix.

## Systematizing features of each system

To structure the hundreds of data points for cross tabulation of data and comparative analysis, Lipis Advisors compiled a features index and typologies with common elements in each system. Each profile includes a typology covering ownership of scheme, operator, and infrastructure, which entities drive change in payment systems, and the products offered by each system. The features index looks at the overall centralized functionality offered by the systems in each market.

The purpose of both of these frameworks is to establish common criteria to compare the diverse systems in scope with the UK, as well as to enable cross tabulations with elements such as banking concentration, ownership structure, or speed of change.

A standard analysis of each country's payment systems features allows for comparisons to other aspects of each system, including:

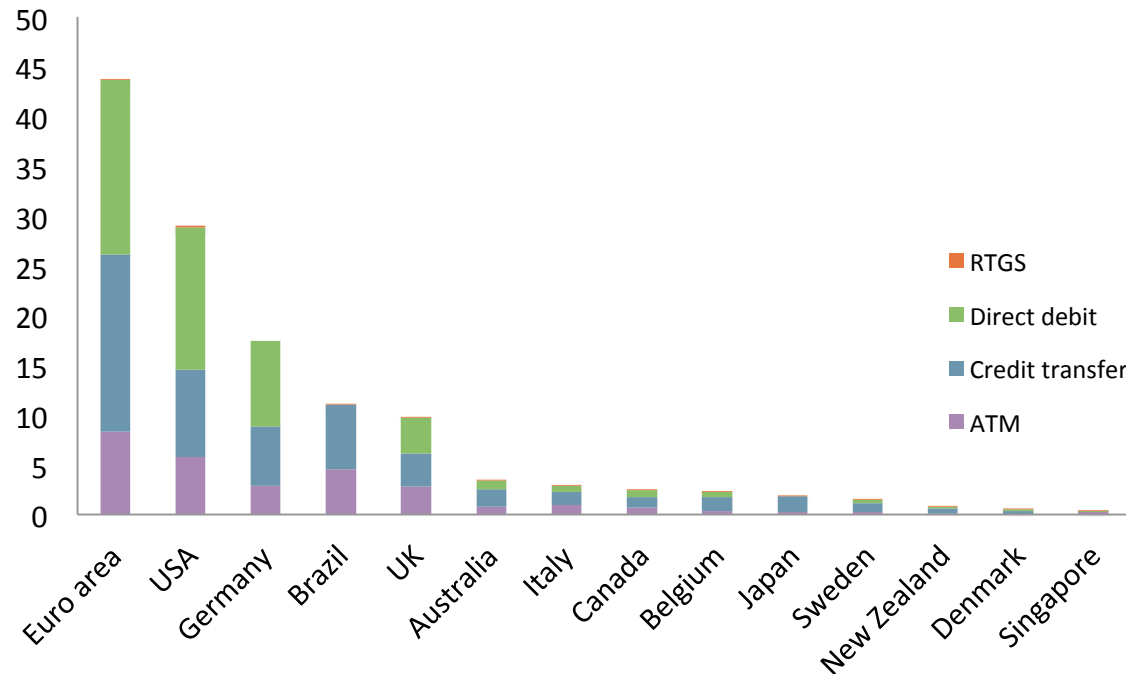
- Access models
- Banking concentration
- Outsourcing / tendering
- Ownership structures
- Speed and drivers of change
- Regulatory regime



# The UK is a large market, although others are larger

Euro area and United States have highest total volumes

Volume of selected payment instruments (2014, in billions)



Notes: Euro area volumes include all Euro area countries, including Belgium, Germany, and Italy.

ATM volume data for the United States is for 2012. ATM data for Denmark is not available.

Sources: BIS, national central banks and clearing houses, Lipis Advisors

The Euro area has by far the largest overall payment volume for the systems in scope, with Germany being the largest Euro area country by payment volume. The United States is the largest single country by payment volume.

Unsurprisingly, there is a strong link between population and overall payment volume. Of the 5 largest countries/regions in scope by population, 4 are in the top 5 for overall payment volume. A notable exception is Japan, which has the fifth lowest overall payment volume. While the use of credit cards (out of scope for this project) is high in Japan, other non-cash payment instruments see very low adoption.

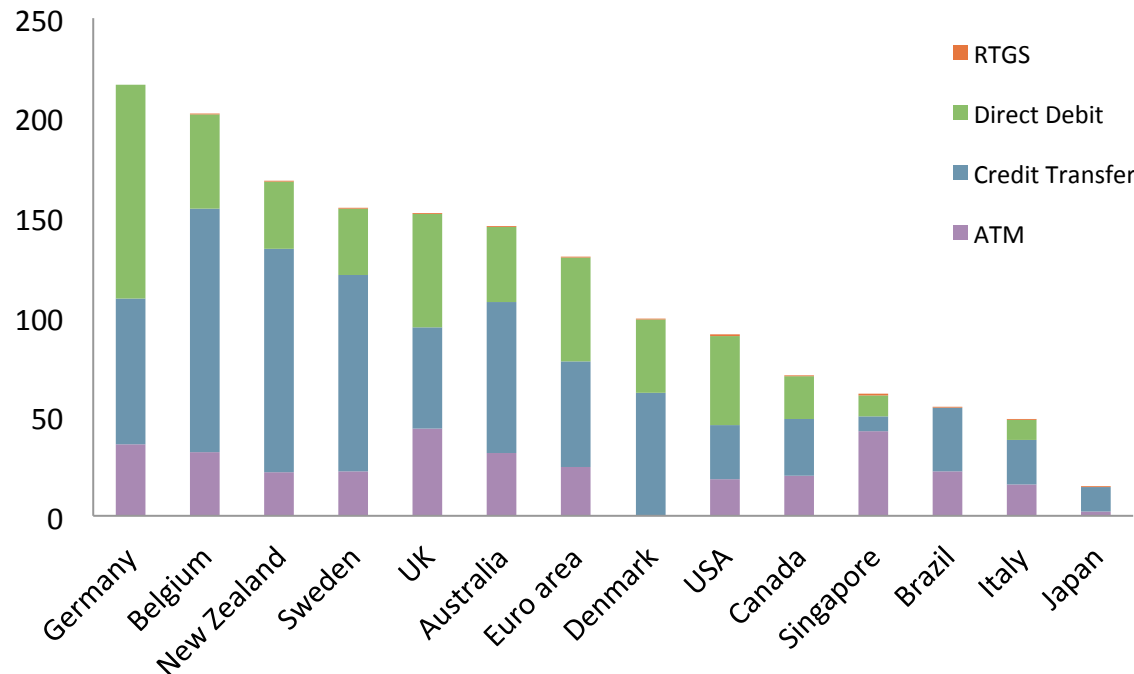
The countries with the highest overall payment volume feature a high percentage of direct debit usage compared to other markets (excluding Brazil, which has no interbank direct debits). Smaller markets with modern payment systems and habits such as Canada and Belgium also see high direct debit usage.

Volume indicates absolute market size, and therefore could be an indicator of ability to support competition. The UK is a substantial market; it is the fifth largest in scope.

# The UK has high per capita usage of payments

Highest volumes do not always equate to high per capita usage

Per capita payment volume of selected payment instruments (2014)



Notes: Euro area volumes include all Euro area countries, including Belgium, Germany, and Italy.

ATM volume data for the United States is for 2012. ATM data for Denmark is not available.

Sources: BIS, national central banks and clearing houses, Lipis Advisors

Per capita usage indicates the penetration or popularity of electronic payment usage and therefore is one indicator of the potential for growth. Per capita volumes in the UK are among the highest in this international comparison, exceeding larger markets such as the United States and Euro area.

Note that the data here does not represent total non-cash transaction volume. Many of the countries with the highest per capita volumes (e.g. Germany, Belgium, and Sweden) have very low cheque usage, while many of the countries in the lower half of the list (United States, Canada, Singapore, Brazil) have much higher cheque usage. Some also have high card usage (such as the USA and UK), although debit/credit card systems are out of scope in this report.

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# Drivers of change in the UK are typical

Change is similar to other countries, but the PSR's mandate is unique

## Overview across all markets

In most countries, neither commercial nor regulatory interests dominate completely. The dominance of one driver over another tends to be a matter of degrees.

Regulatory change most often aims at achieving better outcomes for payment system users. Regulation explicitly targeting increased innovation or more choices for payment service providers is rare. Innovation and competition can result from regulation, but it is often not the primary aim.

Promoting competition among central infrastructures is not a stated objective in any of the countries in scope other than the UK.

## UK drivers of change and comparison

The mixture of commercial and regulatory activities driving changes in UK payment systems has contributed to innovation at the infrastructure level.

The UK is typical in having a mix of regulatory and commercial drivers, but unusual in having both an active regulator and commercial impulses feeding new developments.

Regulation brought about the establishment of the Faster Payments real-time system and a change in settlement method for Faster Payments and Bacs.

Commercial interest has led to the development of innovative products such as Paym and the upcoming launch of Zapp, which hopes to compete at the point-of-sale.

# Catalysts of change in payment systems

Neither commercial interest nor regulation dominate

## Findings

Neither commercial incentive nor regulatory activity necessarily lead to different outcomes in the functionality or pace of change in payment systems.

The evidence from the countries in scope suggests that the catalysts for change in payment systems tend to be highly specific to the local legal and regulatory environment. Markets that see more active regulators (such as Brazil) can feature innovative functionality that is comparable to more commercially-minded markets (such as Singapore).

Moreover, the fact that regulatory activity does not always focus on innovation (e.g. market integration in SEPA, risk reduction in the UK) means that active regulation has not necessarily led to increased functionality.

Regulators and commercial entities often collaborate on implementing changes to one or more payment systems.

The move toward real-time systems was a major driver of change in several countries in scope (such as in Australia, Denmark, and Sweden) or will be factors in future changes in the United States and the Euro area, where both commercial interest and regulatory activities are at play.

## Effect on innovation

Many of the changes seen in this report resulted in outcomes widely regarded as boosting innovation and competition in the markets examined: the development of real-time infrastructures, the use of ISO 20022, changes to regulations or regulatory regimes, and the introduction of new products and services.

By documenting the catalyst(s) for change in each market and comparing this with the functionality found in that market, we can ascertain whether regulatory, commercial, or mixed drivers of change affect overall functionality or level of innovation in a market.

## Methodology

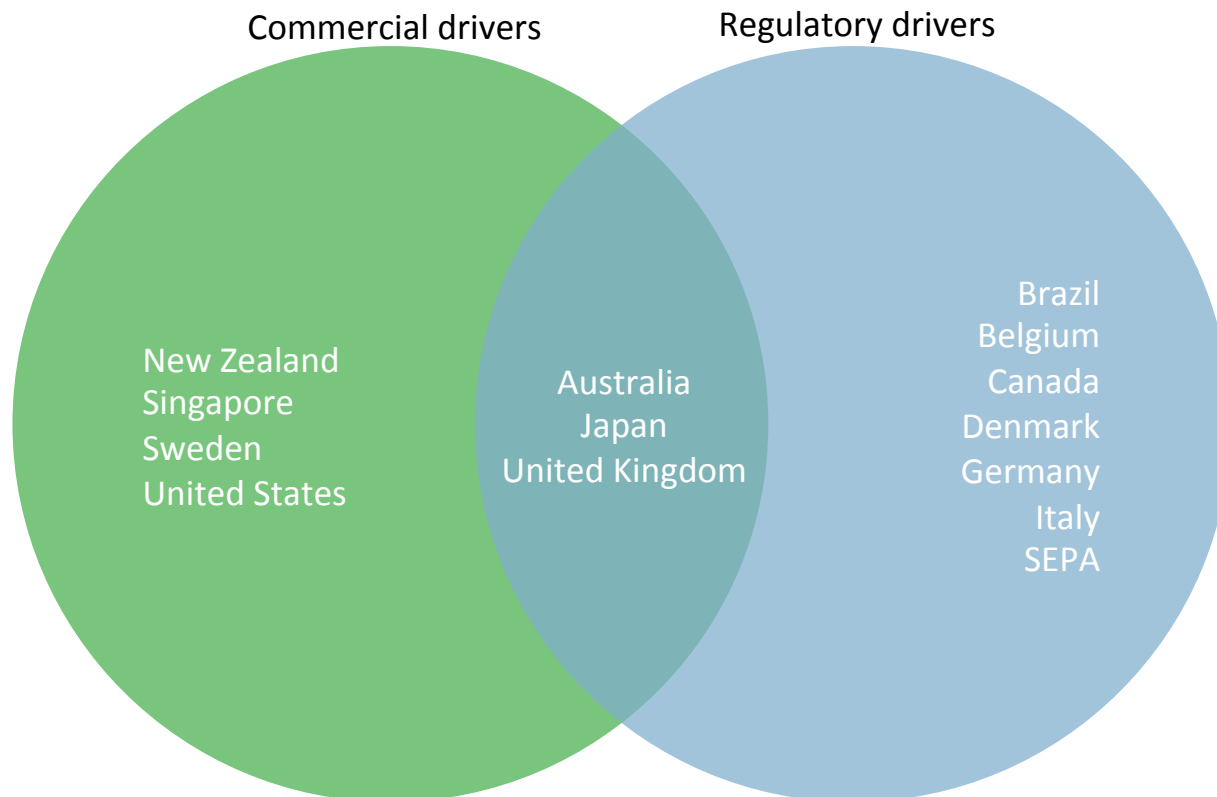
Judgments were made to classify drivers of change across multiple payment systems based on which entities play a dominant role in bringing about the initial push for change.

Changes in payments infrastructure were classified according to whether they were instigated by a regulatory push or mandate, or by commercial entities (e.g. banks or industry associations) coming together to pursue change due to a perceived need in the market.

# Categorizing catalysts for change

Regulation is a more common impetus for change than commercial imperative

Every country in scope has seen some change to one or more of its payment systems in the past 5 years. The vast majority (10 out of 14, including SEPA) have seen major changes in the past 5 years. Regulation has been a key driver, with over 70% of changes in the sampled countries being at least partially due to regulatory imperatives. The decisive determinant was the type of organization that created the impulse for change. In nearly every case, cooperation between commercial and regulatory bodies carries out the changes.



# Type of change not driver-dependent

Both regulatory- and commercially-driven change leads to similar outcomes

	Goals	Actions	
Brazil	<ul style="list-style-type: none"> <li>▪ Increase competition through entry of new players</li> <li>▪ Increase interoperability between different payment schemes and systems</li> <li>▪ Increase access to financial services for the under-banked through payment institutions</li> </ul>	Reform of Brazil's payment systems has been the main focus of regulatory action. In 2013, legislation was passed that brought payment schemes, card schemes, and non-bank payment institutions under the central bank's regulatory umbrella.	<div>Regulatory</div> <div>Both</div> <div>Commercial</div> <div>Examples of changes and drivers</div>
Australia	<ul style="list-style-type: none"> <li>▪ Increase speed of payments to enable better service and new products for corporates and consumers</li> <li>▪ Increase remittance data in payments messaging to ease reconciliation</li> <li>▪ Use of ISO 20022 as modern data standard</li> </ul>	In 2008, Australian payment industry stakeholders developed a roadmap for the future of low-value payments. The development of real-time clearing for electronic payments was considered a crucial component of future payment systems, as was the use of the ISO 20022 message standard. The industry has worked together with the RBA to develop the NPP, due to go live in 2017.	
Sweden	<ul style="list-style-type: none"> <li>▪ Increase competitiveness of banks in P2P payments over third parties</li> <li>▪ Enable development of mobile payment applications targeted at the P2P space, with C2B and B2B use cases also being developed</li> </ul>	The launch of the real-time BiR/PRT system in 2012 was the result of Swedish banks reacting to products and services offered by third parties in the market. A group of banks came together and decided that the development of a real-time system would increase banks' competitiveness in areas such as mobile payments, with a focus on the P2P space.	

# Payment systems are evolving rapidly

## New system introduction is the most commonly observed major change

The degree of change in payment infrastructures in the last 5 years and the drivers of those changes were examined across all systems in scope. The changes were then categorized as minor or major and further categorized as driven by commercial interest, regulation, or both. The majority of systems have undergone significant change.

Major developments include the introduction of a new payment system or significant overlay services, the overhaul of an existing system, or extensive regulatory changes.

Brazil, Canada, and the United States have not undergone major changes in the last 5 years. Brazil saw major developments about 10 years ago, and Canada and the US are planning major changes but those changes have not yet been implemented.

Country	Minor changes	Driver
Brazil	Update of the real-time system (2014)	Regulatory
Canada	Planning for the introduction of faster settlement for low-value payments and a migration to ISO 20022 data standard (planned)	Regulatory
United States	Planning for the introduction of faster settlement for low-value payments and the introduction of a low-value real-time system (planned for 2017)	Commercial

Country	Major changes	Driver
Australia	Implementation of real-time system, NPP (planned for 2017)	Both
Denmark	Introduction of RealTime24/7 system (2014), change in ownership of central infrastructure, Nets, from bank association to private equity (2014)	Regulatory
Japan	Implementation of ISO 20022 payment messaging and other updates to the 6 <sup>th</sup> generation Zengin system (2011)	Both
New Zealand	Move to settlement before interchange (SBI) in BECS (2012)	Commercial
Belgium, Germany, Italy	Migration to SEPA CT / DD rules, PSD and PSD2, competition from pan-European clearing houses (2014)	Regulatory
Singapore	Introduction of the FAST real-time system (2014 )	Commercial
Sweden	Introduction of BiR/PRT system (2012)	Commercial
United Kingdom	Establishment of the PSR (2015), move to pre-funded settlement for Bacs and Faster Payments (2015), introduction of Current Account Switch Service (2013), Paym (2014), and Zapp (planned)	Both



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# Governance, ownership, and competition

## The UK in comparison

### Ownership layers

Ownership of each payment system is broken down into three layers: scheme, operator, and infrastructure.

- In the UK, scheme and operator layers are often the same entity.

For high-value payments, the UK has less involvement by the central bank (acting only as infrastructure provider) than other countries.

Ownership of the scheme and operator layers in the UK low-value bulk system is not-for-profit, which is in line with industry norms elsewhere. The provision of infrastructure by a commercial entity was observed in about half of LV bulk systems in scope.

- The provision of infrastructure for low-value real-time payments in the UK is in line with most other real-time systems in scope, over half of which are operated by a commercial entity.

### Tendering and outsourcing

Outsourcing central infrastructure provision is common. Over half of the markets in scope see at least one system outsource the provision of infrastructure.

Outsourcing of infrastructure is rarely competitive. Overlap of ownership between the two parties to the contract is common. In systems that outsource or tender infrastructure for an existing system, the incumbent processor always wins the bid among the systems in scope.

- The UK's outsourced payment systems are typical in this sense.

Competitive tenders for payment system infrastructures are rare.

- The competitive tendering process for infrastructure provision in the Faster Payments system is one of the few examples of competitive tendering identified in this report.

# Ownership, governance, and outsourcing

## Definitions and methodology

### Ownership

Each system was broken down into three ownership layers: Scheme, operator, and infrastructure.

- Scheme: refers to the body that sets the system rules and admits members
- Operator: refers to the organization with which contracts are signed to operate the clearing
- Infrastructure: refers to the organization running the associated IT infrastructure

Note: The same entity can perform the role of two or more of these layers (as in the UK, where the scheme and operator layers are the same for each system in scope).

### Governance

The owners of the three layers were categorized based on the type of organization they are, including: Not-for-profits, commercial, national central banks, or not applicable.

- Not-for-profit: Organizations such as associations or nominal companies whose owners are also their customers, making them de facto non-profits.
- Commercial: Independent profit-seeking organizations
- Central bank: The national/regional central bank.

Note that some payment systems do not have a central infrastructure.

### Outsourcing and tendering

Each system was investigated to determine which layers – at the scheme, operator, or infrastructure levels – were outsourced. If a part was outsourced, we investigated whether the contract was awarded via a tendering process and if so, whether this tendering process was open and competitive.

An instance of outsourcing was deemed to be a competitive tender if it fulfilled both of the following requirements:

- Several companies/organizations sent in proposals to run the system, and
- There was a fair chance for a non-incumbent party to win the contract.

### Aggregation

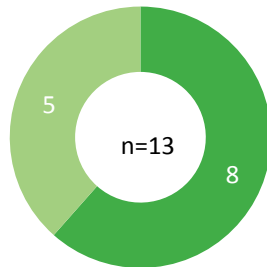
The results for each system were then aggregated to show the breakdown in how ownership differs across the three different system levels across each of the four types of payment systems in scope: high-value, low-value bulk, low-value real-time, and ATM switches.

Note that some countries have multiples of some systems, such as the Euro area's multiple high-value systems or the USA's multiple ATM switches. This means that the total sample size per system is not the same across all system types.

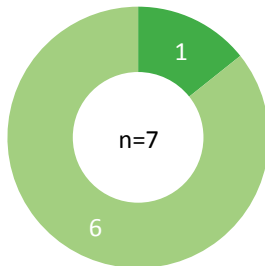
# Scheme governance correlates to risk perception

## Scheme governance by payment type

### High-value

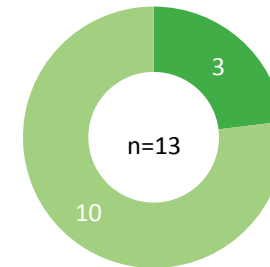


### Low-value real-time

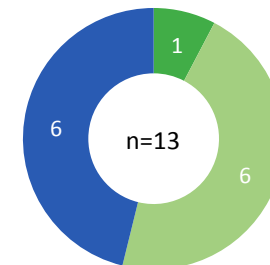


- Scheme governance has evolved in substantially different ways for different payment types.
- High-value schemes are most often governed by central banks.
- LV bulk and real-time are most commonly governed by community consensus.
- ATM schemes demonstrate a mix of governance models and are the only schemes in scope that feature commercial scheme ownership.
- The closer control of high-value schemes by central banks mirrors the perceived risk in those systems. High-value schemes often serve as the settlement for other payment schemes and are a key tool in the execution of monetary policy for central banks.
- LV bulk and RT services are largely seen as commercial services with a strong interest in common rules and standards.
- ATM services are seen as least risky and more competitive.

### Low-value bulk



### ATM



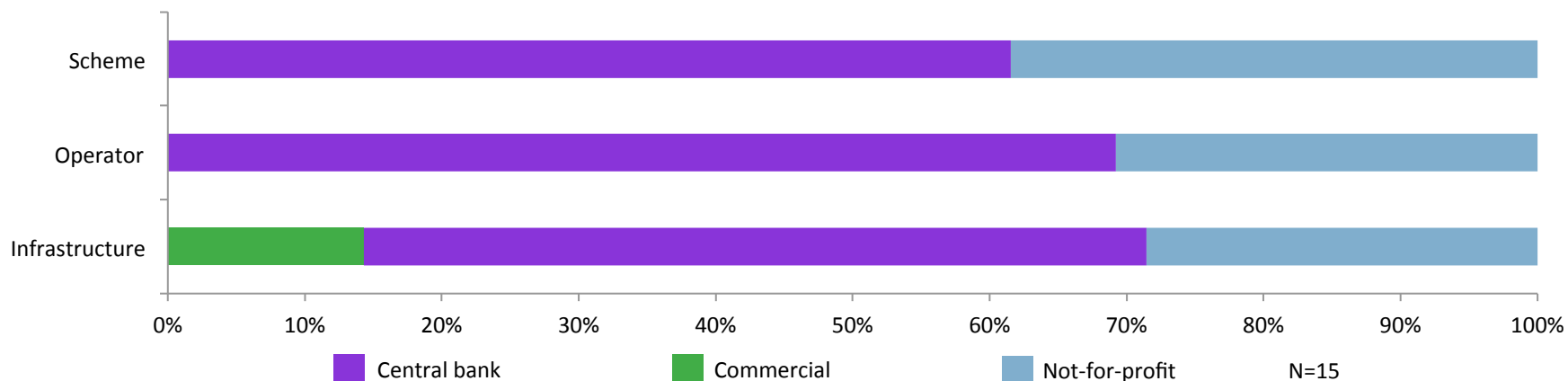
Central bank mandated

Community consensus

Commercial

# High-value systems largely run by central banks

A significant minority, including the UK, are not-for-profit



## Across all countries in scope

The majority (approx. 75%) of high-value systems in scope are controlled on at least one level by a central bank. Over half of the systems are controlled by the central bank at all three levels.

Two markets (Euro Area and USA) each have two high-value systems, one run by the central bank and one by a not-for-profit company.

Only Denmark and Japan outsource their high-value infrastructure to a third-party commercial enterprise.

Three systems, (Canada's LVTS, the Euro area's EURO1, and the USA's CHIPS), all operated by not-for-profit organizations, are high-value netting systems designed to lower cost and liquidity requirements with immediate finality of settlement.

- LVTS is the sole high-value system in Canada; the Euro area and the USA each have an RTGS system in addition to high-value netting systems.

## Comparison to the UK

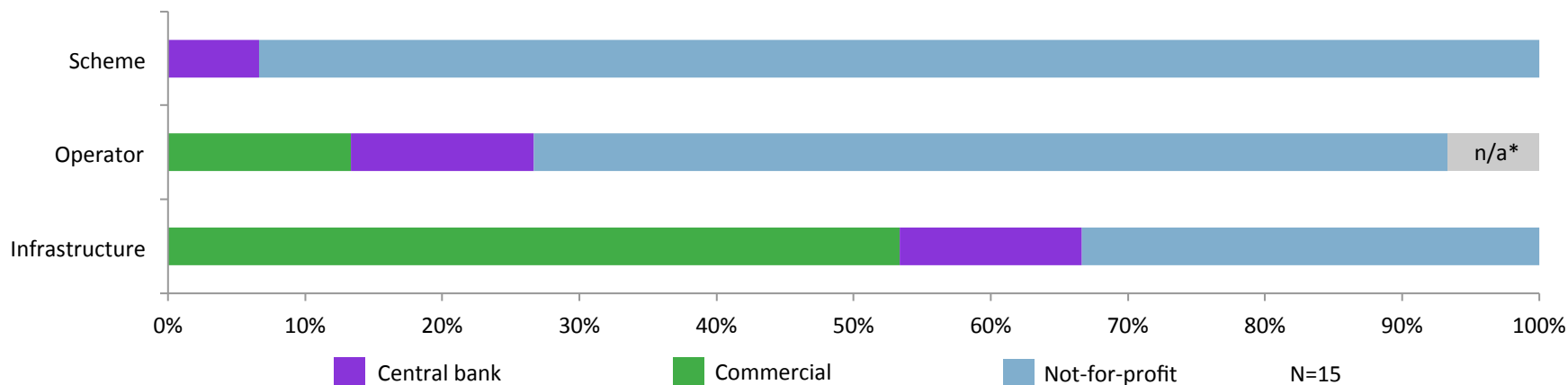
The UK's high-value system, CHAPS, is run by a de facto not-for-profit company at both the scheme and operator levels (colored blue in the chart above), while the Bank of England, the UK's central bank, owns and controls the infrastructure level.

The UK's arrangements are similar to a significant minority of other systems. About 1/3 of systems share the UK's arrangement with a not-for-profit scheme and operator.

# Ownership in low-value bulk systems is diversified

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UK is not unusual by international standards



\*Australia does not have an operator, contracts are bilateral between participants

## Across all countries in scope

Nearly all low-value bulk schemes in scope are owned by not-for-profit organizations.

- Only Canada has all three layers controlled by the same entity (the CPA), and this is established by law.

Only two central banks operate a low-value clearing: Germany and the United States. These are also comparatively fragmented banking markets. Both of these central banks see their role in low-value payments as enabling smaller banks access to the payment system.

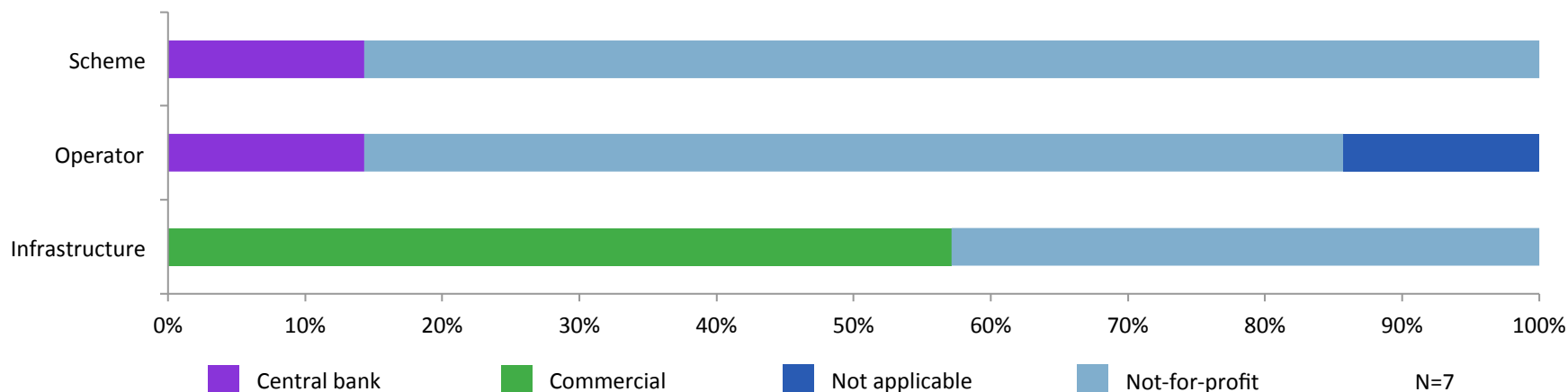
Commercial management at the scheme and operator levels is uncommon; 40% of infrastructures, however, are commercially operated.

## Comparison to the UK

The UK's low-value bulk system, Bacs, is owned at the scheme and operator levels by BPSL, a not-for-profit company limited by guarantee, which is in line with industry norms. A commercial organization, VocaLink, provides the infrastructure, which is true for about half of the low-value bulk systems in scope.

# Real-time systems predominantly not-for-profit

A significant portion of infrastructures are commercially operated



## Across all countries in scope

Almost all of the low-value real-time schemes in scope are owned by not-for-profit associations.

- In 3 of 7 systems (Australia, Singapore, and the UK) there was a tender process of some type for the provision of the system's infrastructure.

The majority of infrastructures (4 of 7) are commercially operated.

It should be noted that there is no entity at the operator level for Australia's NPP, which is why it is colored dark blue. The NPP is designed so that all payments will be exchanged bilaterally.

## Comparison to the UK

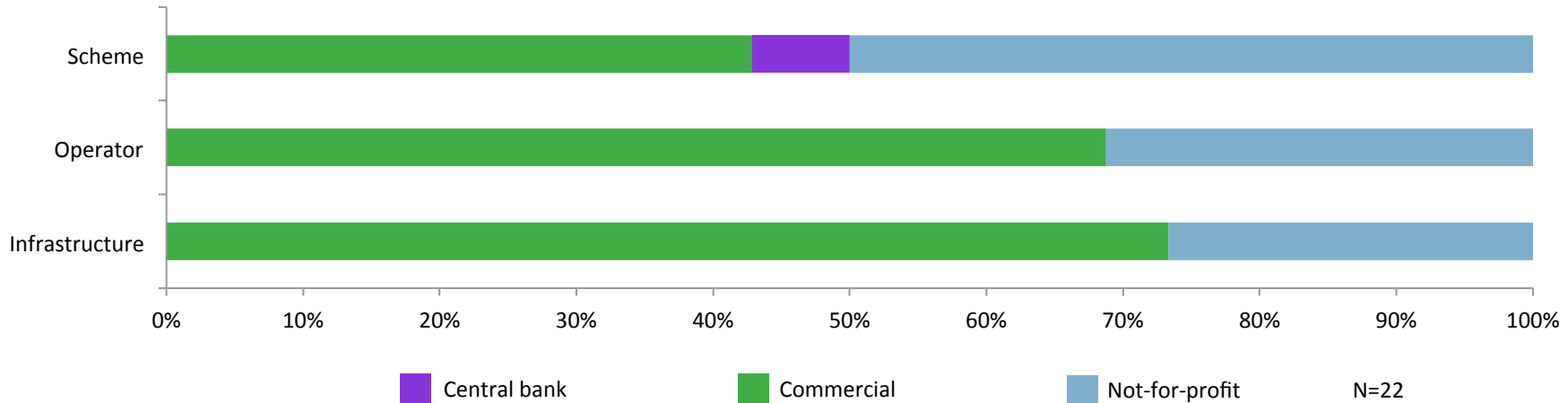
The UK's Faster Payments is in line with the other real-time payment systems in scope in that its scheme and operator are managed by FPSL, a not-for-profit organization.

Furthermore, like 4 of the other 7 systems, its infrastructure is run by a commercial company, in this case, VocaLink.

# ATM systems are often commercially oriented

UK unusual in vertical integration, but not in commercial nature

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## Across all countries in scope

- Scheme ownership among those examined systems is split approximately 50/50 between not-for-profit and commercial organizations. Operators and infrastructure providers are commercially focused in 10 of the 13 countries.
- 4 countries in scope have no central switch (Australia, Germany, New Zealand, and the USA).
- Many of the countries in scope (including Australia, Germany, Singapore, and the USA) have multiple ATM networks, meaning that one could argue that these countries' ATM systems skew the overall data towards more commercially-oriented ownership models.

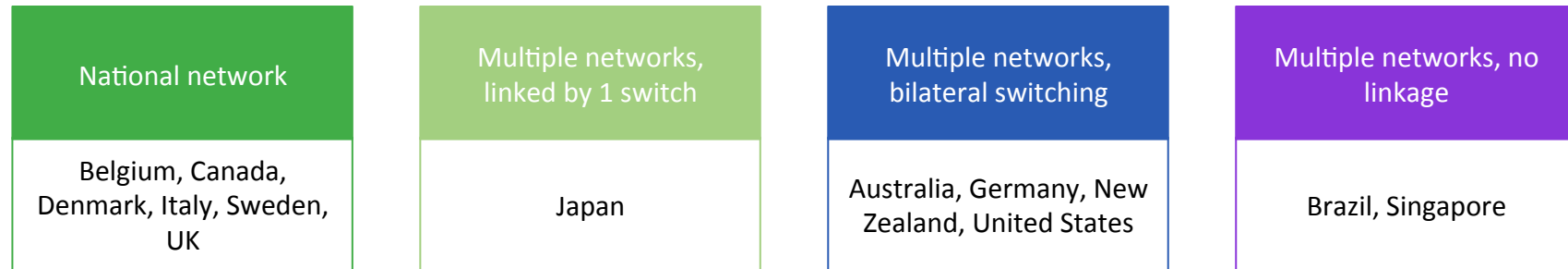
## Comparison to the UK

- ATMs in the UK are vertically integrated in that one company, VocaLink, owns all three levels. That said, the UK seems to be more or less in line with the industry standard when allowing commercial ownership of most, if not all, of the layers of the ATM system.



# ATM network structure varies widely

Innovation often occurs outside central infrastructure



The countries in scope exhibit widely varied structures for their ATM networks.

- 6 countries have a national ATM switch and network, including Belgium, Canada, Denmark, Japan, Sweden, and the UK.
- Japan has 9 networks that connect to each other via a single overarching switch (MICS)
- In 5 countries, ATM networks or individual banks are linked by bilateral or multilateral agreements, such as in Australia, Germany, New Zealand, and the USA.

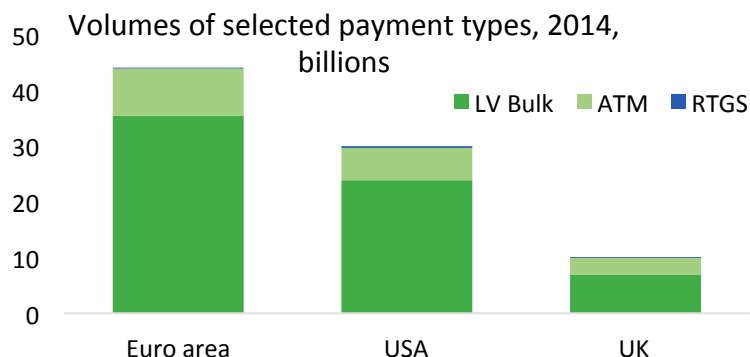
In two countries, Brazil and Singapore, national ATM networks are not interoperable at all.

- Banco24Horas only provides interoperability across 7 banks in Brazil. All other ATMs are individually operated and are not interoperable with other ATM networks.
- Singapore has 3 main ATM networks that are not interoperable: NETS (used by 2 banks), ATM<sup>5</sup> (used by 7 foreign banks), and a proprietary switch used by DBS-POSB.
- Many ATMs in these countries deliver interoperability by accepting internationally branded cards (i.e. Visa and Mastercard).

# Systems in USA & Euro area compete

Competition in all payment types and a tale of two markets

## Market sizes



## High-value payments

- The Euro area has two high-value systems: TARGET2 and EURO1.
- The USA has two high-value systems: Fedwire and CHIPS.
- Each market has one system owned and operated by its central bank, and one by a cooperative industry utility.
- Neither market has a ubiquitous real-time system for low-value payments.

## Low-value bulk payments

- Schemes for low-value bulk payments are managed by EPC rules in the euro area, and by NACHA in the USA.
- 22 CSMs (clearing and settlement mechanisms, also known as ACHs in some geographies) process payments in Euro area; 2 in the USA.
- The Euro area and the USA are very different markets with very different histories:
  - Euro area largely fragmented along national lines
  - USA duopoly evolved from 10+ ACHs (automated clearing houses) in the 1970s.

## ATM networks

- Neither the Euro area nor the USA have a national scheme for ATM transactions.
- USA has 12+ networks, each with its own rules, switch, and infrastructure, plus Visa and MasterCard. They are connected by a patchwork of agreements.
- The Euro area has national schemes, with cross-border transactions completed under Visa, MC, or EAPS rules.

# Competition in infrastructure provision

## Conditions promoting competition in the Euro area and USA

### Market sizes and competition

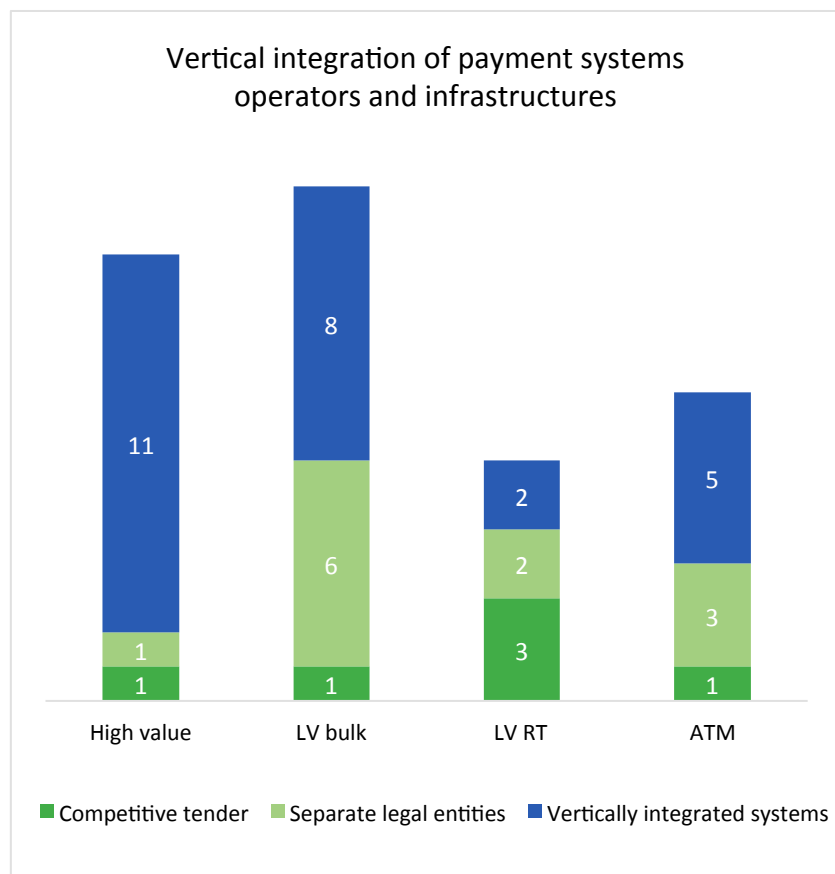
- Both the Euro area and the US markets are much larger than the UK's; the number of banks and their diversity in sizes is also noteworthy.
- The Euro area is far from being a single market for payments infrastructure; it is still highly fragmented for LV bulk and ATM payments. The United States, in contrast, is highly competitive and consolidated in the LV bulk and high-value payment markets.
- ATM switching is highly competitive in the USA and in some countries in the Euro area.
- The number of banks and the extent of direct participation provide greater potential for new PSPs to find sponsors and less loyalty among traditional PSPs to each other in larger markets.
- Pricing in the United States and the Euro area is comparable for LV bulk transactions, with headline prices of 0.15-0.30p, but functionality is not comparable to the UK, where the central infrastructure covers a greater portion of the value chain.

### Governance, regulation, and innovation

- Although there are more than one infrastructure provider for both high-value and low-value bulk markets in the Euro area and the United States (as well as different regulatory approaches), the number of innovative services in these segments is limited.
  - The USA takes a light regulatory approach, and has lots of innovation in consumer services, but these are built on an infrastructure of moderate functionality.
  - The EU takes a more active approach toward regulation and market integration, but Euro area infrastructures are not especially innovative.
- Where there is infrastructure innovation in these markets (e.g. the development of a low-value real-time service in the USA), it is often pushed by the private-sector operators and infrastructure providers or by regulators rather than the central bank.
- ATM switching is loosely regulated almost everywhere, and new product development is commonplace.

# Competitive tenders for infrastructure are rare

Operation and infrastructure provision often one entity



Note: ATM networks in Australia, Germany, Singapore, and the USA are not included to avoid skewing the data. These countries do not have central infrastructures. Data for Brazil's ATM network refers to Banco24Horas, Brazil's only interbank network.

- This chart depicts the vertical integration of payment system operation and infrastructure provision for each system type in scope.
- Vertical integration of entire systems is common.
- There has been a trend over the last decade toward separating legal entities (e.g. SEPA, UK), but this has not had a noticeable effect on genuine competition for infrastructure provision.
- Low-value bulk systems display the most frequent separation of ownership.
- Percentage of vertically integrated ownership:
  - High-value: 85%
  - LV bulk: 57%
  - LV RT: 29%
  - ATM: 55% (not including Australia, Germany, Singapore, and the USA)
- The tendering of Belgium's low-value bulk system resulted in a new, SEPA-compliant system. The provision of infrastructure was tendered, with STET winning the bid.
- One evident trend is previously state-owned (or central bank-owned) entities being spun-off and the systems either being tendered out (Belgium's LV bulk system) or the privatization of previously state-run systems (Denmark, multiple systems).
  - This happened in Euro area countries as well with EPC and EBA Clearing replacing schemes previously run by national associations and/or central banks.

# Legacy systems have never changed providers

Incumbents were awarded the tender in both applicable cases

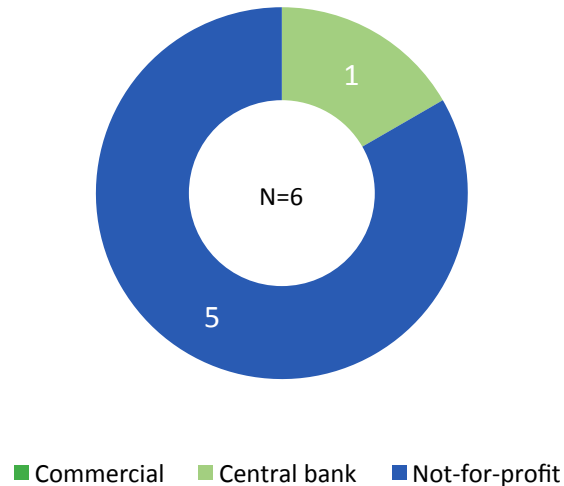
System	Country	System name	Incumbent	Tender winner
High-value	Japan	BOJ-Net	NTT Data	NTT Data
LV bulk	Belgium	CEC	nap	STET
LV real-time	Japan	Zengin	NTT Data	NTT Data
	UK	Faster Payments	nap	VocaLink
	Australia	NPP	nap	SWIFT
ATM	Japan	MICS/IASS	nap	NTT Data

- Of the six systems that had a competitive tender, only Japan has a tendering process for systems already deployed. No bidder other than the incumbent has ever been awarded the contract to operate BOJ-Net or Zengin.
- For instances in which a new service was being developed, a tendering process was sometimes performed; this was the case in the UK and Australia for LV RT systems. In other cases, the contract was simply awarded to a not-for-profit, such as in Sweden's LV RT system, which was outsourced to Bankgirot (and therefore not tendered).
- The relationship between MICS and NTT Data (Japan) is the only scenario in which the ATM contract was open for tender. Several countries, including Australia, Germany, and the USA, lack a centralized switch. The USA, in particular, features competing switches.
- The absence of competitive tendering for legacy systems in the UK is thus typical by international comparison.
- In the particular case of Belgium, STET was awarded the tender to provide the infrastructure for the new, SEPA-compliant low-value bulk system. In the legacy national system, this role was held by CEC, an industry utility that was housed within the Belgian central bank (NBB).
- While communities of banks are reluctant to switch infrastructure providers for an established payment system, individual banks sometimes switch providers in countries/regions that feature more than one infrastructure provider.
  - Since the implementation of the SEPA scheme in the Euro area in 2014, some individual banks or groups of banks in national communities have switched providers (e.g. from national systems to the pan-European STEP2 system operated by EBA Clearing).

# Types of operator and tendering

A large portion of contracts tendered come from not-for-profit industry utilities

Payment systems tendering contracts, by organizational type



- The majority of contracts tendered are awarded by operators categorized as not-for-profits (i.e. banking associations and companies whose owners are also their customers).
- 5 tendered contracts were identified from not-for-profits, while one central bank offered a contract for competitive tendering. No commercial entity was observed that tendered a contract.
- Out of the 13 countries in scope, 9 featured outsourcing on either the operator or infrastructure levels (Australia, Belgium, Denmark, Italy, Japan, New Zealand, Singapore, Sweden, UK).
- Of these 9, only 4 offered up any sort of tendering process (Australia, Belgium, Japan, UK)
- Of these 4 countries, 3 had meaningful tender processes (Australia, Belgium, UK).
- 4 countries feature no outsourcing of entire payment infrastructures: Brazil, Canada, Germany, and the United States, although operators and infrastructure providers commonly outsource portions of their IT, as in most countries.
- A larger number of contracts were awarded without a competitive tender. These contracts are often awarded to a company specifically set up and owned by the banking community, such as in Denmark, Italy, Sweden, the UK, and the USA.

# Bank concentration & system ownership correlate

Belgium is the lone exception to this trend

Relationship between CR <sub>5</sub> and ownership overlap in payment systems				
CR <sub>5</sub> scores	Ownership overlap			
	Low	Medium-low	Medium-high	High
High (over 85%)	Belgium	None	Australia, New Zealand, Singapore	Denmark, Sweden
Medium (65-85%)	Germany	Italy	None	Brazil, Canada, UK
Low (below 65%)	USA	Japan	None	None

Notes: Countries that could be considered outliers are circled in **red** whereas countries following the trend – that is, countries with higher banking concentration ratios tend to have more highly overlapping ownership in their payment systems – are circled in **blue**.

Bank concentration figures (CR<sub>5</sub>) are extracted from the World Bank.

Criteria for scoring ownership overlap:

- Number of legal entities present in scheme management, operation, and infrastructure provision
- Overlapping ownership structures of these entities or shared owners
- Presence of different types of entities (i.e. a mixture of banks and government entities)

Banking concentration was found to weakly correlate with overlap in payment system ownership, although this may be due to the sample size and selection.

The “high-high” grouping is made up of small countries (countries with populations less than 20 million) – Belgium is the only small country not found at either “medium-high” or “high-high.”

- Belgium’s outsourcing of CEC’s low-value bulk system diluted its ownership overlap, otherwise it would be close to Singapore, further strengthening this correlation.

“Outliers” include Belgium, Brazil, Canada, Germany, and the UK.

Brazil and Canada see “high” overlap because industry utilities provide comprehensive, vertically integrated services. In Canada, these are stipulated by law, and in Brazil, by the central bank.

The UK appears to be unusual in its cohort group, with high overlap, medium concentration, and little government ownership of payment systems.

# Limited data prevents conclusions about quality and price

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High quality is essential for all infrastructure providers

## Quality and competition

- The limited amount of genuine competition for central infrastructure provision in the countries and payments in scope makes conclusions about the effects of quality and pricing difficult.
- Competition in payment system provision is rare: We have only noted 6 tenders in the more than 40 systems examined.
- Control and trust are the key reasons for keeping systems in-house or selecting a known incumbent supplier.
- Quality is typically measured by uptime and error rates.
- Quality is integral and is typically assumed for any service provider bidding on an infrastructure.
- Industry insiders estimate that central infrastructure provision covers 5-10% of the total cost of the payments value chain. While controlling costs for the central infrastructure is no doubt important, banks often focus on the factors of the value chain directly under their individual control to reduce overall cost.

## Pricing

- There is an inherent difficulty in comparing pricing due to the commercially sensitive nature of pricing information.
- Pricing models depend on institutional motives (cost recovery for central bank/industry utilities versus for-profit companies).
- Typical aspects of pricing mechanisms include:
  - Some systems require new entrants to pay a one-time entry fee in order to compensate existing members for infrastructure costs
  - Annual and/or monthly fees
  - Transaction-based fees (sometimes tiered, based on volume)
- Many ATM systems are run by for-profit companies, few of which publish any pricing data.



- Executive summary
- Scope, methodology, and basic data
- Drivers of change
- Ownership, governance, outsourcing, and tendering
- **Product diversity & features index**
- Indirect access
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# Product diversity

## Relevance to the UK

### Overview across all markets

The greatest diversity in core product offerings was seen in low-value bulk and ATM systems.

- While the majority of LV bulk and ATM systems offered only single products, other systems offered multiple products, individual bank services (for ATM systems) or community services (for LV bulk).

High-value systems typically offer only single products, and some offer closely-related additional functionality.

- Additional products offered by some high-value systems include collateral management and automated reporting processes.

Every real-time system in scope offered a single core product: real-time credit transfers. Although the diversity of functionality is low, the speed of payments itself is often considered a value-add compared to legacy systems.

Overlay services add significant functionality to all or most participants in a payment system. In this study, we have only examined those offered by payment systems, not third parties.

- Real-time systems and low-value bulk systems see the most overlay services. Typical overlay services include mobile payments/proxy address services, account switching/masking, and alternative merchant payments.

### UK products and services

The UK has a richly functional payments system offering products and services beyond the basic payment instruments.

In addition to rich core functionality that includes direct corporate access and A-services that enable automated management of recurring payments, UK payment systems feature uncommon overlay services such as:

- Current Account Switch Service for automated account switching
- Paym, which allows users to send and receive payments using a mobile phone number
- Zapp (in development), which will enable real-time payments at the point of sale

### UK comparison to other markets

Product offerings in the UK (both core services and overlay services) are richer than most other systems in scope for this project. The added functionality of the real-time system, as well as rich functionality on legacy systems, is the result of innovation.

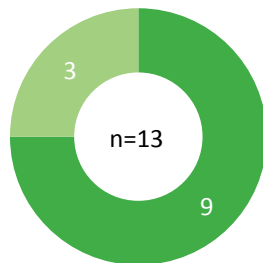
- Sweden and Denmark have similarly rich functionality among the payment systems examined in this report.

# Low-value bulk systems show greatest product diversity

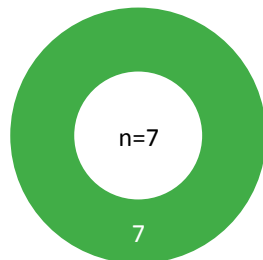
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## Products and services by payment type

### High-value



### Low-value real-time

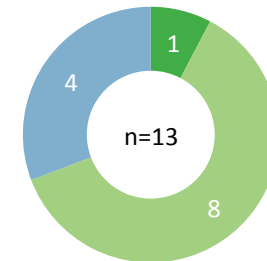


Low-value bulk and ATM systems typically support multiple products. In some cases this results from maintaining legacy products, and serving special needs of community members. These systems are also most likely to support bank and community services.

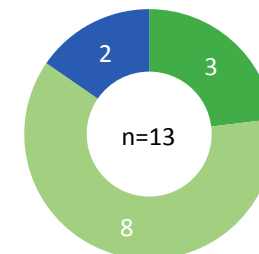
In most cases, low-value real-time systems have been developed recently and in addition to low-value bulk systems. There is thus no need to support legacy products in these systems. Instead, the emphasis is on creating an excellent customer experience and supporting innovative technology rather than a diverse suite of products and services.

As the core of the payments ecosystem, high-value systems have to be highly secure and reliable; product diversity is not a priority.

### Low-value bulk



### ATM



Single product

Multiple products

Bank services

Community services

# Low-value bulk systems most diverse

Danish, Swedish and UK systems support rich product offerings

## Sweden

- The Bankgirot system in Sweden supports a variety of specialty payment products and services targeting consumers as well as corporates.
- Beyond standard payment instruments, corporates in Sweden can receive a Bankgirot number which functions as an account identifier and enables easier account switching.
- Corporates are offered supplier and payroll payments and corporate treasury products to help with account management and reconciliation.
- In addition, Bankgirot offers digital information services such as digital invoices, documents and secure messages, as well as electronic identification, document signing, and mobile payments.

## UK

- The UK also has a richly functional payments system offering products and services beyond the basic payment instruments.
- Examples of UK products and services managed by the Bacs scheme company include:
  - The Current Account Switch Service which allows account holders to easily switch from one bank to another.
  - So-called “A-services” that enable the automated management of recurring payments as well as the streaming processing of returns.
  - Direct corporate access to the central infrastructure by tens of thousands of corporates.

## Denmark

- Nets offers a broad spectrum of services to banks as well as corporates via 3 low-value clearing services
- In addition to credit and debit transactions, Nets offers direct debit management, supplier payments, and warehousing credit transfers.
- Nets offers corporate clients direct debit management, e-billing, digitization and information services, and digital e-security products.

# Examples of overlay services

Most overlay services only offered in select markets

Products and services defined as overlay services in this report are services that offer significant added functionality and to all or most payment system participants in a particular country or region. They must rely on underlying payment systems for operation. There is no evident correlation between the types of entities or their governance arrangement and the type or frequency of overlay services. A partial list of the overlay services identified in the course of our research includes:

## Proxy address service

- Australia (not for profit, in development)
- Denmark (commercial)
- Sweden (not for profit)
- United Kingdom (not for profit)

## Account switching / account masking

- Sweden (not for profit)
- United Kingdom (not for profit)

## Alternative merchant payments (e.g. using a real-time payments infrastructure)

- Germany (not for profit)
- United Kingdom (commercial, in development)

## Real-time payments using legacy infrastructures

- Belgium (commercial)
- Italy (commercial)

## Centralized bill payment services

- Brazil (not for profit)

## Centralized mobile payments

- Denmark (commercial)
- Sweden (not for profit)

## Additional optional services for specific communities

- SEPA (not for profit)

## Centralized non-payment messaging services

- Belgium (not for profit)

## Direct debit mandate management services

- Sweden (not for profit)

# LV bulk and RT feature the most overlay services

## How overlay services differ from core services

### Findings

In all, there were 16 different overlay services observed in 8 of the countries in scope. Almost all overlay services were found in low-value bulk or low-value real-time systems.

There was an equal number of overlay services observed for each of these system types. Both bulk low-value and real-time systems each accounted for 44% of overlay services found in the report.

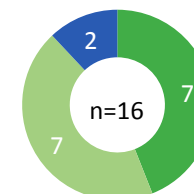
High-value systems and ATM networks saw the least amount of overlay services. Of the countries in scope, only 1 ATM system featured overlay services and no high-value systems offered overlay services.

Overlay services tend to be most prevalent in newer systems or in markets where new systems/schemes have been recently introduced or where new systems are in development. Of the 8 countries in scope that offer overlay services, 6 of them have introduced new systems/schemes in the last 5 years or are in the process of developing a new system.

Each country profile distinguishes between overlay services and products and services that are part of the core infrastructure or scheme. In all but the most obvious cases, Lipis Advisors had to make judgment calls to determine whether a product or service is an “overlay” or not.

### Distribution of overlay services

By payment system type



■ LV Bulk ■ LV Real-time ■ ATM

### Distinguishing overlay services

Overlay services can be offered by the central infrastructure provider(s) or by banks or third-parties via a central infrastructure.

While there may be clear examples of overlay and non-overlay services, the line between the two is unclear. Some countries have clear examples of overlay services such as proxy databases that are clearly an “overlay” service because it was not designed as part of the core infrastructure in each system from the outset. But some systems feature products and services that go beyond the traditional offerings from core infrastructures, but that are not necessarily overlay services. An example of this is the optional Same-Day ACH service in the United States.

In all, there were 16 different overlay services observed in 8 of the countries in scope. As a result, the data about overlay services may be of limited value.

# Measuring richness of features

## Features scorecard methodology

### What was measured...

All systems analyzed in the study are included on a country-by-country basis.

Each system was ranked on the richness of functionality scale based on the type of services it offers ranging from low to medium to high.

Four additional country-wide system features were included that are indicative of the overall level of functionality within a country's payment systems.

For countries that have multiple infrastructures for a single payments system (such as low-value bulk in the USA or high-value payments in the Euro area), the scores indicate the richest functionality available to the market as a whole.

We recognize an inherent bias to the methodology toward features in LV bulk systems, as these systems typically have the greatest diversity of functionality. In order to limit this bias, we have added additional categories specific to other types of systems and weighted each category to arrive at a more holistic features score for each market.

### ... and how it was counted

After filling out the scorecard for each of the 13 countries in scope, weights were added to the individual categories in order to demonstrate their overall importance to the payments market and the level of innovation occurring in that area. These weights are the same across all countries.

Services considered of “low” importance include: high-value (due to a lack of innovation), and DD mandate management; “medium” importance included LV bulk, ATM switch, indirect participant & corporate access, and non-payment messaging; “high” importance included LV RT and account switching & masking.

These weights (1 for low, 2 for medium, and 3 for high) were then multiplied by the corresponding score for each category (1 for low, 2 for medium, and 3 for high) to come up with a score for that category. These category scores were then added together to arrive at a country score, which was then used to broadly compare all countries in scope.

We then grouped the countries into 4 groups based on their scores (see following slide).

# Payment system features scorecard

## Methodology and rubric

Lean ← → Rich			
Payment system features	High-value	How many products does the system offer? One? Many? Or bespoke products for individual participants?	Low
	Bulk LV credits	How many products does the system offer? One? Many? Or community services and bespoke products for individual participants?	Medium
	Bulk LV direct debit scheme	Does the system offer direct debits? With or without mandate management?	Low
	Real-time LV	How many products does the system offer? One? Many? Or bespoke products for individual participants?	High
	ATM switching	What types of products does the system offer? Just withdrawals and balance enquiries? Overlay services? Or bespoke products for individual participants?	Medium
	Account switching and masking	Does the system provide automated account switching or account number masking services for some payment types? A comprehensive service of one type? Or both?	High
	Indirect participant & corporate access	Via which channel does the system allow for indirect participant and corporates access? Via direct participants? Via a single national network? Direct to the infrastructure?	Medium
	Non-payment messaging	Does the system allow non-payment messages? Do these inform of one-time events? Are they for ongoing information management? Are they driven by a central database?	Medium
			Weight



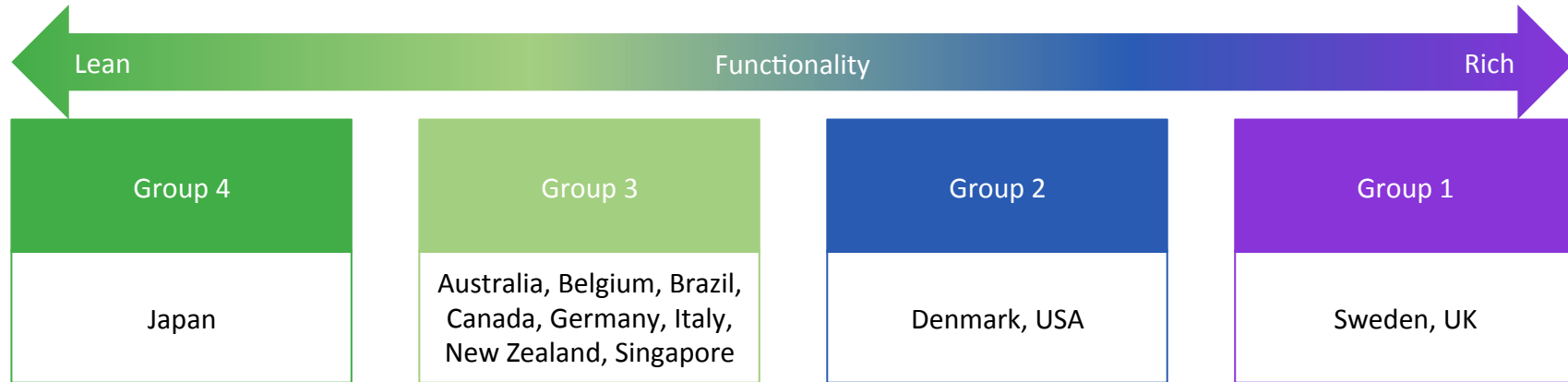
# Payment system features scorecard

Methodology – example of the UK's payment systems functionality

Lean ← → Rich					
Payment system features	High-value	Single product	Multiple products	Community / bespoke services	Low
	Bulk LV credits	Single product	Multiple products	Community / bespoke services	Medium
	Bulk LV direct debits scheme	No direct debit scheme	Yes, but no DD mandate management	Yes, with DD mandate management	Low
	Real-time LV	Single product	Multiple products	Community / bespoke services	High
	ATM switching	Withdrawals & enquiries	+ Overlays	Community / bespoke services	Medium
	Account switching and masking	Partial	Switching or masking	Both switching and masking	High
	Indirect participant & corporate access	Via sponsor bank	Via national network	Direct to payment infrastructure	Medium
	Non-payment messaging	One-off message transmission	Ongoing messages	Database-driven services	Medium
					Weight

# Four groups of payment system richness

Sweden and the UK are rich & Euro area countries and Japan are lean



## Findings

After evaluating all of the countries in scope and calculating the weighted result, four groupings became evident.

Group 1 countries exhibit the richest feature set among countries in scope. Group 2 exhibits the next richest feature set, and so forth.

These measurements are not precise enough to measure differences within the 4 groups, but they are precise enough to say that countries in group 1 feature richer payment functionalities than countries in group 2, etc.

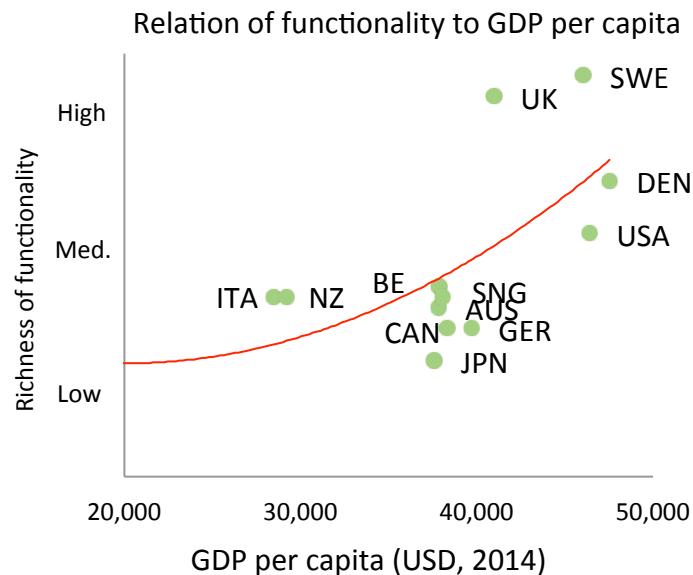
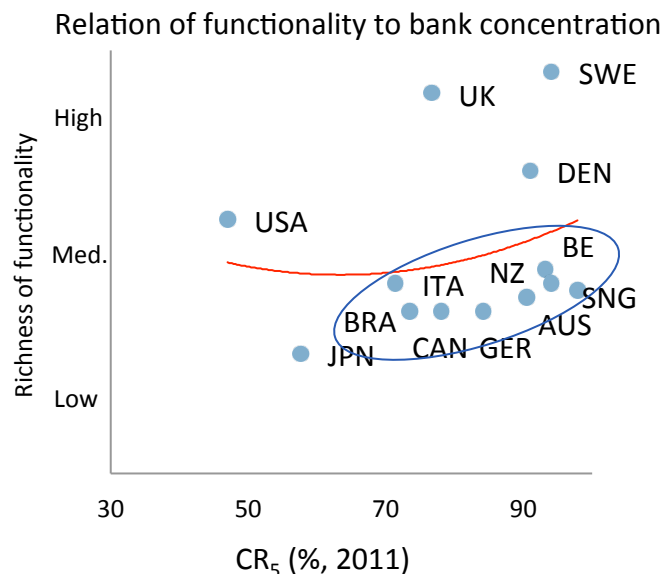
## How to use these groupings

The groupings presented here are very broad. The methodology used has the advantage that changes to the criteria or weighting would not have much impact on the outcome. The purpose is to group payment systems by functionality and create payment system groupings.

We cannot, however, say how much richer group 1 is than group 2 or group 2 than group 3.

# Richness of functionality is related to CR<sub>5</sub> and GDP

Slight trend, but not statistically significant due to small sample size



## Analysis

Plotting CR<sub>5</sub> and GDP per capita against these functionality groupings.

Although both graphs do show a distinct (if small) trend illustrating that levels of payment systems functionality richness increases with an increase in both the concentration of banking assets in a country as well as a country's GDP per capita, the findings are not conclusive.

Two factors prevent us from drawing definitive conclusions:

- Sample size too small
- Functionality rankings are too broad and not suitable for this detailed of a statistical analysis

If neither wealth nor banking concentration can fully explain the difference in payment system functionality richness, what could? Possible drivers:

- Regulation at the national level
- Cultural attitudes toward payment usage

- Executive summary
- Scope, methodology, and basic data
- Drivers of change
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## Methodology

This analysis examines how payment system participants access the central infrastructure in each system and groups them into three different models.

Systems were analyzed and categorized according to how indirect participants access the central infrastructure. Three access models describe the collective systems in scope.

- Infrastructure-centric
  - All direct and indirect participants connect directly to a central technical infrastructure
- Direct participant-centric
  - Indirect participants connect to the infrastructure through a sponsor (direct participant)
- Multi-network-centric
  - Multiple networks connect participants to each other, either bilaterally or through a central switch.

Abstraction necessarily creates generalizations. Detailed access information, including access diagrams for each system, can be found in the individual country profiles in the appendix.

## Findings

High-value systems have very similar access models. Only one allows direct technical access for indirect participants (EURO1 via the STEP1 service). All others require indirect participants to access the system via direct participants.

There are a wide variety of access models for low-value bulk systems.

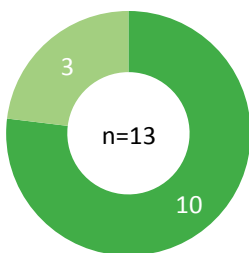
Low-value real-time systems exhibit two access models: European countries and Japan tend to utilize an infrastructure-centric approach, while all other systems in scope are direct participant-centric.

ATM systems exhibit the greatest model diversity, including all three types. Two countries in scope (Brazil and Singapore) do not have interoperable ATM networks on a national scale.

# Most access models are direct participant-centric

Infrastructure-centric access models are also relatively common

## High-value



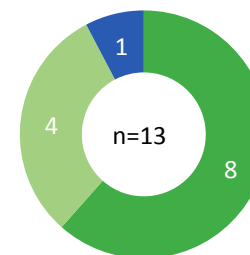
Almost all high-value systems in scope feature a direct participant-centric access model. This model places a premium on risk management and is favored by these systemically important systems. The exception is EURO1, which allows indirect participant access via STEP1 and serves 3 of the countries in scope.

The majority of low-value bulk systems also feature a direct-participant model; Denmark, Italy, Sweden, and the UK, however, use an infrastructure-centric model (although also allows for access via a direct participant).

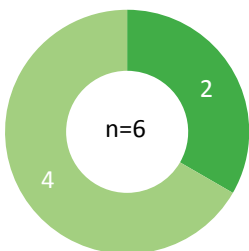
Low-value real-time\* systems tend toward the infrastructure-centric (67% or 4 of 6 total) rather than direct participant-centric model.

ATMs display the most diversity in that all 3 types of access models are found across the 13 countries in scope. Multi-network-centric is the most common (39% or 5 of 13), followed by direct participant-centric (31% or 4 of 13), and rounded out by infrastructure-centric (15% or 2 of 13).

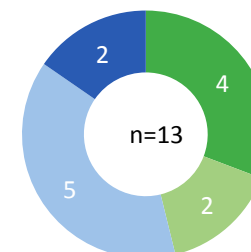
## Low-value bulk



## Low-value real-time



## ATM



Direct participant-centric

Infrastructure-centric

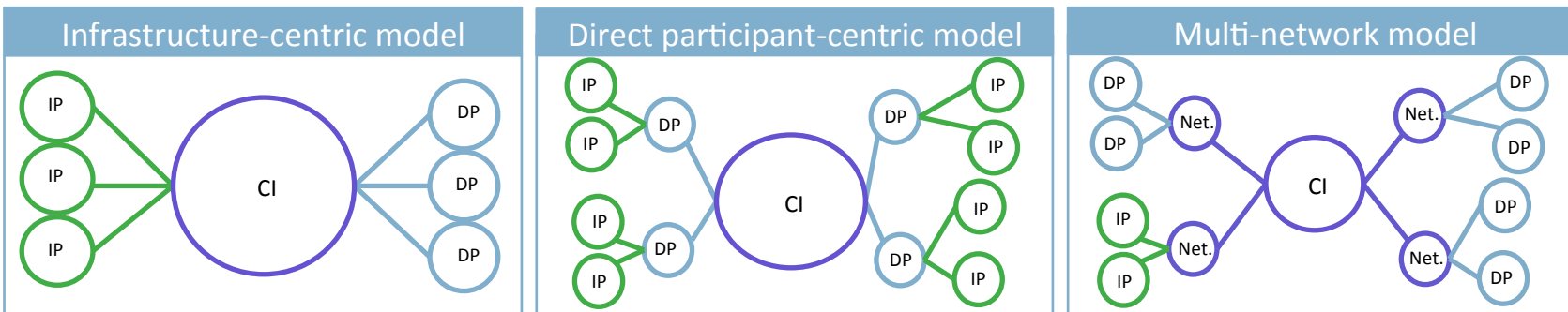
Multi-network-centric

Not applicable

\*Note: Certain aspects of Australia's NPP have not been formulated yet, meaning it may not always appear in the count for low-value real-time systems.

# Participant access models

Each model has its own advantages and disadvantages



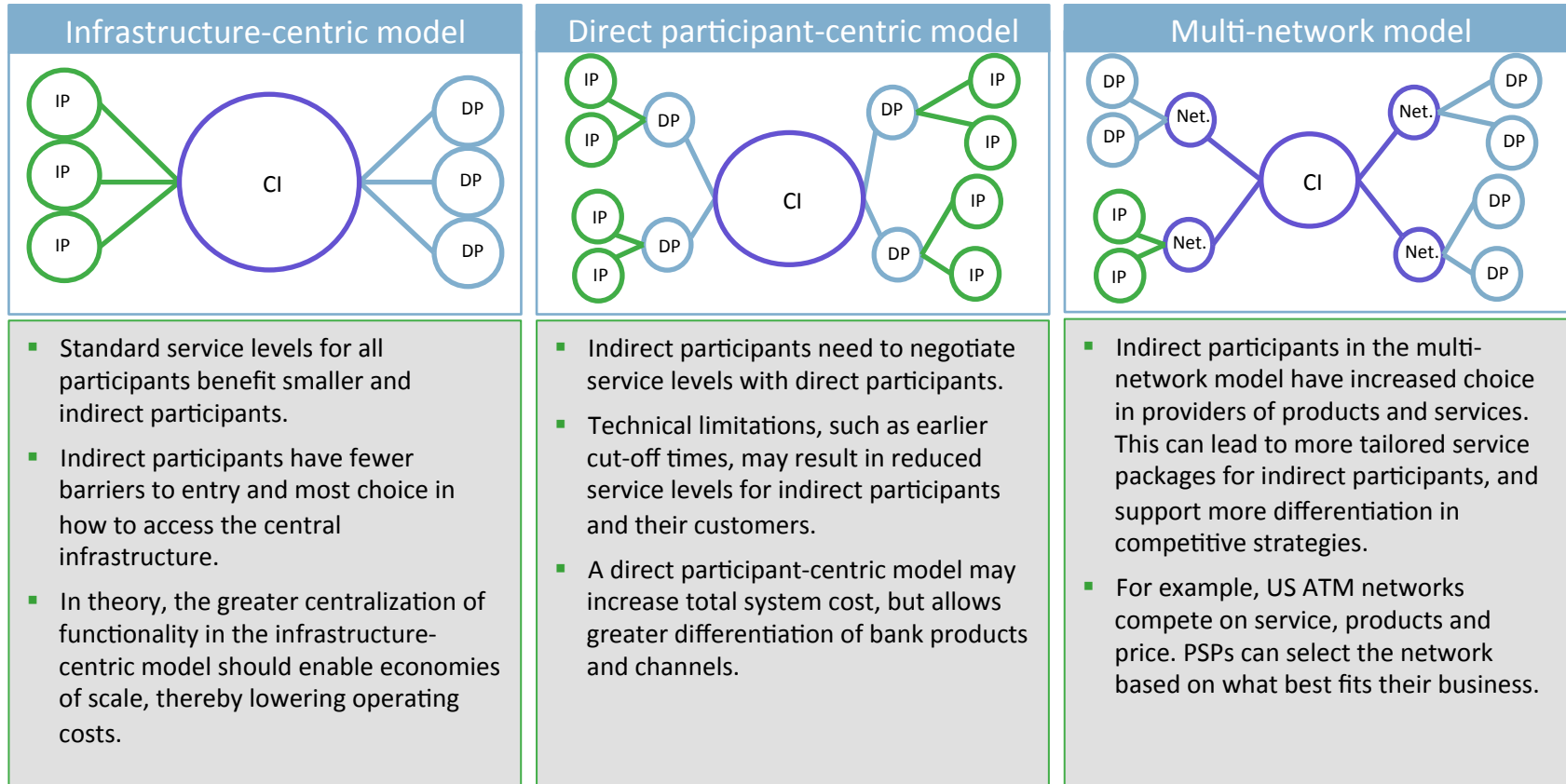
A **centralized infrastructure/network** (CI) is the entity that facilitates interbank transfers between connected participants. For the purposes of the present analysis, the bilateral or multilateral nature of the CI is not considered.

**Direct participants** (DP) connect to the central infrastructure via a number of networks (SWIFT, VPNs, prop, etc.), whereas **indirect participants** (IP) usually connect via a direct participant, except where noted.

- In an infrastructure-centric model,** all users, including direct and indirect participants, and corporate originators submit payments directly to the infrastructure.
- The central infrastructure** is responsible for enforcing security policies and credit risk limits, for indirect participants, as set by sponsoring banks.
- In a direct participant centric model,** each sponsor bank communicates with its sponsored participants. Only direct participants connect to the central infrastructure.
- This is the most common model** among high-value and low-value bulk systems, and is also widely used in LV RT and ATM systems.
- Multiple networks** connect participants to each other, either bilaterally or through a central switch.
- This model is commonly found** in ATM networks.

# Impact of access models on indirect participation

Centralization drives efficiency & distribution drives PSP competition





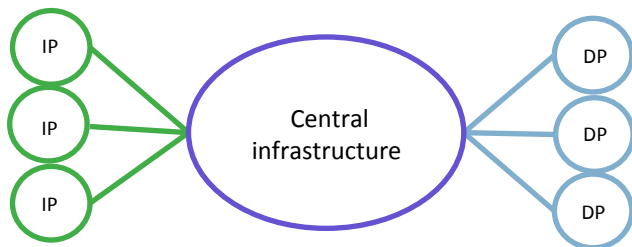
# Infrastructure-centric model

Marked by uniform service levels, rich functionality, and speed

## Prominent central provider

- In an infrastructure-centric model, all users (direct and indirect) submit payments directly to the central infrastructure.
- The centralization of this model often coincides with rich central functionality, like account switching, often with one operator and/or infrastructure provider for multiple systems.
- The centralization of infrastructure provision and networking means standard services for all participants. They cooperate at an infrastructure level and compete further down the value chain.

### Infrastructure-centric model



## Denmark, Italy, Sweden, the UK

- In Denmark, this model is used by all participants for both low-value bulk and low-value real-time payments. In both cases, the central infrastructure provider is Nets.
- In Italy, most FIs connect directly to the central infrastructures via the National Interbank Network (RNI), a financial network created by the Italian central bank and run by SIA.
- Sweden's Bankgirot is the central infrastructure provider for both the low-value bulk and low-value real-time systems. All participants connect directly to Bankgirot. Account switching is eased for corporates in Sweden, as is the use of a mobile number as a proxy identifier for sending and receiving payments.
- In the UK, Bacs low-value bulk payments use an infrastructure-centric model that enables direct technical access for all participants (although indirect participants can also access the infrastructure via direct participants). Bacs manages a variety of community services, including account switching and non-payment messaging, which simplifies returns and processing at an interbank level. Faster Payments has recently announced a similar model.

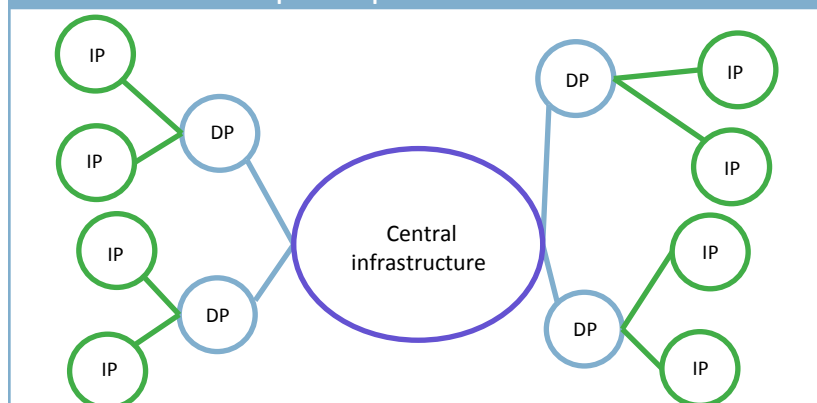
# Direct participant centric model

Majority of high-value systems & low-value bulk systems employ this model

## Greater product differentiation

- In a direct participant-centric model, indirect participants connect to central infrastructure via direct participants.
- Only direct participants connect to the central infrastructure, mitigating the risks associated with more loosely regulated and harder to monitor direct access for indirect participants.
- This model may increase total system cost as a greater portion of the payments value chain must be internalized by participants, but allows greater differentiation of bank products and channels.
- This is the most commonly used model for the high-value and low-value bulk systems examined in this study.

### Direct participant-centric model



## Most predominant model examined

- All high-value systems in scope, aside from EURO1 via the STEP1 service, use the direct participant model.
- Banks participating in Australia and New Zealand's low-value bulk systems (both called BECS), exchange files bilaterally. Indirect participants connect via direct participants.
- Canada's Automated Clearing and Settlement System (ACSS) is a low-value bulk bilateral system where indirect participants access the system through sponsors.
- Many small banks in the United States choose to access the payment system via larger sponsor banks, despite the fact that the Federal Reserve offers settlement accounts for all banks regardless of size. While technically direct participants, these banks use sponsorship arrangements with larger banks to connect them to the central infrastructure to lower cost. Sponsors may exercise control over their indirect participant's payment flows.

# Multi-network model

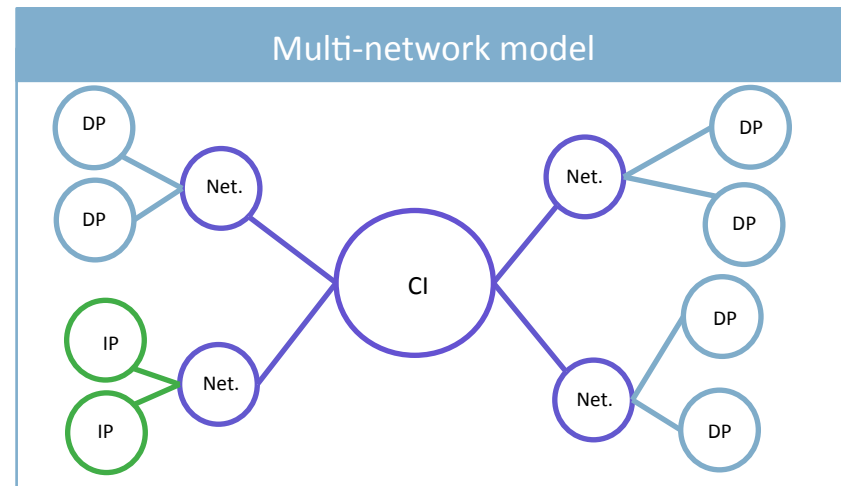
Multiple networks are connected to ensure interoperability

## Strong entry barrier for new participants

- Multiple networks provide interoperability through a central switch or bilateral agreements with other networks.
- Where multiple connections must be maintained, e.g. bilateral scenarios, the high number of connections necessary to participate in the system is a barrier to entry for new participants, especially smaller PSPs.
- This model was only found in ATM systems in this report.
- One key characteristic of this model is that transactions can be cleared/switched and settled within a single network, i.e., the central infrastructure (where present) only handles inter-network traffic.

## Australia, Japan, New Zealand, United States

- Australia has multiple ATM networks that connect to each other and exchange payments. Large banks have their own ATM networks, while smaller banks have developed common sub-networks.
- Germany, New Zealand, and the United States each have multiple, interoperable ATM networks connected via a patchwork of bilateral and/or multilateral agreements.
- Japan has a central switch connecting its multiple ATM networks.



# Variations in network models

Multiple models are often present in a single market

## Many countries have multiple systems

- No country in scope uses only one model for all systems.
- Within a specific country multiple models may be available for each system type. This is especially true, but not limited to, where parallel systems exist.
- In a few cases, a single system has multiple access methods. The new access model for the UK's Faster Payments offers both infrastructure and direct participant-centric models (both models are also featured in the Bacs system).

## Italy has a national financial infrastructure

- In Italy, SIA operates the National Interbank Network (RNI). The RNI is an electronic network connecting the most important financial intermediaries in Italy, i.e. Banca d'Italia, the clearing houses, and banks. SIA is also integrated with the Public Connectivity System for public administration and with SWIFT.

## Germany and the USA use aggregators

- In Germany and the United States, each of the two low-value bulk clearing systems available is connected with the other — RPS and STEP2 in Germany and EPN and FedACH in the United States. Banks that participate one of these systems can send payments to any bank in the other. Banks in both countries also have the option to clear low-value payments bilaterally.
- It is also common for smaller banks in Germany to outsource payment processing to captive processors. Nearly all savings banks outsource to the cooperatively-owned Finanz Informatik, and nearly all cooperative banks outsource to Equens. These payment processors connect to STEP2 and RPS for their customers.
- In the United States, commercial aggregators connect indirect participants to FedACH, the low-value system operated by the Federal Reserve. While the Fed offers direct connection to all members, a majority of bank members (approx. 8,000) are medium- to small-size banks. To minimize complexity, these banks prefer to outsource their data processing, payment processing, and IT to third-party data processing companies.
- Large banks in the United States choose to connect directly to central infrastructures. Thus banks in the United States can choose based on business and strategic reasons how they access the central infrastructure.

# SWIFT is a prominent presence

SWIFT messages are common even when proprietary connections exist

## Connectivity and messaging standards

- In many payment systems, connectivity between a payments infrastructure and its participants is often achieved using the SWIFT network.
- SWIFT FIN is used by many high-value systems as a messaging service.
- SWIFT FileAct is used by several low-value bulk systems in this study to exchange bulk payment files.
  - FileAct is often one of multiple options rather than the sole method of connecting to the infrastructure. Several systems use VPNs in addition to (or in place of) SWIFT services for connectivity and message exchange.
  - In the UK, for example, Bacs participants use the SWIFT-based STS transmission service, as well as ETS, a VPN-based service.
- SWIFT-based messaging standards, such as the MT series and the ISO 20022-compliant MX series, are common in several payment systems. SWIFT also delivers messaging platforms and messaging gateways, which act as interfaces for exchanging payment messages.

## Countries where SWIFT is most prominent

- In Australia, SWIFT plays a prominent role in multiple payment systems:
  - High-value: The SWIFT Payment Delivery System (PDS) is the mechanism used to allow banks to exchange payments via the high-value system, RITS. Access to PDS is encrypted end-to-end with unique logins and digital certificates.
  - Low-value bulk: The Low Value Clearing Service (LVCS) was established to create a bridge for participants to exchange cheque & bulk low-value files across either the COIN or SWIFT networks, rather than force members to belong to both.
  - Low-value real-time: SWIFT will operate the common network for the New Payments Platform, which is due to launch in 2017. The decentralized messaging architecture will rely on the bilateral exchange of payment messages.
- New Zealand requires participation via SWIFT network connection for their RTGS system, ESAS, and the low-value bulk system, BECS.
- The EBA's EURO1 and STEP2 systems use SWIFT FIN and FileAct, respectively, as their primary communications networks.

# Direct participants are almost exclusively banks

## Overview of scheme membership and indirect participation

### Data insights

- Direct participants share common characteristics including being almost exclusively defined as banks.
- There are several instances where barriers to direct participation are actively being reduced, either for reasons of competition or risk distribution.
- Not all banks want to participate directly, even when there are no significant barriers. This is mostly due to lack of a business case to do so, i.e. the cost of direct participation outweighs the benefit when compared to indirect participation.

### Methodology

- Scheme membership criteria and indirect participation was analyzed through document review and through interviews with experts in individual markets and systems.
- The results are reported in the access section of the country profiles.
- Individual responses have been aggregated by system type and presented along with key findings.
- Where there is more than one access model in a market, the most open form of access is reported.

### Focus on indirect participation

- The following analysis provides an overview of indirect participant access within the systems in scope as well as highlighting noteworthy examples.
- Indirect participation varies based on country and system type. Regulation or market forces prohibit access to direct participation.
- A focus on indirect participation is relevant to issues of competition, service levels for end users, and risk.
- Where indirect participation affects service levels and/or results in higher transaction costs, there is an impact on competition within that market. For example, where indirect participants are granted a lesser service level or are limited in access to a market, some niche or customer needs may go unfulfilled.
  - In Italy, indirect participants have reported reduced service levels due to the access arrangements. This has led to technical limitations, such as earlier cut-off times.
  - EURO1 enforces a EUR 50 million (GBP 41.5 million) limit on indirect participants in STEP1, limiting their use of the system.

# Risk mgmt drives increases in direct participation

Direct access for IPs is about increasing competition and service levels

## Direct participants share characteristics

- Direct participants are defined as a distinct participant type and held to a higher regulatory and requirement standard under the laws or regulations.
- Direct participants must meet additional oversight scrutiny for liquidity risk management, including the liquidity required for any sponsored indirect participants.
- For larger banks, there may be a business case for the associated additional costs of becoming a direct member.
  - They also have the resources to overcome market barriers such as market size and structure.
- It is widely believed that direct participants enjoy competitive advantages, such as lower marginal cost and increased service levels. However, pricing and service level data to evaluate this claim is not publicly available.

## Efforts to broaden participation

There are several instances where barriers to direct participation are actively being reduced.

- In Brazil, non-bank participants are legally entitled to hold accounts in the central bank settlement system (although few exercise this right).
- The Reserve Bank of New Zealand is considering broader access to indirect participants in its low-value bulk system.
- The UK's Faster Payments system has recently begun to support technical access for a new type of indirect participant, direct agency.

## Not all banks want to participate directly

- In some markets, indirect participants are reluctant to become direct participants, even when it is available.
- The EU's Payment Services Directive has expanded the potential pool of scheme participants to non-banks. Adoption by non-banks, however, has not been widespread. Banks remain the dominant participant group by far.
- In the United States, some smaller banks choose to use larger sponsor banks for settlement, even though they themselves are legally entitled to settlement accounts at the central bank.

# Broadening direct access is uncommon

Change is motivated by risk, not competition

Most systems limit  
broad technical access

The EU is an exception

Examples of broadening  
direct access

- Direct access to high-value systems is restricted to direct participants in every system in scope, aside from EURO1, which allows indirect participants direct technical access to the system via the STEP1 service.
- ATM access is mostly restricted to direct participants.
- Over half of real-time systems allow direct technical access for all participants.
- Only European countries allow non-banks to join schemes and give direct technical access to the low-value bulk and real-time infrastructure.
- Most non-European systems require indirect participants to submit payments via direct participants. Japan is an exception.
- New Zealand's Reserve Bank is working to encourage wider direct membership to reduce risk due to the dominance of a few large banks as direct participants.
- Similarly, the UK's CHAPS extended direct participation to former indirect participants.
- In cases where direct participation is widespread, many small PSPs choose to outsource technical processing (e.g. Germany, Italy, USA).

In markets with a small number of direct participants and a high number of indirect participants, settlement risk is concentrated among the direct participants. Some regulators are motivated to increase direct participation, which lowers liquidity risk concentration by distributing risk among a broader base of participants. As part of the Bank of England's 2012 Payment Systems Oversight Report, CHAPS, the UK high-value system, invited indirect participant financial institutions with an over 2% average daily total payment activity (by value) processed by CHAPS to become direct participants. Similarly, in New Zealand, the RBNZ seeks to widen direct access to the low-value bulk system (BECS) to current indirect participants, thereby distributing liquidity risk.

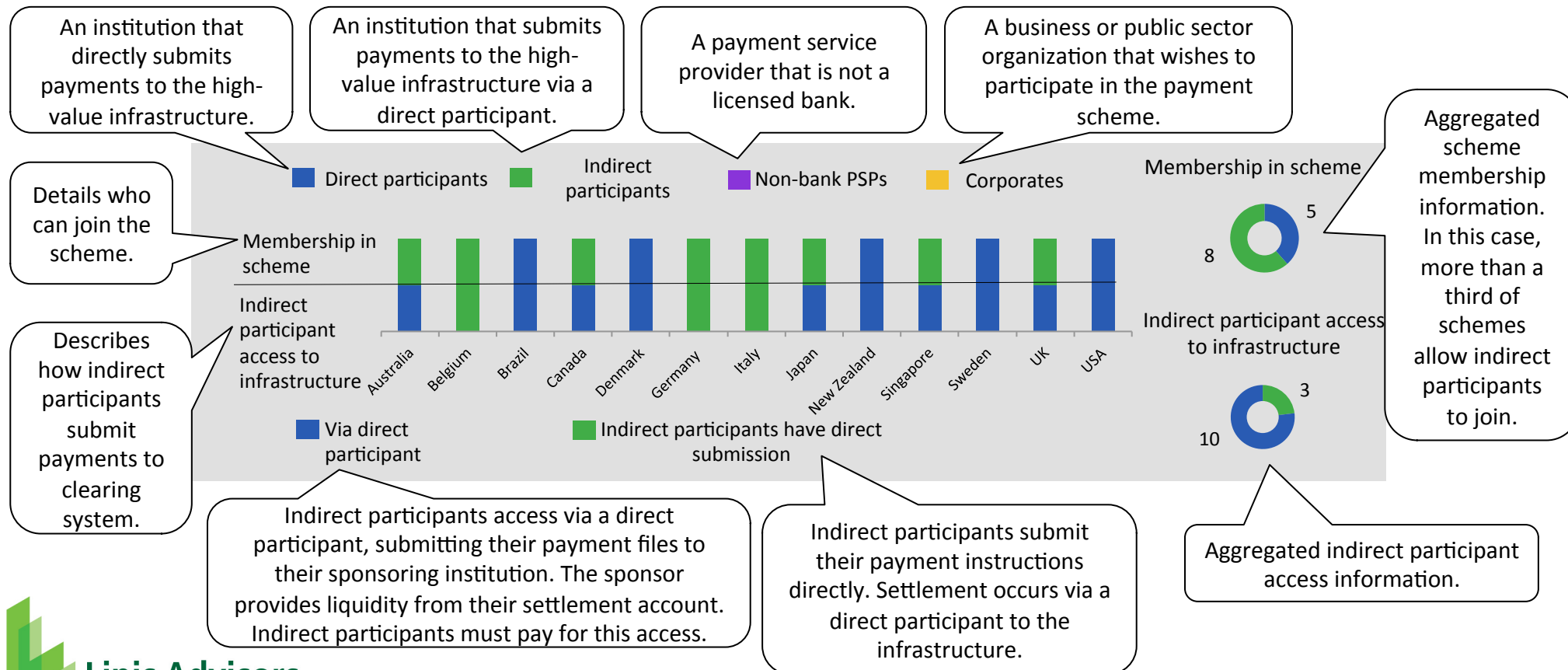


# Scheme access & participation

## Methodology

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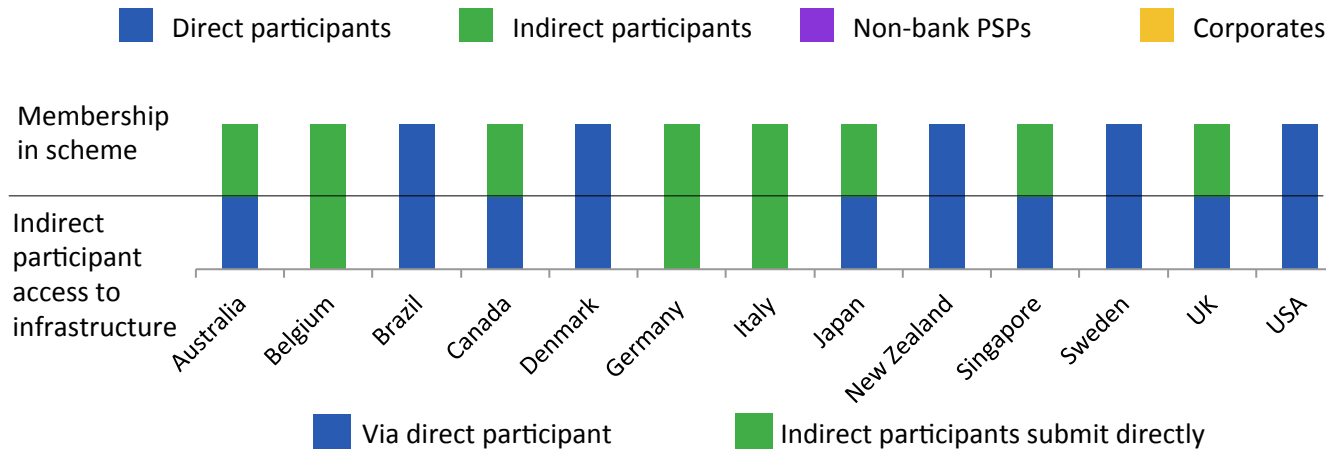
The framework below is used to depict scheme membership criteria and indirect participant access by system type across the countries in scope. The example below (from high-value systems) is annotated to explain the terminology used throughout this section, which applies the framework to all countries and system types in scope. Note that categories are cumulative, i.e. responses of indirect participants include direct participants. Also, a country or market view is taken, i.e. where multiple systems exist within a market the most open response is presented. The individual country profiles include more detailed system level information.



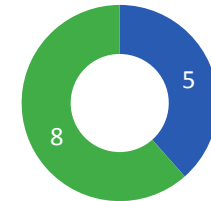
# Indirect participants access high-value systems via sponsors

58

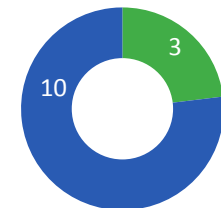
Only EURO1 allows direct technical access for indirect participants



Membership in scheme



Indirect participant access to infrastructure



**Scheme membership:** As the foundation of a national payments system, more than half of the high-value schemes restrict membership to direct participants. Indirect participants are able (or required) to join just over a third of the high-value systems in scope. Allowing indirect participants contribute to the scheme governance, despite their limited access, ensures openness and transparency. No scheme, however, allows high-value scheme membership by non-

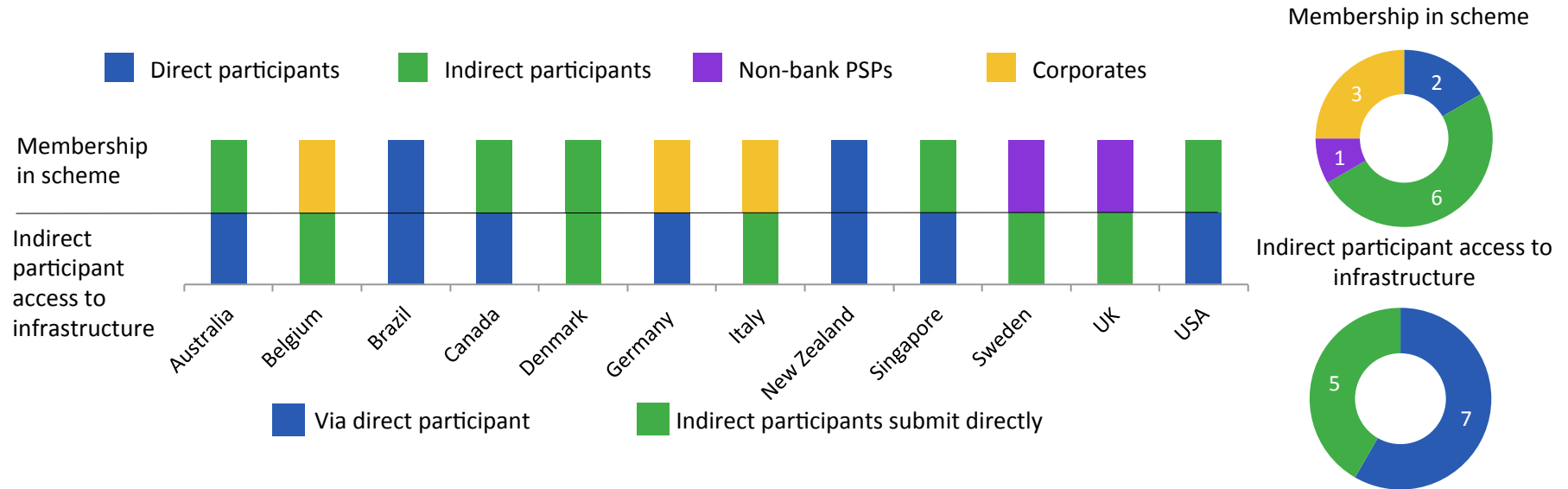
banks.

**Indirect participant access:** Indirect participant access to the high-value infrastructure is highly restricted. These systems are designated as systemically important, and risk and liquidity management are key reasons cited for restricting access. Access to high-value systems is restricted to direct participants in every system in scope, with the exception of the EURO1 system (through the STEP1 service).

# Low-value bulk systems display a variety of access models

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## Euro area countries most open to non-bank scheme membership



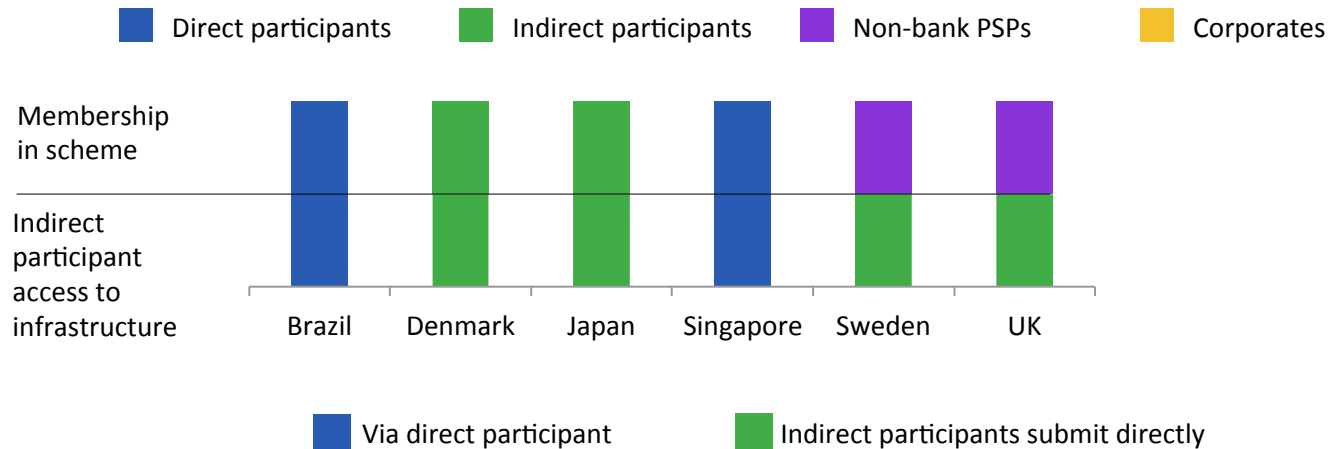
**Scheme membership:** Scheme membership is restricted to direct participants in only 4 of 13 low-value bulk systems in scope. Over 80% restrict membership to only direct and indirect participants. Only Euro area countries, in compliance with the PSD, allow non-bank PSPs to join schemes. EPC rules allow corporates to join as well, and several industry associations are members at this time.

**Indirect participant access:** Allowing direct technical access to the low-value bulk infrastructure is also a European phenomenon; all non-European systems in scope require indirect participants to submit payments via direct participants.

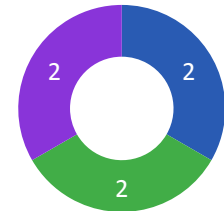
# Access to real-time systems is mixed

Over half of real-time systems allow direct technical access

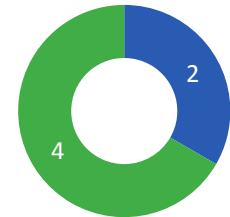
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Membership in scheme



Indirect participant access to infrastructure



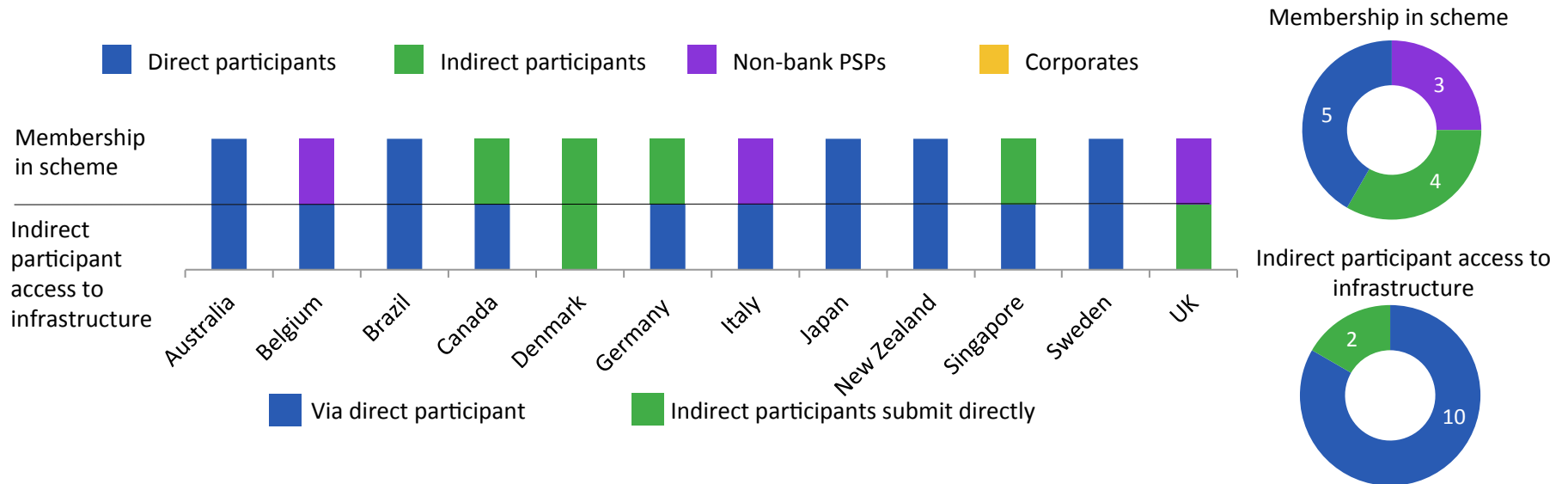
**Scheme membership:** Of the 6 existing systems, membership is restricted to direct participants in Brazil and Singapore, whereas Denmark and Japan both allow indirect participants to join the scheme. In both Sweden and the UK, non-bank PSPs are allowed to join. No system in scope currently allows corporates to join the scheme as members. About half of the countries in scope have real-time systems, and Australia's NPP system is due to go live in 2017. There are several other systems under development or consideration, notably in the USA and SEPA.

**Indirect participant access:** Four systems (Denmark, Japan, Sweden, and the UK) allow indirect participants to directly submit payment instructions. Brazil and Singapore do not have any indirect participants.

# ATM access is generally restricted to direct members

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UK and Denmark are exceptions



**Scheme membership:** Scheme membership is restricted to direct participants in five of the 12 markets. Seven of the 12 markets allow indirect participants to become scheme members, of those seven, Belgium, Italy, and the UK allow non-bank PSPs to become members. Brazil, Singapore, and the US have multiple ATM networks. Most of Brazil's multiple ATM networks only serve individual bank brands and are not interoperable with other ATM networks. Brazil's largest multi-bank network, Banco 24 Horas, only allows direct membership and access via direct participants. Of Singapore's 3 ATM networks, only Nets allows indirect participants to join the scheme, however, in

practice there are none. All three networks restrict technical access to direct members. The USA has no national ATM scheme, so it is excluded from this analysis; instead, there are 12+ interoperable regional and local schemes.

**Indirect participant access:** Indirect access to ATM switches is rare, occurring in only Denmark and the UK. As ATM authorization occurs in real time and often over a separate network, most countries believe that ATM settlement via direct participants does not impact the customer experience or service levels.

# Direct technical access in multiple systems

## Technical access to indirect participants not only in UK

### Denmark: LV bulk, LV RT, ATM

- Danish low-value clearings including bulk, real-time, and the ATM network, Dankort, have a participant structure where all participants submit instructions directly to the clearings.
- Only direct participants hold a settlement account at the central bank. Indirect participants settle their payments via settlement accounts held by direct participant sponsors.

### Sweden: LV bulk, LV RT

- Both direct and indirect participants as well as corporates can directly access the LV bulk and LV RT clearings.
- Indirect participants have direct technical access to the payment system infrastructure, submitting payment instructions directly to Bankgirot.
- Only direct participants hold a settlement account at the Swedish central bank (Riksbank). Indirect participants settle their payments via settlement accounts held by direct participant sponsors.

### UK: LV bulk, LV RT, ATM

- Indirect participants have technical access to the infrastructure operated by VocaLink. The chief difference on a technical level is whether they settle on their own behalf or via a direct member.
- Under its new access model, Faster Payments allows two types of indirect members: Direct Agency, which has a direct connection to the infrastructure, and Indirect Agency, which does not. Both types rely on a direct member for settlement.
- All members of the LINK scheme connect directly to the technical infrastructure, regardless of their settlement arrangements or regulatory classification.

- Executive summary
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- Drivers of change
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- Product diversity & features index
- Indirect access
  - Access models / network topology
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- **Conclusions**
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  - Detailed methodology

# Conclusions

## Results of analysis across all 13 markets

### The same outcome in payment system development can have different drivers (regulatory, commercial, or both)

Similar developments were observed in countries with differing drivers of change

- Sweden and Denmark have each developed real-time payment systems for different reasons. In Sweden, banks reacted to a perceived threat posed by real-time products and services offered by third parties. Danish banks were required to change settlement practices for the low-value bulk system by regulators and used the opportunity of this overhaul to go further and develop real-time.

### Three participant access models were observed across all system types

- Each market features a mix of models across system types; no market has the same access model for each of the four payment systems observed.
- Changes to participant models in systems observed may be driven by:
  - A desire to improve service levels for indirect participants
  - Risk management, particularly a desire to reduce settlement risk

### The outsourcing of infrastructure provision is rarely competitive

- Competitive tenders for payment system infrastructure provision is rare.
  - Only six examples of tendering were observed, and only 3 of these were deemed competitive. All of these were in new systems or legacy systems undergoing an extensive overhaul
- In existing systems, incumbent infrastructure providers have a huge advantage over other potential providers.

### The greatest diversity in system functionality was seen in low-value bulk and ATM systems

- Overlay services are available in just over half of the markets in scope, with the majority concentrated in a few markets: Denmark, SEPA countries, Sweden, and the UK.
  - Each of these markets has introduced a new system or scheme in the last 7 years
  - Almost all overlay services are found in low-value bulk and low-value real-time systems
- Rich functionality is only weakly correlated to banking concentration and GDP per capita



# Conclusions

## Relevance to the UK

### **Outsourcing and tendering of payment system infrastructure**

- The competitive tender for infrastructure provision in the Faster Payments system is one of the few examples of a truly competitive tendering process observed in the countries and systems in scope.
- The absence of competitive tendering for the Bacs infrastructure in the UK is typical compared to other legacy systems in scope.

### **UK payment systems display rich overall functionality compared to other systems.**

- Only two other markets examined displayed comparable levels of functionality: Denmark and Sweden.
- Together, these three markets display the most centralized features of any country in scope.
- All three of these countries feature high ownership overlap in payment system layers and high banking concentration.

### **The ownership structure of UK low-value bulk and real-time systems is typical. High-value & ATM systems are less typical.**

- Both low-value bulk and real-time systems have a commercial entity providing the infrastructure and a non-profit scheme/operator overseeing the system.
- The central bank has less involvement in the operation of the high-value RTGS system than in other markets. The Bank of England acts solely as infrastructure provider, while CHAPS handles the operations and scheme management.
- Fewer than half of markets examined have a national ATM network comparable to LINK. In most countries, ownership is not integrated. Some have no national network.

### **Access methods for UK high-value and real-time systems are typical. Low-value bulk and ATM systems are more unusual compared with other systems.**

- Connection to central infrastructure via direct participants is the norm for all but one high-value system examined.
- Direct connection to the real-time system by indirect participants is also a common practice.
- Allowing indirect participants to directly access the low-value bulk system is slightly atypical.
- The UK is one of only two countries that grants indirect participants direct access to the technical infrastructure for an ATM switch.

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### Highlights

- Australia's payment system infrastructure is highly decentralized.
- The Australia Payments Clearing Association (APCA) is a member-owned payments association that sets the rules for several payment systems, including BECS (LV bulk), HVCS (high-value), and ATM transactions. The rule-maker for the New Payments Platform, a low-value real-time payment system due to go live in 2017, will be NPP Australia Ltd.
- The Reserve Bank of Australia (RBA) is developing a 24/7 settlement module to provide multilateral gross settlement for NPP transactions. Development of the NPP was awarded to SWIFT after a competitive bidding process.
- Indirect participants access RITS and BECS via direct participants, while ATM networks (whether proprietary or cooperative) only grant access to direct participants. It is unclear what the access arrangements for the NPP will be.

### Recent evolution and drivers

Australian payments are developing rapidly due to the development of the New Payments Platform (NPP), a low-value real-time system set to go live in 2017. Work is under way to provide more timely settlement of low-value retail payments, currently settled on a next-day deferred net basis (there will be a 24/7 settlement mode in the RITS system once the NPP goes live). A community network will be used to exchange clearing files for the NPP and simultaneously send associated settlement instructions to RITS. The move from bilateral to multilateral links began in 2014 for eftpos (debit card) transactions.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	1,784.6
Direct debits	883.1
ATM	744.0
High value	10.6
Cards	5,862.8
Population	23.5
Bank concentration ratio (CR <sub>5</sub> )	90.5%

### Tendering & outsourcing

Australian payment systems do not have central infrastructures, but they do often outsource networking. APCA's database management for both the low-value bulk and the planned NPP is outsourced to Fiserv, while RITS' and the NPP's messaging systems are provided by SWIFT, which also won the development contract for the NPP in a competitive bid. The COIN network is outsourced to Telstra and SWIFT.

# Central infrastructure provision

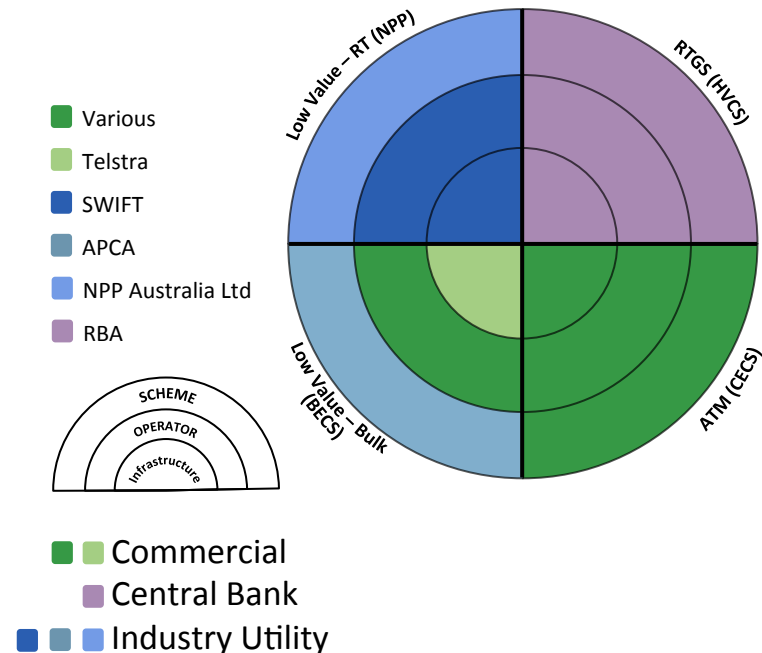
## Australia

The Australian Payments Clearing Association (APCA) administers the Bulk Electronic Clearing System (BECS) for credit transfers and direct debits, the Issuers and Acquirers Community (IAC) for ATM and EFTPOS payments, the High Value Clearing System (HVCS) for the exchange of RTGS SWIFT messages outside of RITS, and the Australian Paper Clearing System (APCS) for cheques and other paper instruments. The eftpos debit-card network, a multilateral payments hub, owned and operated by bank and retail members, can also process ATM transactions. The RITS system (RTGS) is owned and operated by the RBA.

NPP Australia Ltd will set scheme rules for the NPP, which is due to go live in 2017. SWIFT won a competitive bidding process to operate and provide the technical infrastructure for the NPP.

Australia does not have a clearing house operator. APCA sets rules for all payment schemes, but transactions are exchanged bilaterally between banks. The RBA's Payments Policy Department provides general oversight of Australian payment systems. APCA is financially supported by member shareholders (RBA, banks, and retail industry bodies), which contribute to APCA based on the volume and importance of payments they make. Associate membership is also possible for groups not designated in the aforementioned list of stakeholders.

## Ownership in Australian payment systems



# Access and settlement arrangements

## Australia

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank P2Ps	Corporates
High value	RITS	■	■	
LV Bulk	BECS	■	■	
LV Real-time	NPP	■	■	■
ATM	Various	■	■	■

**Legend**

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- There are 88 direct participants in RITS and each must have an ESA (Exchange Settlement Account). Participation and access policy around ESA eligibility is set by the Bank's Payments Policy Department, under the governance of the Payments System Board. Indirect participants access RITS via direct participants.
- There are 2 participant tiers in BECS. Tier 1 members, of which there are 25, clear and settle directly with each other across their respective ESA accounts at the RBA. There are 45 Tier 2 members, who use a Tier 1 member to settle on their behalf. New entrants rely on banks to gain access to the low-value bulk system and there are no other channels to allow new entrants in the market.
- All participants in an ATM network must participate directly. Major banks have developed their own ATM networks, and groups of smaller banks have created their own sub-networks that include multiple banks. Achieving access between the various networks is done via bilateral links. Banks can set up a one-way access arrangement between each other to allow customers of one bank to access another bank's ATM network, with one bank paying the other a fee and no direct charge to end-users. This arrangement is designed to allow smaller banks to access larger networks.
- Access criteria and methods for the NPP have not yet been set.

# High value & ATM

## System details

### RITS

- Australia's RTGS system, RITS, settles high-value credit transfers in real time.
- RITS is owned and operated by the Reserve Bank of Australia.
- RITS falls under the Payment Settlements Department of the RBA.
- Members must be authorized deposit-taking institutions, an Australian-licensed central counterparty (CCP), or a securities settlement facility.
- Participants must hold a settlement account at the RBA to access the system, i.e. they must be direct participants.
- Participants connect to RITS over a proprietary network or via the High Value Clearing System (HVCS), which is a closed SWIFT user group.
- RITS offers real-time settlement of high-value payments and final settlement of low-value payment systems.
- RITS pricing is based on a cost recovery principles.
- RITS participants are required to keep their settlement accounts adequately funded at all times.

### ATM networks

- There is no central ATM network or switch. Each ATM network is linked to others via bilateral agreements to ensure reach for Australian end users.
- Banks exchange payment files bilaterally or through the new EFTPOS hub. Settlement occurs via BECS.
- Networks are operated by each of the "Big Four" banks. Many smaller banks connect directly to the Cuscal network. Cuscal is a payments provider that mostly serves credit unions.
- New entrants in an ATM network must pay a connection fee to other incumbents in the network.
- Interchange fees for ATM transactions were abolished in 2009 by the RBA due to concerns about transparency in charging. End users are now charged directly for all off-us ATM transactions.
- Large banks access ATM networks directly via their back office, while smaller banks form sub-networks.

# Low-value bulk & low-value real-time

## System details

### BECS

- Australia's low-value bulk system does not have a central infrastructure.
- APCA sets scheme rules and governs the system. BECS enables participants to exchange credit transfers and direct debits bilaterally via common rules. The Payment Systems and Netting Act specifies netting arrangements for BECS payment obligations.
- Banks exchange messages bilaterally over SWIFT or via the COIN network.
- Settlement occurs in RITS.
- Any registered financial institution that meets APCA's requirements can be a participant in BECS.
- BECS has a two-tier participation model. Tier II (indirect) participants do not have a settlement account at the RBA and settle through Tier I direct sponsors.
- APCA does not define any system-wide value-added services for participants.
- BECS participants are required to pay both entrance fees and annual fees to use the system. There are no transaction-based fees for using the system.

### NPP

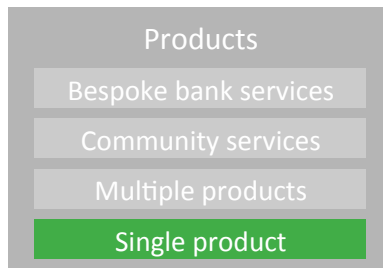
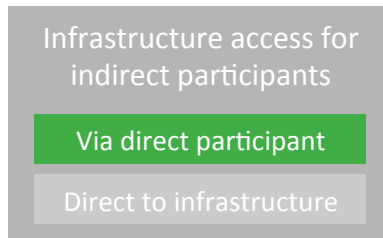
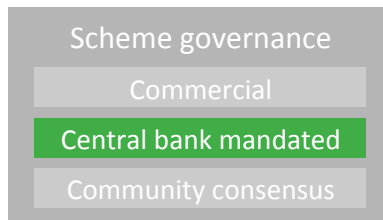
- The New Payments Platform (NPP) is a real-time low-value payment system scheduled to go live in 2017.
- The NPP scheme will be governed by APCA. Scheme rules will be set by NPP Australia Ltd.
- The system infrastructure is being developed by SWIFT as a common network for bilateral exchanges.
- The NPP will be mutually owned by 12 financial institutions (initially), including all four major banks.
- Participation in the NPP will likely be limited to banks at the outset. Each participant will connect to the infrastructure through a SWIFT payments gateway.
- In addition to offering real-time credit transfers, the NPP will feature a module allowing participants to provide a variety of overlay services.
- The pricing model has not yet been finalized.
- NPP participants will be required to hold sufficient collateral to settle all obligations. Settlement will be immediate and posting will occur almost simultaneously.
- The RBA is developing the Fast Settlement Service at RITS to enable 24/7 immediate settlement of all NPP transactions.

# Payment systems taxonomy

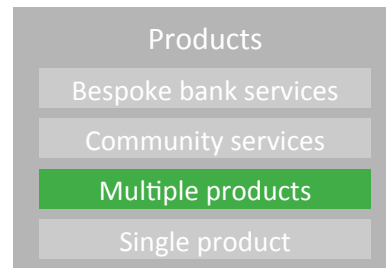
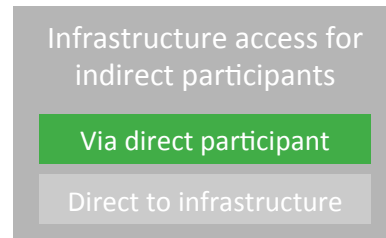
## Australia

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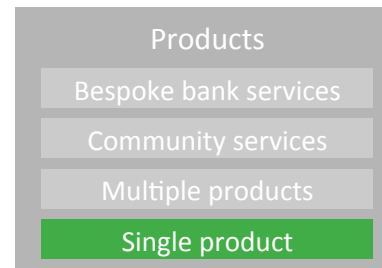
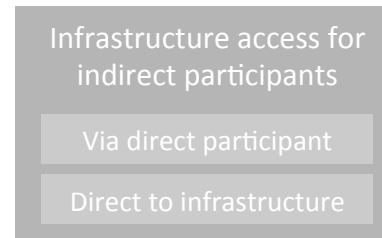
### RITS



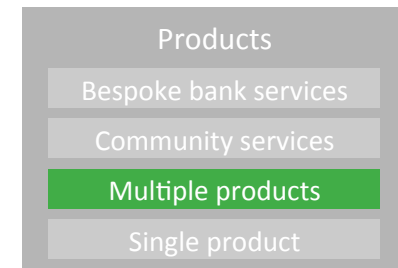
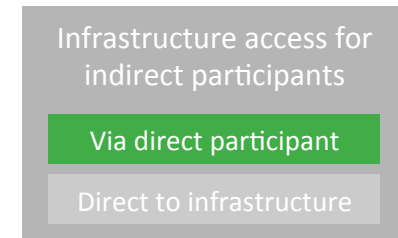
### BECS



### NPP



### ATM networks





# Brazil

## Payment market overview

### Highlights

- Brazil has a strong central bank regulator who has implemented significant reform over the last 15 years. The central bank has recently adopted BIS's PFMI principles.
- Brazil's RTGS system, STR, has high volumes and allows non-banks to directly submit payments.
- Brazil has one of the world's first low-value real-time systems (SITRAF). While it has relatively low volumes, it is now showing solid growth.
- The SILOC low-value bulk system only processes credit transfers and offers overlay services such as bill payments.
- There are very high numbers of ATMs, however there is a lack of interoperability.
- Brazil was an early adopter of rich payments messaging, using a proprietary XML protocol.

### Market data (2014, millions)

Credit transfers	6,452.8
Direct debits	nap
ATM	4,567.4
High value	36.5
Cards	10,993.6
Population	202.8
Bank concentration ratio (CR <sub>5</sub> )	73.5%

### Recent evolution and drivers

Regulatory development has centered around the reform of Brazil's payment system regime. In 2013, legislation was passed that brought payment schemes, card schemes, and payment institutions under the central bank's regulatory umbrella and subjected them to similar oversight requirements. This legislation introduced a regulatory framework over the card schemes, and established minimum requirements for the safe provision of payment services. The legislation encourages by giving new players (such as non-banks) access to payment systems, and creates a more inclusive and innovative environment for retail payments overall.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

There is no evidence of tendering or outsourcing in any of the four Brazilian payments systems examined in this study.

# Central infrastructure provision

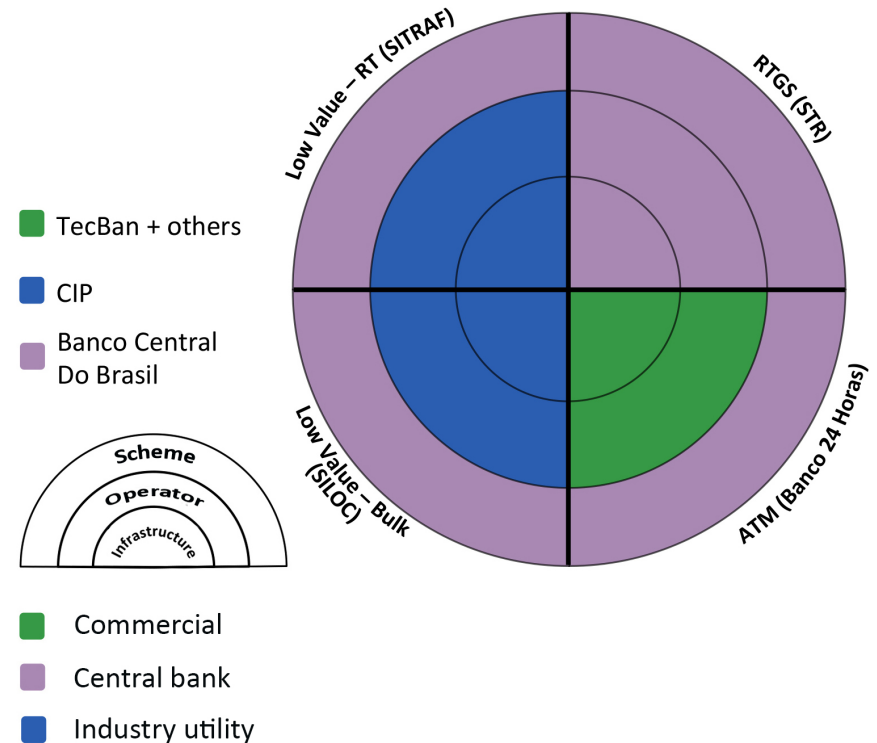
## Brazil

The central bank, Banco Central do Brasil (BCB), provides core infrastructure services that support Brazil's payment systems. It owns and operates the high-value RTGS system (STR), and the National Financial System Network (RSFN), which is used to access the real-time low-value system SITRAF. The RSFN is a real-time messaging platform that acts as the conduit between the central bank infrastructures and all other participating organizations.

Câmara Interbancária de Pagamentos (CIP) is an interbank payment clearing house. It provides clearing and settlement services for inter-bank payments, including the SITRAF real-time system, the SILOC low-value bulk system, and several other interbank payment systems. CIP is a non-profit association that was established in 2001 with the launch of SILOC. Prior to SILOC, cheques and cash dominated Brazil's payments landscape. CIP has operated the SITRAF real-time system since 2002.

TecBan is the only shared infrastructure for ATMs and has limited reach. It is owned by seven of Brazil's largest banks and provides the main shared ATM network, Banco 24 Horas.

## Ownership in Brazilian payment systems



# Access and settlement arrangements

## Brazil

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	STR	■	■	■
LV Bulk	SILOC	■	■	■
LV Real-time	SITRAF	■	■	■
ATM	Various	■	■	■

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Access to the STR system requires a central bank settlement account. Since 2013, non-bank entities have been eligible for a settlement account at the central bank and may directly access STR. This includes card schemes, payment system providers such as CIP, and small banks such as credit unions. There are currently 187 direct participants in STR. All banks and systemically important financial market infrastructures must have a settlement account and be a STR participant.
- Any bank that has a settlement account at the central bank can join SILOC. There are currently 121 direct members. SILOC's access policy is based on the access requirements for obtaining a settlement account with STR. From 2013, a wider range of banks became eligible for obtaining central bank settlement accounts.
- Membership in SITRAF is open to central bank settlement account holders. There are currently 98 members. SITRAF's access policy is based on the access requirements for obtaining a settlement account.
- The lack of ATM interoperability has reduced feasibility for independent operators to establish a presence in the Brazilian market. While not an official policy, all ATM operators are banks (or regulated banks such as credit unions). There are approximately 40 ATM operators. Membership requirements are distinct to each network operator and not available publicly. The largest network, Banco 24 Horas, is operated by TecBan, which is owned by 7 of the country's largest banks. Despite being the country's largest ATM network, it has limited reach.

# High value & ATM

## System details

### STR

- Sistema de Transferência de Reservas (STR) is Brazil's RTGS system, owned and operated by the central bank.
- Participation in STR is mandatory for banks that hold reserve accounts at the central bank.
- Since 2013's legislative change, non-bank entities can hold a settlement account at the central bank and directly access STR.
- Transfer requests submitted to STR are queued based on priority and time.
- STR utilizes the RSFN real-time messaging platform, which is also owned and operated by the central bank.
- STR is required to have a minimum availability of 99.8%.
- There are no admission fees or annual fees. Participants only pay transaction fees.
- There are no overlay services specified for STR.
- Connectivity resilience is enhanced due to dual connection avenues, including the dedicated RSFN messaging system and back-up internet connection.

### ATM networks

- Brazil is a cash-centric society with a history of hyper-inflation, and a large underbanked population. ATM deployment is high.
- A standardized approach for ATMs is not available, which hinders the potential for interoperability. Regulatory focus has shifted to encourage ATM interoperability, improve market efficiency, and increase access to financial services.
- Due to the lack of standardization in the ATM market, there is no common set of connectivity requirements.
- While not official policy, all ATM operators are banks.
- Settlement of ATM transactions occurs via the low-value bulk system (SILOC).
- TecBan offers its client banks over 300 different transaction types, ranging from withdrawals to payments to investments.
- No shared network means that overlay services are part of each ATM owner's product offering.
- Banks charge each other an interchange fee (paid by issuing bank to acquiring bank) for ATM transactions.
- High levels of ATM fraud have led banks to invest heavily in security. The proliferation of bank-specific security solutions has hindered communication between institutions.

# Low-value bulk & low-value real-time

## System details

### SILOC

- SILOC is Brazil's low-value bulk payment system, owned and operated by CIP. SILOC processes credit transfers only, and there is no interbank system for direct debits.
- SILOC payments are cleared during two relatively short time periods (one 2-hour session and one 3-hour session).
- SILOC uses a deferred net settlement mechanism. Multilateral settlement occurs in STR twice per business day at specific times.
- Any bank that has a settlement account at the central bank can join SILOC.
- Participants can offer a range of overlay services to facilitate the "boleto de cobrança," bill payment product.
- SILOC aims for the full recovery of costs through the issuance of a flat fee per transaction, and an annual fee to CIP.
- There is no mechanism to guarantee the settlement of funds transfer orders processed by the system.
- CIP operates SILOC from two separate locations, and has the ability to change which location operates the SILOC system to ensure up-time and stability.
- SILOC's payments messaging uses a data-rich proprietary XML format.

### SITRAF

- SITRAF is a low-value real-time payment system owned and operated by CIP.
- SITRAF takes a hybrid approach that positions it as both an RTGS and deferred-net payment system.
- SITRAF utilizes the RSFN real-time messaging platform operated by the central bank to allow banks access to the system.
- Despite its maturity, usage remains relatively low. However, SITRAF does have the highest growth rates of all Brazilian clearing systems, at 29.2% (2014 vs 2013).
- The launch of SITRAF is attributed to a wider regulatory reform to modernize infrastructure, restore confidence in local currency, and alleviate the central bank from having to cover banks during lengthy deferred settlement delays.
- Any bank that has a settlement account at the central bank can join SITRAF.
- SITRAF only processes electronic funds transfers, known in Brazil as "TED" (similar to wire transfers).
- Cost recovery in SITRAF is managed through transaction fees, charged to both the remitting and receiving banks.

## Brazil

## ATM networks



### Highlights

- Canada has a complex regulatory arrangement. The Bank of Canada oversees payments but does not operate core infrastructures. The Canadian Payments Association (CPA) owns, governs, and operates infrastructures, while the Minister of Finance has oversight powers over the CPA.
- Low-value bulk payments are processed through the Automated Clearing Settlement System (ACSS), which settles transactions on the following business day.
- The Large Value Transfer System (LVTS) is a high-value multilateral net-deferred that ultimately settles all retail payments. Canada does not have a true RTGS system.
- The ATM network is operated by Interac, a non-profit association owned by 60 bank and non-bank members. There is a high number of independent ATM operators.

### Market data (2014, millions)

Credit transfers	1,013.1
Direct debits	762.3
ATM	713.7
High value	7.9
Cards	8,796.8
Population	35.5
Bank concentration ratio (CR <sub>5</sub> )	84.2%

### Recent evolution and drivers

The most important change in recent years is the overhaul of payments legislation, effective July 2015. The Next Generation Payment System project is a multi-year project to renew core infrastructures for both high and low-value payments. The Next Generation Payment System initiative also includes a commitment to adopt ISO 20022 for the low-value ACSS (and potentially LVTS) system. Interac is the sole ATM network provider, and allows network connectivity to providers. This has led to a competitive ATM market with comparatively high numbers of ATM machines deployed.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

There is no evidence of tendering or outsourcing in any of the four Canadian payments systems examined in this study.

# Central infrastructure provision

## Canada

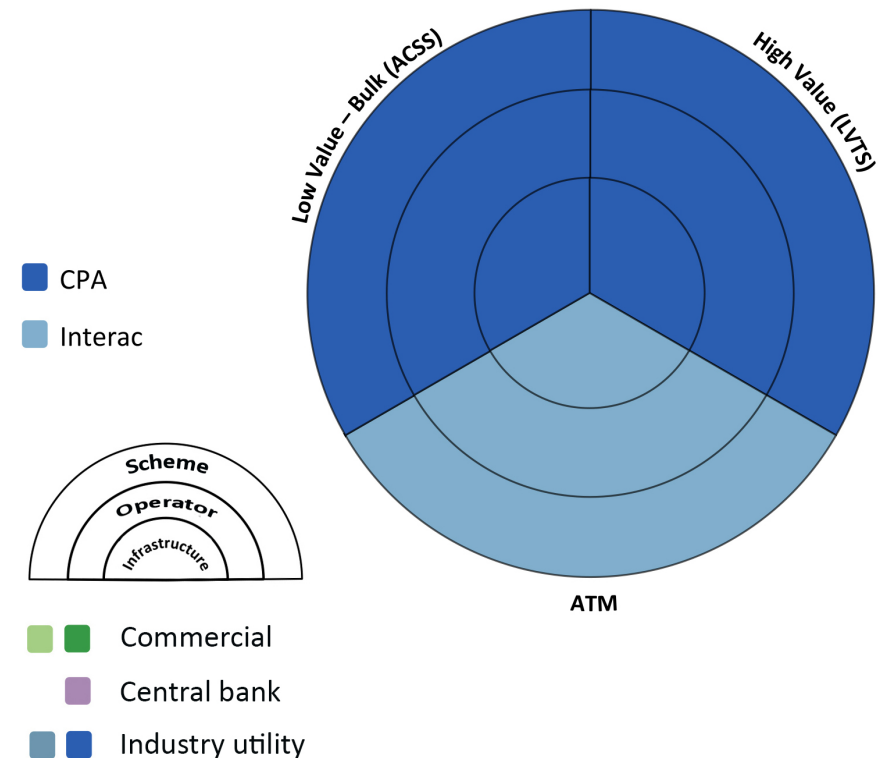
80

The CPA owns and operates the ACSS and LVTS infrastructures. The CPA organizational structure includes an operational team responsible for running these infrastructures. By legislative design, the CPA is a non-profit organization. It uses a mixture of legislation, by-laws, rules, and standards to govern the infrastructures.

The Bank of Canada (BOC) neither owns nor operates any of Canada's major payments or settlement infrastructures. The BOC provides a settlement account to each CPA member that participates directly in ACSS and LVTS. Settlement of LVTS positions is completed through these accounts. The BOC accepts collateral, provides collateralized advances, and provides services to members in support of LVTS intraday operations and advances. The BOC is itself a CPA member and participates directly in LVTS and ACSS.

Interac is a major Canadian cards processing non-profit organization, switches all of Canada's interbank ATM transactions. All ATMs in Canada are connected to the Interac Cash network.

## Ownership in Canadian payment systems





# Access and settlement arrangements

## Canada

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	LVTS			
LV Bulk	ACSS			
LV Real-time	nap			
ATM	Interac			

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- All LVTS participants, both direct and indirect, must be CPA members. Both banks and non-banks can be LVTS participants, although currently only banks are direct participants. There are 17 direct participants and approximately 65 indirect participants. All indirect participants must be officially registered as CPA members. ACSS membership is split into two categories: direct clearers and indirect clearers. Indirect clearers submit payments into ACSS via agent banks. While all ACSS members are currently registered banks, ACSS is open to non-bank institutions.
- Participants in ACSS must be CPA members and are required to have a settlement account at the Bank of Canada. Members must account for 0.5% or more of ACSS's total transaction volume, and must have the ability to meet rules and system requirements
- There are two classes of Interac Association members:
  - Direct Connectors are members who connect directly to the Inter-Member Network (IMN) to provide Interac Cash and Interac Debit services. Each Direct Connector maintains a physical network connection to the IMN, which allows them to connect to each other through a private TCP/IP telecommunications network.
  - Indirect Connectors are members who connect to the Inter-Member Network via a Direct Connector.

# High value & ATM

## System details

### LVTS

- Canada's Large Value Transfer System (LVTS) settles large value and time-critical payments.
- LVTS is owned and operated by the CPA. LVTS is a deferred net settlement system and not a true RTGS system. In the event of a participant default, the BOC extends the funds necessary for the participant to settle its final net debit position.
- All LVTS participants, both direct and indirect, must be CPA members. Access requirements are set by the CPA.
- The Bank of Canada plays a key role in managing both the collateral used to secure participant's deferred net settlement positions and enacting settlement.
- LVTS requires connectivity to both SWIFT and the LVTS core system.
- All LVTS payments are immediately final and irrevocable.
- LVTS transfers funds through two streams or "tranches." Each tranche has a corresponding risk-control limit, collateral requirements, and loss-sharing arrangements.

### Interac

- The Interac Association, a major Canadian cards processing non-profit organization, switches all of Canada's interbank ATM transactions.
- The ATM market in Canada is open to competition from financial institutions and white label ATM companies.
- Interac members are broken down into direct and indirect connectors.
- ATM usage has expanded into non-payment functionality including cross-selling, basic banking transactions, and bill payments, but these are offered by individual ATM owners and not by Interac.
- A single interchange fee of CAD 0.75 (GBP 0.39) per transaction is paid by the issuer to the acquirer for all Interac Cash transactions.
- Interac sets and enforces the technical requirements and standards to connect to its network.
- ATM transactions ultimately settle in LVTS.
- Card security is transitioning from magnetic stripe to chip for both ATM and point of sale transactions. Full adoption of chip-and-pin is expected to be completed by the end of 2015.

# Low-value bulk

## ACSS system details

### ACSS

- The Automated Clearing Settlement System (ACSS) was introduced in 1984 and is owned and operated by the CPA. The ACSS clears retail payments, including paper-based payment items (mostly cheques), pre-authorized debits and credits, debit card, and ATM transactions.
- ACSS membership is split into two categories: Direct clearers and indirect clearers.
- ACSS is a bilateral system where direct clearers exchange payment items directly with each other.
- At the core of ACSS is an information switch used to track the volume and value of payment items exchanged between direct clearers in order to determine the balances due to and from direct clearers.
- ACSS annual fees are based on participant transaction volume and are not publically disclosed.
- ACSS uses a proprietary data format, CPA Standard 005.
- There are no overlay services designated for ACSS.
- The ACSS does not require collateral to be posted. Settlement of payments takes place one business day following clearing, meaning that participants implicitly grant each other unsecured overnight credit.
- ACSS settlement takes place in the high-value LVTS system.
- Unwinding provisions were removed from the ACSS rule book in 2012 because it was deemed operationally ineffective. Risk management is handled in LVTS.

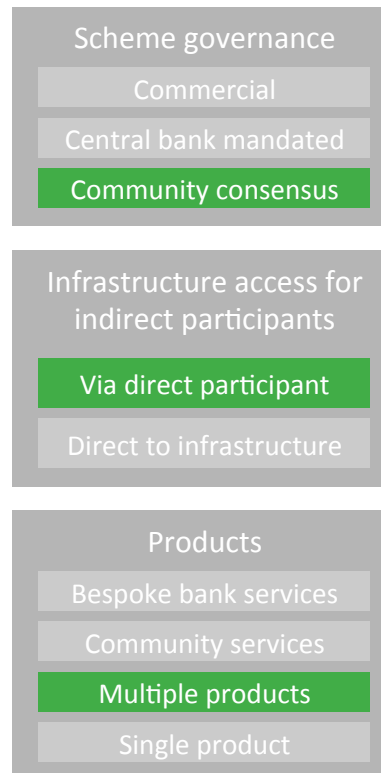
# Payment systems taxonomy

## Canada

### LVTS



### ACSS



### Interac



### Highlights

- Denmark has a highly centralized payment system.
- The Danish Bankers Association sets scheme rules for low-value payment systems. The central bank sets scheme rules for the RTGS system.
- Nets, the only infrastructure provider, plays a central role in low-value clearing. It operates low-value bulk, low-value real-time, and ATM systems serving all Danish banks.
- Denmark has a cooperative banking community for schemes. A key infrastructure provider, Nets, was bought by 3 private equity firms in 2014.
- The majority of banks outsource IT to one of three shared data centers.
- Indirect participants connect directly to all low-value payment infrastructures.
- Competition focuses on customer facing activities, e.g. products and services.

### Market data (2014, millions)

Credit transfers	345.8
Direct debits	207.1
ATM	nav
High value	1.1
Cards	1,516.0
Population	5.6
Bank concentration ratio (CR <sub>5</sub> )	91%

### Recent evolution and drivers

In March 2014, Nets was acquired by a group of private equity firms (Advent International, ATP, and Bain Capital). Nets operates three retail clearing systems in Denmark, the national debit card scheme, and the largest card acquirer. Both Nets and the Danish banks have commented that since Nets' acquisition they have pursued new business areas and competition for customers has increased. The banking community incentivized electronic payments; cheque usage is minimal and declining rapidly.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

While outsourcing for the operation and infrastructure of low-value payment systems is widespread, no meaningful tendering process occurs. Nets, which is now owned by several venture capital firms, operates the clearings and provides the infrastructure of the low-value bulk, low-value real-time, and ATM systems.

# Central infrastructure provision

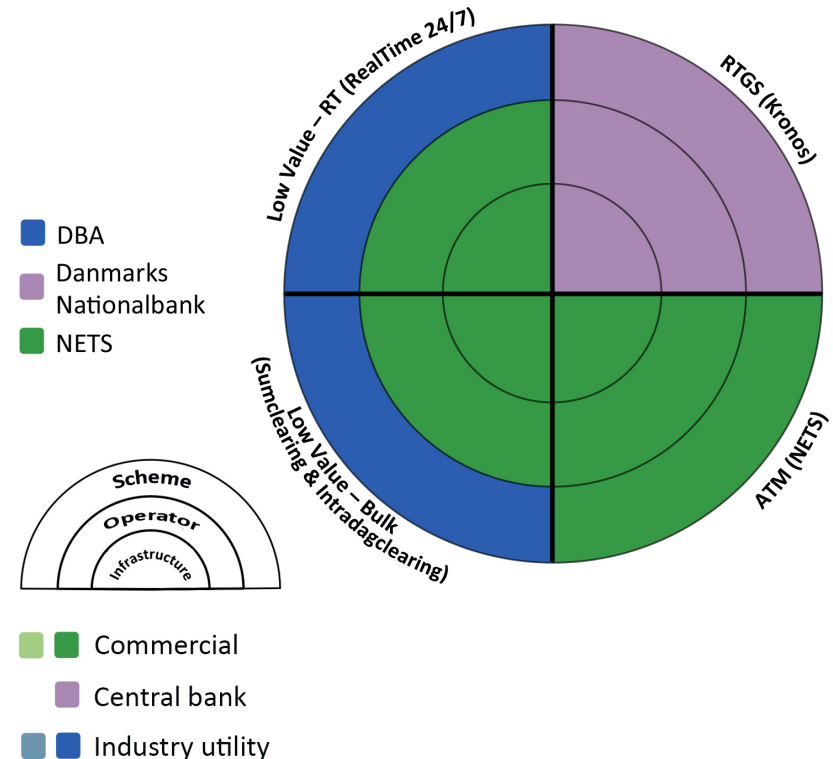
## Denmark

Nets' central infrastructure consists of three low-value clearing systems, Sumclearing, Intradag clearing (Intraday), and Straksclearing (also called RealTime24/7). The systems are owned by the Danish Bankers Association and operated by Nets. The Real-Time 24/7 system is a prefunded real-time gross settlement system in which banks continuously settle payments as they are made. In addition, Nets operates the national ATM switch and clears ATM transactions in the Sumclearing system. In addition to their role as a central infrastructure provider, Nets offers payment services directly to corporates and customers, including payment collection services, merchant card acquiring, and e-security services for the public sector.

The Danish central bank, Nationalbanken, owns and operates the Kronos system, which is both the RTGS system and the settlement system for all low-value clearings. Kronos is maintained by BEC, a Danish IT company that also operates a data center for Danish banks.

The low-value schemes are owned by the Danish Bankers Association. According to an industry insider, the provision of infrastructure is occasionally tendered. However, no other company has ever provided the infrastructure. The Danish banking community has historically cooperated on central infrastructure and may believe it would be too risky to change providers.

## Ownership in Danish payment systems



# Access and settlement arrangements

## Denmark

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### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	KRONOS	Via direct participant	No relationship to infrastructure	No relationship to infrastructure
LV Bulk	Sum & Interday	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure
LV Real-time	RealTime24/7	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure
ATM	Dankort	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure

Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Danish low-value clearings have a dual participant structure with both direct and indirect participants. All participants submit instructions directly to the clearings, however only direct participants hold a settlement account at the Nationalbanken. Indirect participants settle their payments via settlement accounts held by direct participant sponsors.
- There are 94 direct participants in Kronos. Most Danish banks are connected to Kronos to send and receive RTGS payments, and manage liquidity accounts for settling obligations in the low-value clearing systems. Indirect participants settle their obligations through a sponsoring bank. Most indirect participants are small local savings banks that use larger regional banks as their sponsors.
- As of 2014 the low-value bulk clearings have 51 direct and 43 indirect participants. In general, participation in low-value clearings and the real-time system is mandatory for participants in the two other clearing systems, but the Danish Bankers Association can grant exceptions from this requirement. Five small local banks currently do not participate in the real-time system, which has only 46 direct and 43 indirect participants.
- Dankort participants require a relationship with a data center as well as membership in Nets, the scheme operator for Dankort. Participation in the Nets ATM network requires a separate contract, and Nets charges for its services. Direct participation requires a settlement account at Nationalbanken. Indirect participants settle their payment obligations via direct participants. All participants have direct technical access. Indirect participants submit payment instructions directly to the clearings by connecting to data centers to submit payment instructions to Nets.

# High value & ATM

## System details

### Kronos

- Denmark's RTGS system, Kronos, is owned and operated by the central bank, Nationalbanken, which also sets scheme rules.
- Membership is open to registered financial institutions in Denmark.
- Most banks connect directly to Kronos, however some smaller banks are indirect participants accessing the system through larger regional sponsors.
- Banks connect to Kronos via SWIFT or a proprietary web interface.
- Nationalbanken charges participant fees to cover the costs for operating and further developing Kronos. Fees are posted on the Nationalbanken's website.
- Kronos was operational 99.7 % of the time in 2014.

### Dankort

- Nets operates the central ATM switch in Denmark.
- The ATM authorization system falls under the Dankort debit card scheme, which is owned and operated by Nets.
- Clearing and settlement occur in Sumclearing.
- Membership and access rules are the same as the other Nets clearings.
- Banks in Denmark (both direct and indirect) connect directly to the Nets infrastructure through data centers.
- The ATM system supports multiple cash related products.
- Settlement is prefunded, thereby removing settlement risk.
- Operational reliability of the Danish retail payment systems was high in 2014.



# Low-value bulk & low-value real-time

## System details

### Sumclearing and Intradagclearing

- Nets operates the two Danish low-value bulk schemes, Sumclearing and Intradagclearing.
- The Danish Bankers Association (DBA) sets the rules, makes all strategic decisions for both schemes, and admits new participants.
- All banks registered in Denmark can be admitted to the schemes.
- The Danish low-value schemes have a dual participant structure with both direct and indirect participation.
- Banks in Denmark (both direct and indirect) connect directly to the low-value bulk infrastructure through data centers.
- Nets offers different products in each of the clearing systems it operates for the DBA.
- Nets offers a basic service package that grants access to all their clearing services. They also offer value-added services like direct debit management.
- Technical returns for credit transfers must be made within 5 days. All direct debits can be returned within 7 days for technical reasons, and within 8 weeks for refunds.

### RealTime24/7

- RealTime24/7 is a credit transfer system processing credit transfers in real-time, 24/7/365.
- The system falls under the same ownership and governance structures as other Nets clearings.
- Membership and access rules are the same as the other Nets clearing. The system currently has 46 direct and 43 indirect participants (due to 5 banks being granted an exemption to the mandatory participation requirement).
- Connection to the system is done via data centers for all participants (direct and indirect).
- There are two overlay services using the system: Mobilepay and Swipp.
- Settlement is prefunded to avoid settlement risk.

# Payment systems taxonomy

## Denmark

90

### KRONOS

Scheme governance

Commercial

Central bank mandated

Community consensus

Infrastructure access for  
indirect participants

Via direct participant

Direct to infrastructure

Products

Bespoke bank services

Community services

Multiple products

Single product

### Sumclearing & Intradagclearing

Scheme governance

Commercial

Central bank mandated

Community consensus

Infrastructure access for  
indirect participants

Via direct participant

Direct to infrastructure

Products

Bespoke bank services

Community services

Multiple products

Single product

### RealTime24/7

Scheme governance

Commercial

Central bank mandated

Community consensus

Infrastructure access for  
indirect participants

Via direct participant

Direct to infrastructure

Products

Bespoke bank services

Community services

Multiple products

Single product

### Dankort

Scheme governance

Commercial

Central bank mandated

Community consensus

Infrastructure access for  
indirect participants

Via direct participant

Direct to infrastructure

Products

Bespoke bank services

Community services

Multiple products

Single product

# Japan

## Payment market overview

### Highlights

- The Bank of Japan (BOJ) operates the BOJ-NET FTS (BOJ-NET) system, which operates as a high-value RTGS system and as a settlement system for all interbank payment systems.
- The Zengin Data Telecommunication System (Zengin) processes all credit transfers in Japan. It is operated by the Japanese Banks' Payment Clearing Network (Zengin-Net), which is a subset of the Japanese Bankers Association. Zengin undergoes major hardware and software overhauls every 8 years.
- There are 9 ATM networks in Japan that are all connected by the MICS central switch.
- Japan does not have a low-value bulk payment system and does not have a system for processing interbank direct debits.
- NTT Data provides the central infrastructure for Zengin, BOJ-NET, and MICS.
- Use of ISO 20022 is optional in the Zengin system, and many banks still use the legacy standard.

### Recent evolution and drivers

Japan's payments market has remained stable but there are changes underway. The sixth generation Zengin system went online in 2011, and featured the implementation of ISO 20022 for payments messaging. The legacy data standard is still accepted and the Japanese government and the Bank of Japan are now weighing whether or not they would like to make the use of ISO 20022 mandatory in the future. Zengin is currently developing a new platform that will operate 24/7 by 2018 (alongside the legacy platform). The BOJ has also updated the BOJ-NET system to utilize ISO 20022, extend its operating hours, and implement liquidity-saving features.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	1,558.4
Direct debits	nap
ATM	263.0
High value	16.7
Cards (debit only)	11.4
Population	127.1
Bank concentration ratio (CR <sub>5</sub> )	57.7%

### Tendering & outsourcing

All 3 of the Japanese payments systems in scope outsource the provision of central infrastructure – and this outsourcing is contracted to NTT Data. Although the Zengin system officially tenders the provision of infrastructure every 8 years, NTT Data has won the contract every time. No information is available on the frequency or competition in contracting for BOJ-NET or MICS.

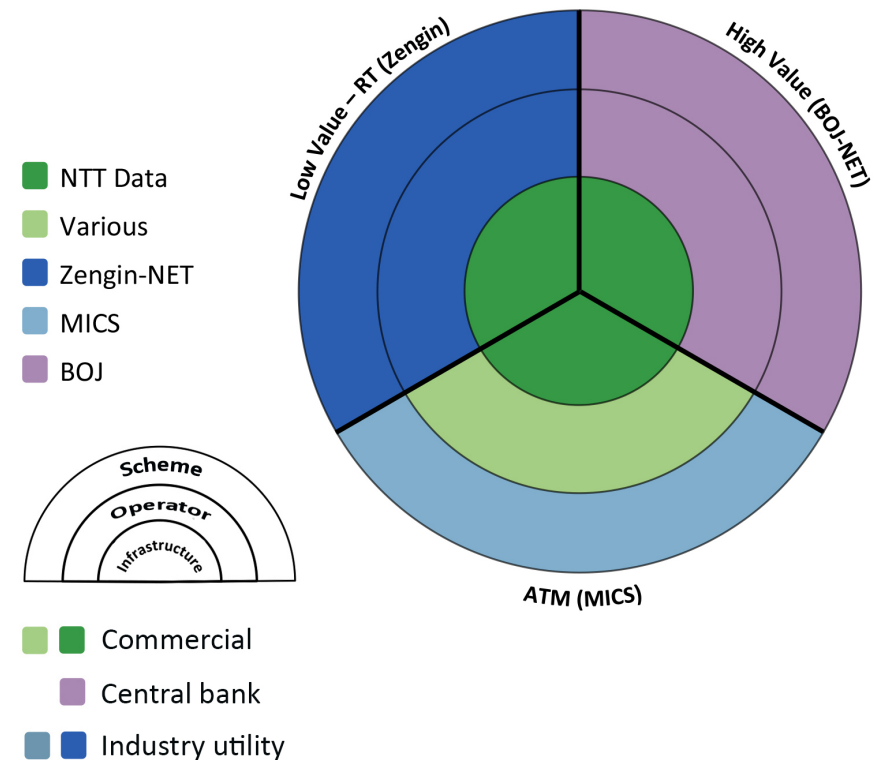
# Central infrastructure provision

## Japan

Japan's RTGS system, BOJ-NET, is owned and operated by the Bank of Japan, which also sets the rules for the system. It acts both as a high-value payment system and as a settlement system for low-value payments such as credit transfers and ATM transactions. Zengin is operated by the Japanese Banks' Payment Clearing Network (Zengin-Net), a subset of the Japanese Bankers Association. Zengin is a real-time low-value system for credit transfers. Japan does not have a bulk low-value ACH system. Japan has 9 separate ATM networks that are deployed by individual banks or groups of banks across the country. MICS is a common scheme for the central Integrated ATM Switching Service (IASS, a technical switch operated by NTT Data) and ensures interoperability and reach between all Japanese ATM networks.

The infrastructure for Zengin, BOJ-NET, and MICS is provided by NTT Data. The provision of infrastructure in the Zengin system is tendered every 8 years when upgrades occur. NTT Data has always won the bid due to the fact that it is seen as the most trusted and experienced infrastructure provider. The Bank of Japan also conducts tenders for BOJ-NET. While some of Japan's largest banks do own shares in NTT Data, they do not represent a controlling stake in the company. Regulators have not openly expressed concerns about competition in the operation of payment systems (Zengin, MICS) and the provision of infrastructure by NTT Data. The majority shareholder in NTT Data is NTT Corporation (54%). The Japanese Ministry of Finance is the largest shareholder in NTT Corporation (35%).

## Ownership in Japanese payment systems



# Access and settlement arrangements

## Japan

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	BOJ-NET	Via direct participant	No relationship to infrastructure	No relationship to infrastructure
LV Bulk	nap	No relationship to infrastructure	No relationship to infrastructure	No relationship to infrastructure
LV Real-time	Zengin	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure
ATM	MICS	Via direct participant	No relationship to infrastructure	No relationship to infrastructure

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Membership in BOJ-NET is open to all financial institutions in Japan. There are currently 474 participants in the BOJ-NET FTS system (with 538 total participants on the securities side). Participants include all major Japanese banks, foreign banks, Japanese cooperative banks, securities companies, and money market brokers. Some small Japanese banks settle indirectly via larger banks and thus do not hold settlement accounts at the BOJ.
- Access to Zengin is only open to authorized financial institutions. The system currently has 142 direct participants and approximately 1,200 indirect participants. Non-banks and corporates are not eligible to participate in the system. New participants must pay an admission fee and a percentage of the operating costs of running Zengin. All participants access the system directly.
- MICS acts as a central switch between nine different ATM networks. The total membership in these networks was 1,377 at the end of 2009. The nine networks connected by MICS only count banks as members. The nine separate networks connected by MICS are made up of groups of similar banks: city banks, regional banks, trust banks, credit banks, Shinkin banks (small cooperative banks), labor banks, and agricultural cooperative savings banks.

# High value & ATM

## System details

### BOJ-NET

- BOJ-NET is an RTGS system for all payments above JPY 100 million (approx. GBP 540,000). All transactions settled in the system are final and irrevocable.
- BOJ-NET is owned and operated by the Bank of Japan, which also sets the system rules.
- In October 2015, the new BOJ-NET went live. The updated platform includes the capability to process ISO 20022 messages, the ability to extend operating hours (expected to take place in February 2016), and liquidity saving features such as bi- and multilateral offsetting algorithms.
- The technical infrastructure for BOJ-NET is provided by NTT Data, with the Bank of Japan operating the system.
- Membership in BOJ-NET is open to all Japanese banks.
- BOJ-NET participants are charged a monthly fee as well as transaction fees to use the system.
- The Bank of Japan provides an intraday overdraft facility during BOJ-NET operating hours. All overdrafts are fully collateralized by participants.

### MICS

- Japan has 9 separate ATM networks developed by different groups of banks.
- MICS is a central switching scheme operated by the Japanese Bankers Association (as MICS secretariat) and owned by Japanese banks.
- The Integrated ATM Switching Service (IASS) was established to provide a technical switch for the MICS gateway. IASS is operated by NTT Data.
- NTT Data also provides the technical infrastructure for some of the larger individual ATM networks.
- Most ATMs provide cash withdrawal, balance inquiry, bank transfer, and bill payment services. There are no known additional overlay services.
- Pricing information is unknown, but presumed to be on a cost recovery basis.
- Security and resilience figures are not made public. Most ATMs do not operate 24/7.
- Liability, solvency, and dispute resolution procedures are not made public.

# Low-value real-time

## Zengin system details

### Zengin

- Zengin is a low-value real-time payment system owned and operated by the Japanese Banks' Payment Clearing Network (Zengin-net), a subsidiary of the Japanese Bankers Association, which sets the system rules.
- Zengin only processes credit transfers. There is no interbank system for direct debits in Japan.
- The technical infrastructure for Zengin is provided by NTT Data.
- The Zengin system undertakes major upgrades every 8 years. This includes re-tendering provision of infrastructure. NTT Data has always won the tendered bid.
- All participants access the Zengin system directly, although some participants settle indirectly at BOJ-NET.
- All Zengin members hold equal voting rights on the Zengin-net board.
- Zengin-net is currently planning on increasing the system's operating hours to 24/7 beginning in 2018.
- Payments are final and irrevocable once settlement occurs, at the latest on the first business day after initiation.
- Overlay services have not been developed for Zengin.
- Security and resilience figures are not made public.

# Payment systems taxonomy

## Japan

### BOJ-NET



### Zengin



### MICS





# New Zealand

## Payment market overview

### Highlights

- New Zealand has a centralized RTGS system and decentralized clearing systems for low-value bulk and ATM switching.
- Low-value bulk payments in the Bulk Electronic Clearing System (BECS) are cleared through a decentralized SWIFT-based system called SBI that settles each batch at the central bank before the interchange file is exchanged. SBI is owned and governed by Payments NZ, with infrastructure provided by SWIFT.
- The ESAS RTGS system is operated by the Reserve Bank of New Zealand, with business rules set by Payments NZ. Banks access ESAS via the High-Value Clearing System (HVCS).
- ATM switching is done via decentralized bilateral networks, with Payments NZ setting rules.

### Market data (2014, millions)

Credit transfers	505.3
Direct debits	150.8
ATM	98.7
High value	2.3
Cards	1405.7
Population	4.5
Bank concentration ratio (CR <sub>5</sub> )	94.1%

### Recent evolution and drivers

In 2010, Payments NZ was established as a scheme and rule making organization for the payments industry. In 2012, New Zealand's low-value bulk system BECS moved from a bilateral exchange with multilateral settlement, to a multilateral exchange with bilateral settlement. The system uses Settlement Before Interchange (SBI). In SBI, settlement is completed before the interchange file is released, eliminating settlement risk.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

The RBNZ payment and settlement systems, ESAS and NZClear (a securities settlement and depository system), require significant investment or replacement. RBNZ has decided to replace ESAS and to divest the NZClear business if another specialist operator can provide the necessary services. Datacom provides the technical infrastructure for ESAS.

# Central infrastructure provision

## New Zealand

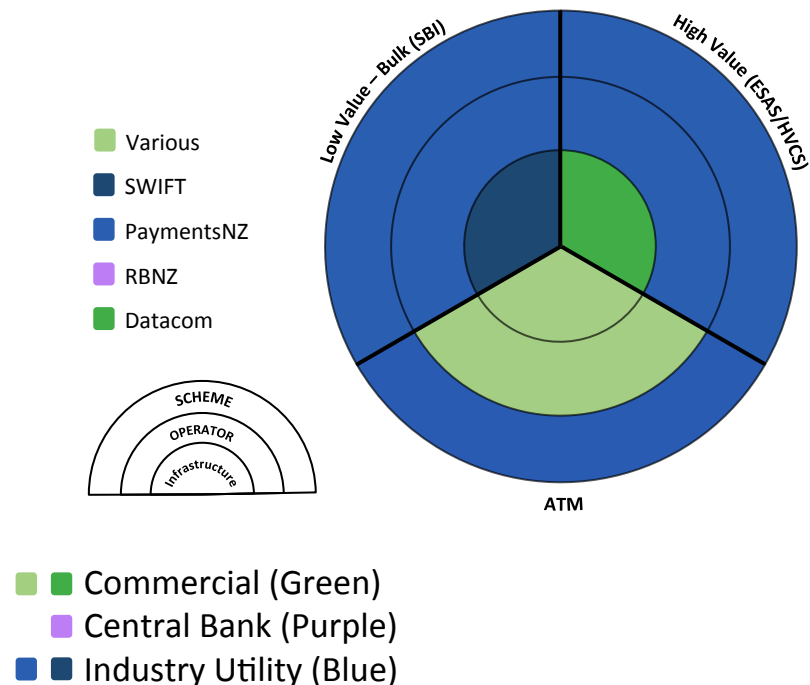
The New Zealand payments community operates a limited number of central infrastructures and depends mostly on bilateral agreements and bilateral exchange of payments. The Reserve Bank of New Zealand (RBNZ) oversees high-value payments. Payments NZ, which has 8 member banks, sets rules for ATMs, low and high-value payments, and owns SBI. SWIFT provides the technical messaging services and infrastructure for BECS and HVCS.

RBNZ and Payments NZ are the only entities governing payments in New Zealand.

RBNZ owns and operates the Exchange Settlement Account System (ESAS) and provides settlement for RTGS payments. The ESAS system is managed internally, with technical infrastructure currently outsourced to Datacom. There are three payment/ settlement systems that can access ESAS:

- HVCS (High Value Clearing System) known as AVP (Assured Value Payment) in New Zealand for RTGS payments
- BECS for bulk low-value payments
- NZClear, which processes security and equity settlements

## Ownership in New Zealand payment systems



# Access and settlement arrangements

## New Zealand

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### Technical access to payment systems

Type	Name	Indirect participants	Non-bank P2Ps	Corporates
High value	RITS	■	■	■
LV Bulk	BECS	■	■	■
LV Real-time	nap	■	■	■
ATM	Various	■	■	■

Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- There are 14 direct participants in HVCS. All HVCS participants must apply via Payments NZ for direct access to ESAS (Electronic Settlement Account System). While there are no non-bank members in ESAS, there is no policy to exclude them and there are requirements in place for non-bank organizations to join. The actual decision making authority for new participant access resides with three independent directors of Payments NZ.
- There are 8 direct and 10 indirect members in BECS. Direct members must apply to Payments NZ to join but indirect participants are not obliged to follow Payments NZ rules, as they do not settle or interchange with other participants. All compliance obligations and requirements are covered by their sponsor bank. The direct sponsor bank absorbs the indirect participant's volumes and settlement obligations into their own transaction volumes. This arrangement is not regulated by RBNZ, nor is it regulated by Payments NZ.
- There are 8 direct participants in the ATM network and an unknown number of indirect participants. There is no policy for access requirements for ATM operators in New Zealand. Access is bilaterally negotiated with the banks. An ATM transaction acquirer that wishes to settle directly with card issuers must join Payments NZ's Consumer Electronic Clearing System (CECS). Alternatively, they can acquire ATM transactions through an agency arrangement with an existing CECS Participant.

# High value & ATM

## System details

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### HVCS

- Payments NZ sets scheme rules for HVCS. RBNZ owns and operates ESAS.
- RBNZ has ultimate responsibility in terms of access, membership, and overall liability.
- RBNZ owns the closed user group AVP which makes up the members of HVCS.
- All HVCS participants must apply via Payments NZ for direct access to ESAS.
- All HVCS participants must connect via SWIFT.
- HVCS uses SWIFT messaging – mainly MT103, MT202, MT205.
- System costs for HVCS are not publically disclosed.
- There are no overlay services defined for HVCS.
- All participants are required to have two connections to SWIFT. ESAS has an alternative processing system in place in the event of an ESAS failure.

### ATM networks

- There is no central ATM switch or organization that runs the ATM network. Each participant is responsible for maintaining their respective links.
- ATM networks are connected via proprietary bilateral communication links that run between participating banks.
- Governance of ATMs falls under Payments NZ's Consumer Electronic Clearing System (CECS) Management Committee.
- Domestic ATM transactions are settled each business day via the BECS system.
- There is no common ATM ownership service or system.
- In order to be able to clear and settle ATM transactions, participants must join CECS and Payments NZ's ATM rules.
- ATM products and services are defined by individual operators.
- ATM pricing is not publically disclosed.
- There are no overlay services defined for ATMs.
- Payments NZ defines a rule set, but liability, dispute resolution procedures, and security measures are decided by individual operators.

# Low-value bulk

## BECS system details

### BECS

- The Bulk Electronic Clearing System (BECS) refers to the system used to exchange low-value bulk payment transactions, namely credit transfers and direct debits.
- Payments NZ is the rule-maker and owner of the BECS system.
- BECS uses the Settlement Before Interchange (SBI) model, which involves settling all transactions before payment files are exchanged between banks.
- SBI was launched in early 2012. SBI was an industry initiative, and was not a regulatory mandate (although it was supported by RBNZ).
- Proposed members must apply to Payments NZ to join BECS.
- Indirect participants are not obliged to follow Payments NZ rules because they do not technically access the system.
- All BECS participants must connect via SWIFT.
- Credit transfers and direct debits make up the majority of volume cleared in BECS.
- BECS pricing is not publically disclosed.
- There are no overlay services defined for BECS.
- Extensive procedures are stipulated in the case of insolvency or a major operational disruption.

# Payment systems taxonomy

## New Zealand

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### HVCS



### BECS



### ATM networks



### Highlights

- The Euro area has at least two infrastructures for each payment type within scope.
- Two systems, TARGET2 & EURO1, are in place for high-value payments. These are owned and operated by the Eurosystem of central banks and EBA Clearing, respectively.
- EBA Clearing also operates STEP2, a pan-European system for low-value bulk payments.
- The European payments council manages the schemes for SEPA low-value bulk payments. There are 22 clearing and settlement mechanisms (CSMs) that operate under these schemes.
- Change in payments at a European level is driven almost exclusively by regulation. Local developments, like changes in ownership, are often driven by commercial interest. Governance & regulation is mixed among pan-European, national, and local institutions.
- The EPC is currently working on a scheme for low-value real-time payments based on the SEPA Credit Transfer scheme.

### Recent evolution and drivers

TARGET2 and EURO1 are both pan-European high-value payment systems, while STEP2 is the only pan-European CSMs for low-value payments in Europe. All national and regional ACHs in SEPA (such as STET, ICBPI, Equens, etc.) are required to comply with SEPA standards for credit transfers and direct debits, but no clearing house other than STEP2 currently has pan-European reach. There is currently no real-time infrastructure for SEPA (pan-European or national), nor is there a SEPA ATM network. ATM systems are different for each SEPA country. ATM systems are different for each SEPA country.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	17,810.0
Direct debits	17,504.4
ATM	8,318.9
TARGET2	87.8
EURO1	57.6
Cards	26,942.6
STEP2 SCT	3,791.1
STEP2 SDD	5142.6
Population	336.5
Bank concentration ratio (CR <sub>5</sub> )	nav

Note: Payment volumes are for the Euro area. SEPA transactions outside the Euro area are negligible.

### Tendering & outsourcing

Neither TARGET2 nor EURO1 outsource infrastructure provision. STEP2 outsources its infrastructure to SIA. Other SEPA CSMs outsource individually, if at all.

# Central infrastructure overview

## SEPA

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### Central infrastructure provision

There is a clear separation between scheme (SEPA formats and standards) and the provision of clearing and settlement services in SEPA. There is a single scheme for low-value bulk payments that is run by the EPC.

There are multiple low-value clearing and settlement mechanisms (CSMs) in Europe. Originally these primarily served their domestic markets. With the implementation of the Single Euro Payments Area (SEPA) in August 2014, most of these CSMs migrated to SEPA schemes. Others introduced a new system (such as Belgium, which outsourced the provision of CEC's infrastructure to STET, a French CSM. Some national clearing and settlement systems closed and their traffic moved to STEP2, the only pan-European low-value bulk payment system.

The STEP2 system began operating in April 2003 and was developed as the first pan-European automated clearing house (PE-ACH) for bulk payments in euros, with a view toward enabling low-cost cross-border euro payments to be executed in compliance with Regulation (EC) No 2560/2001 on cross-border payments in euros. The STEP2 system migrated to SEPA standards and today handles SEPA credit transfers (SCT) and SEPA direct debits (SDD), as well as similar pan-European instruments such as SEPA Card Clearing (SCC).

### Governance

Oversight of large-value payment systems is based on the internationally accepted Core Principles for Systemically Important Payment Systems (SIPS), defined by the Committee on Payment and Settlement Systems (CPSS) and adopted by the ECB's Governing Council in 2013. SIPS should comply with the ten Core Principles, which are universal guidelines to encourage the design and operation of safer and more efficient infrastructures worldwide.

The ECB Regulation on Oversight Requirements for Systemically Important Payment Systems implements the CPSS (CPMI) – IOSCO Principles for Financial Market Infrastructures and applies to payment systems in the Euro area. On 21 August 2014, the ECB published the list of systems that fall under the SIPS Regulation on its website:

- STEP2
- TARGET2
- EURO1
- CORE (operated by STET)

No distinction is made for the application of the regulation between high-value and low-value payment systems. If a system is classified as a SIPS, it has to comply with the SIPS Regulation in its entirety.



# Access and settlement arrangements

## Pan-European high-value and low-value bulk systems

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	TARGET2	Via direct participant	No relationship to infrastructure	No relationship to infrastructure
High value	EURO1	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure
Low-value bulk	STEP2	Via direct participant	Via direct participant	Via direct participant

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Direct participants in TARGET2 hold their own RTGS accounts and have access to the Information and Control Module. All supervised credit institutions within the European Economic Area (EEA) can become direct participants. Indirect participants settle TARGET2 payments via direct participants. Only credit institutions with regulated branches in the EEA are allowed to become indirect participants.
- EURO1 rules distinguish between two types of participants, namely EURO1 participants and pre-fund participants. EURO1 participants must fulfill all admission criteria and participate in the system's loss-sharing arrangements. Pre-fund participants are not required to fulfil the financial admission criteria and can only have a positive position in the system. The pre-fund participant status in EURO1 is currently only available for sending and receiving payment messages for the purpose of settlement of certain STEP2 services. Central banks are eligible to be admitted as pre-fund participants.
- Indirect access in EURO1 (known as sub-participation) is made possible via EBA Clearing's STEP1 service, which is used by banks that do not meet the strict access requirements for EURO1. STEP1 enables banks to directly send and receive payments to/from all participants and sub-participants in the EURO1/STEP1 services. Payments sent and received by a sub-participant are included in the position of the parent bank and covered by the liquidity of the parent bank. Sub-participants have the same service features (cut-off times, MT usage, etc.) as their parent banks. Reaching all bank participants is facilitated by the EURO1/STEP1 Directory, which assists the originating banks in identifying the EURO1 and STEP1 banks through which the beneficiary banks can be reached.
- Technical access to STEP2 is only available to direct participant banks; indirect participants connect to the system via direct participants. STEP2 has also established interoperability with 14 other SEPA CSMs to enhance reachability throughout Europe.

# RTGS & high-value netting

## System details

### TARGET2

TARGET2 is the RTGS system owned and operated by the Eurosystem for processing high-value urgent Euro payments. Payments are processed on a continuous basis and settled with immediate finality. TARGET stands for Trans-European Automated Real-time Gross Settlement Express Transfer. TARGET2 is operated on a Single Shared Platform for payments to and from all participating countries. TARGET 2 was developed to meet three main objectives:

- Provide a safe and reliable mechanism for the settlement of euro payments on an RTGS basis
- Increase the efficiency of inter-member state payments within the Euro area
- Serve the monetary policy of the Eurosystem

TARGET2 is Europe's most important payment system for high-value payments and processes a daily average of around 360,000 payments with a total value of roughly EUR 2 trillion (GBP 1.4 trillion). About half of the payments in terms of volume and nearly one-third in terms of value are submitted via the Bundesbank, Germany's central bank.

### EURO1

EURO1 is a privately-run, pan-European, high-value payment system, owned and operated by EBA Clearing. The system settles same-day via a settlement account opened with the ECB in TARGET2. EURO1 is overseen by the ECB.

The system is typically used for high-value payments (both domestic and cross-border), and offers participants the functionality of an RTGS system with multilateral net settlement to provide an efficient use of liquidity. EURO1 is based on a legal structure that creates a Single Obligation Structure (SOS) among participants. This means that at any time on any given business day, each participant only has one single obligation/claim towards the system as a whole, which is automatically adjusted every time a new payment that is sent or received by this participant is duly processed. Payment messages that would breach these limits at the time they are sent are queued, which are revisited on a regular basis to allow for the processing of the queued payment messages.

To address potential gridlock situations, an algorithm allows the simultaneous booking of multiple payment messages from different participants.

# Low-value bulk

## STEP2 system details

STEP2 is a pan-European automated clearing house (PE-ACH) for retail payments in Euros, and is managed and operated by EBA Clearing. STEP2 is fully compliant with EPC scheme rulebooks and implementation guidelines.

The service dates back to 1999 when EBA Clearing decided to implement a retail payment system based on direct bank participation from all EU member states. The original STEP2 cross-border credit transfer (XCT) service was then migrated to SEPA formats and standards. Since 1 August 2014, SEPA credit transfers (SCT) and SEPA direct debits (SDD) have replaced credit transfers and direct debits in national formats in Euro area countries.

The technical infrastructure for STEP2 is provided by SIA, an Italian payments processor, which has provided the central infrastructure for STEP2 since the inception of the service. Precise contract lengths, terms, and pricing are not available to the public.

STEP2 SCT provides the following clearing and settlement cycle arrangements:

- Five intraday cycles: participants are free to send payments for settlement during any of these five cycles but must be ready to process incoming payments during each of them.
- The sending cut-off of the last settlement cycle in the day stands at 16:00 CET.

- Two optional night-time cycles: participation is on a closed user group basis, i.e. any bank wishing to send or receive payments during either or both of the optional cycles has to register separately for each optional cycle.
- Ability to request additional cycles: any community interested in additional cycles may enquire about their implementation in the STEP2 SCT service.

The STEP2 SEPA direct debit services settle in two separate cycles:

- SDD Core settlement takes place between 12:00 and 12:45 CET
- SDD B2B settlement takes place between 13:00 and 13:45 CET.

# Payment systems taxonomy

## Euro area

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### TARGET2



### EURO1



### STEP2



### Highlights

- The ownership and operation of Belgium's payment systems features high levels of market consolidation and privatization.
- As a Euro area country, Belgium shares its RTGS and low-value bulk payment systems with other Euro area countries. Accordingly, the Eurosystem controls TARGET2, EBA Clearing controls EURO1, and the EPC sets rules for low-value payments. Clearing and settlement for low-value payments is competitive.
- The National Bank of Belgium (NBB) and the Financial Services and Market Authority (FSMA) are in charge of general regulation and oversight of Belgium's payment systems.
- SEPA migration has played a major role in system evolution in Belgium, as has the integration of EU-level rules and regulations.
- The low-value bulk clearing system is owned and operated by CEC, which outsourced the operation of the technical infrastructure to STET in 2013.
- BCMC acts as the scheme manager for Belgium's ATM and POS market.

### Recent evolution and drivers

Clearing and settlement in Belgium has transitioned from being centralized within the NBB toward a more open model focused on conforming to SEPA regulations. Implementation of SEPA in Europe offered the Belgian banking community – and CEC in particular – the opportunity to achieve discounts by utilizing economies of scale by outsourcing the technical processing of its bulk low-value clearing operations to STET, a French company. The Belgian market for ATM and POS processing has also undergone considerable consolidation.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	1,366.4
Direct debits	529.5
ATM	360.5
High value	2.5
Cards	1,502.2
Population	11.2
Bank concentration ratio (CR <sub>5</sub> )	93.2%

### Tendering & outsourcing

Belgium's low-value bulk system, managed by CEC, was separated from the Belgian central bank and then its operations were outsourced to the French CSM, STET through a competitive tender in 2013. On the ATM side, BCMC, a private company, outsources infrastructure provision to Worldline (and SIX for its SEPA-switch).

# Central infrastructure provision

## Belgium

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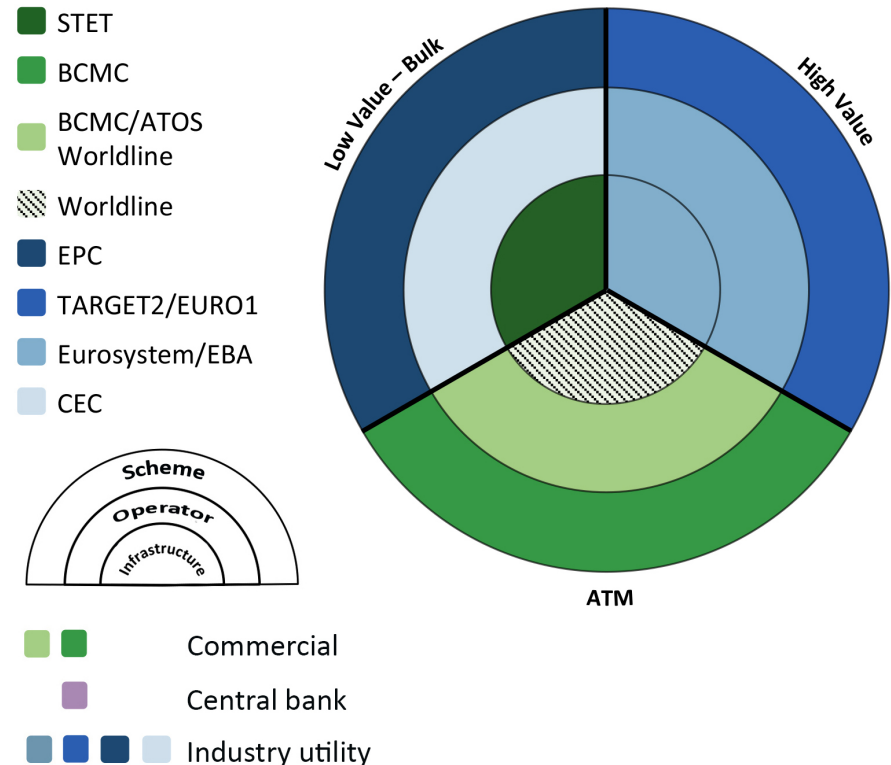
The migration to SEPA within Europe led the Belgian banking community to move operation of low-value payment systems out of the National Bank of Belgium (NBB). CEC, the low-value bulk system, became a non-profit association and outsourced technical processing to STET. Outsourcing CEC's technical infrastructure was based on the judgment that the original infrastructure could not handle the impending SEPA migration or accommodate the development of faster processing or complimentary value-added services.

High-value payments are offered by TARGET2 and EURO1, while settlement of low-value payment systems occurs in TARGET2.

Belgium's ATM infrastructure is less centralized, with Bancontact/Mister Cash (BCMC) acting as the central network and scheme operator, and Atos Worldline (Worldline) providing the technical infrastructure connecting the ATM/POS terminals to the network.

One driver of change in the ATM market has been Belgium's need to implement SEPA-compliant card payments. There had been a plan to move away from the BCMC scheme towards a new, SEPA-compliant scheme in the ATM/POS market. Turmoil in the wake of the financial crisis, however, has delayed such a move, which prompted BCMC to create its own SEPA-compliant scheme.

## Ownership in Belgium's payment systems



# Access and settlement arrangements

## Belgium

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
LV Bulk	CEC			
ATM	BCMC			

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Any potential PSP that meets CEC's technical requirements can be granted access to the system. There are two non-bank indirect members to the CEC system that submit files directly to the technical infrastructure: BCMC and Worldline. These two entities are the only indirect participants in CEC that actually submit files directly, with all other indirect participants submitting files via direct participants. Settlement is the same as with all other indirect members, with BCMC and Wordline settling indirectly in TARGET2 via a direct member bank.
- According to an industry insider, CEC is open to other non-bank PSPs having direct technical access as long as they have a sponsoring bank support them for the specific services they want to be included in.
- Corporates do not have direct submission in Belgium, but Isabel, a provider of corporate banking solutions in Belgium, allows corporates to initiate payments via a range of banks using a single network. Isabel is owned by 4 banks and has 25 member banks. Isabel also owns Zoomit, a free Internet banking service application.
- Any institution that wants to have access to BCMC has to sign an agreement and follow the rules that govern institutional accreditation. BCMC does not prohibit network access to non-bank payment service providers. In practice, only banks access the BCMC network. BCMC provides certificates for many different firms entering the market including issuers, acquirers, and a wide range of PSPs.

# Low-value bulk & ATM network

## CEC and BCMC system details

### CEC

- Low-value bulk clearing in Belgium takes place at CEC, with technical processing outsourced to STET. Final settlement occurs at TARGET2.
- CEC is a not-for-profit industry association and operates on a cost-recovery basis.
- Membership is open to both direct and indirect participants. Two indirect participants access the clearing system via direct submission.
- SWIFT FileAct is used to send messages to the STET platform.
- STET's CORE platform is believed to be flexible enough to provide for additional products and services should CEC's members decide they would like to develop them.
- STET also provides a data exchange service that could be used in the future to provide overlay services.
- CEC's bylaws do not contain liability, solvency, or dispute resolution policies. There are procedures in place to revoke a participant's status in the clearing system, if necessary.
- There is no evidence of any security issues affecting the CEC or STET system over the past few years.

### BCMC

- BCMC is the ATM scheme operator and functions as the central ATM network, with technical processing outsourced to Atos Worldline (Worldline). Worldline also operates an intra-processing switch for ATM transactions between two banks that have outsourced their ATM processing to Worldline.
- BCMC and Worldline are both for-profit private companies.
- ATMs in Belgium are regulated by the NBB and FSMA in the same way that other payment infrastructures are.
- Banks must be members of the BCMC scheme to access ATM switching services and must have a settlement account at TARGET2 (or settle indirectly) in order to access the system.
- Atos Worldline manages technical connections to the ATM network.
- Pricing for BCMC varies depending on volume.
- There are no overlay services in Belgium's ATM market.
- Liability, solvency, and dispute resolution issues in the ATM market are handled according to CEC rules.
- There have been several issues regarding the reliability of the ATM network in Belgium and the NBB and the Belgian Banker's Association (Febelfin) are discussing how to handle these issues.



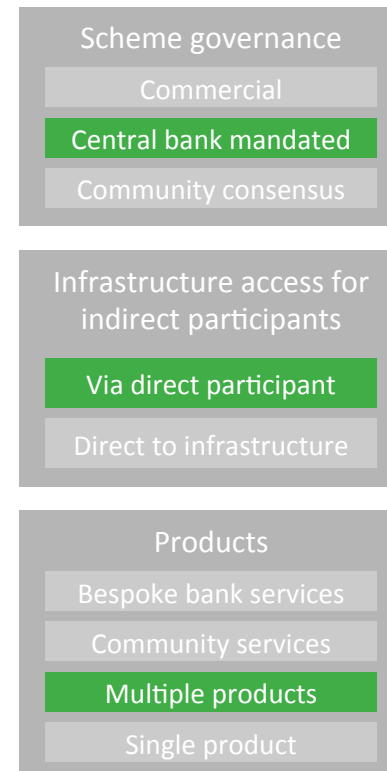
# Payment systems taxonomy

## Belgium

### CEC



### BCMC



# Germany

## Payment market overview

### Highlights

- Germany's national payment systems are decentralized.
- As a Euro area country, Germany shares its RTGS and low-value bulk payment systems with other Euro area countries. Accordingly, the Eurosystem controls TARGET2, EBA Clearing controls EURO1, and the EPC sets rules for low-value payments. Clearing and settlement for low-value payments is competitive.
- The majority of Germany's low-value payments are cleared and settled via EBA Clearing's STEP2 system. A minority are cleared via the Bundesbank's RPS SEPA Clearer and a few are cleared bilaterally.
- Germany's Deutsche Kreditwirtschaft, an industry association, sets rules for ATM switching, but there is no central infrastructure.

### Recent evolution and drivers

The primary driver of change in German payment systems in the past 5 years has been the migration to SEPA. The low-value bulk clearing schemes are managed by the European Payments Council. The ATM scheme is managed by Die Deutsche Kreditwirtschaft (DK), an umbrella association of banking associations. These schemes are implemented by multiple CSMs and switches. For both low-value payments and ATMs, practical requirements mean that new market entrants and non-banks must find a bank sponsor to join payment systems. Innovation in Germany occurs outside interbank payment schemes.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	5,923.6
Direct debits	8,666.9
ATM	2,897.8
High value	44.4 (2013)
Cards	3,335.4
Population	80.7
Bank concentration ratio (CR <sub>5</sub> )	78.1%

### Tendering & outsourcing

Due to the lack of central infrastructures, there is no significant tendering in the German payments market. Historically, captive outsourcers have provided processing services to the savings banks (Finanz Informatik) and cooperative banks (Equens).

# Germany's low-value payments market

## Provision overview

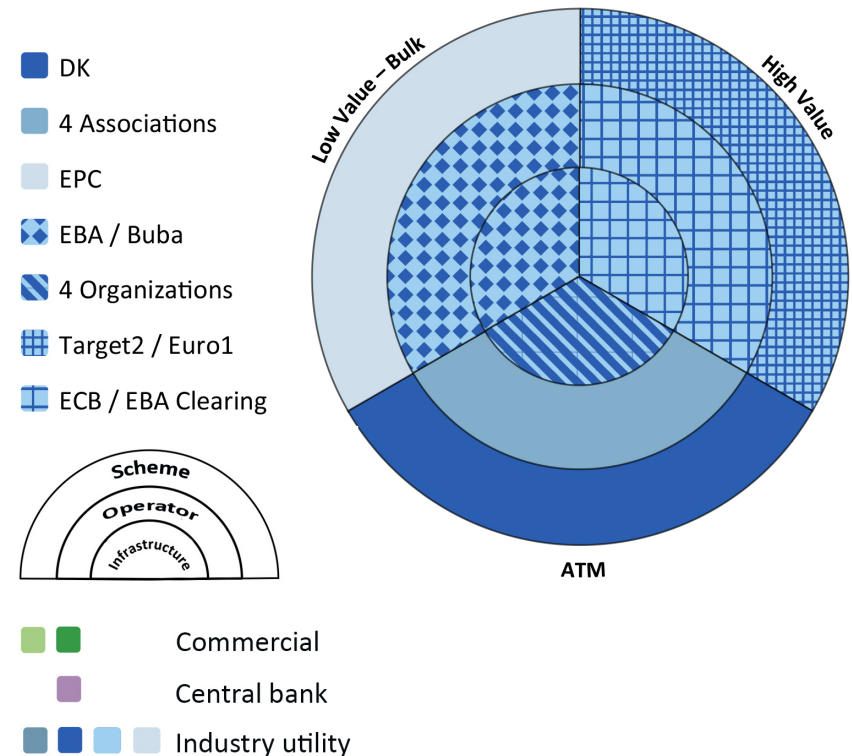
115

The market in Germany offers two widely used solutions for clearing and settling low-value payments. Seven large banks send and receive payments via EBA's clearing's STEP2 service. Most other banks send and receive via the Bundesbank's RPS SEPA Clearer. The two CSMs have an agreement with one another that allows sending financial institutions to reach any other financial institution through either CSM.

In the course of migrating to SEPA, seven of the largest clearing banks in Germany agreed to discontinue the bilateral links that they previously operated for domestic clearing schemes. Instead, they agreed to use STEP2. A market insider reports that the decision to clear through STEP2 was taken for strategic reasons – the large banks wanted the efficiency of a single solution for European payments, and did not want to connect to multiple infrastructures.

Prior to SEPA, approximately 85% of payment were cleared bilaterally, and about 15% through the Bundesbank's Retail Payment System. The service is generally used by smaller banks, and the Bundesbank sees part of its role in providing clearing and settlement services as allowing smaller banks access to the payments market. The 85% of payments that were previously cleared bilaterally have now largely migrated to STEP2, while the Bundesbank's share of volume has remained steady.

## Ownership in Germany's payment systems



# Access and settlement arrangements

## Germany

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
LV Bulk	STEP2	Via direct participant		
ATM	DK	Via direct participant	No relationship to infrastructure	No relationship to infrastructure

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Both direct and indirect participants can be members of the EPC scheme, non-banks may also join the schemes. Only direct participants can access the technical infrastructures in use in Germany.
- Indirect participants submit payments via direct participants. Technical access and settlement occur via direct participants. The data formats are rigorously standardized and have been for a long time in Germany. Indirect participants and corporate customers that use more the one bank often use the same software to prepare payment files.
- Corporate customers will often sort their own payment files and submit to multiple banks using the same standards. Banks are chosen based on price and speed.
- All banks in Germany are members of the girocard ATM and debit card scheme.
- Only banks that are members of the respective banking associations can access ATM networks directly. Non-banks that wish to connect to the networks must use a bank sponsor.
- The concept of indirect participation does not exist for ATMs in Germany. For banks that do not operate their own ATM processing infrastructure, comprehensive card processing and outsourcing services are available in the market for handling authorization and account management. These are commonly done by captive processors and are also available from the market on a commercial basis. All banks settle of their own accord using direct debits.

# Low-value bulk & ATM

## STEP2 and girocard system details

### Low-value bulk systems

- The SEPA schemes for low-value payments are managed by the EPC.
- The market in Germany offers two widely used solutions for clearing and settling low-value payments. EBA Clearing's STEP2 service and the Deutsche Bundesbank's RPS SEPA Clearer. Bilateral clearing is also used.
- Germany's national infrastructure is owned and operated by its central bank, Deutsche Bundesbank. It clears about 14% of SEPA payments originating from Germany.
- Indirect clearing and outsourcing of payment processing to captive processors in Germany is common, especially given the large number of small banks.
- Connectivity to CSMS is achieved via SWIFT and EBICS, an internet-based connectivity standard.
- Interbank products and services are standardized. Overlay services include ecommerce payments but these are not offered by all in the market.
- Liability and solvency matters are for individual CSMS. But all CSMS settle before outputting files to receiving banks to mitigate settlement risk. Dispute resolution, security, and resilience are matters for individual CSMS, but they are not differentiated.

### ATM systems

- The girocard ATM agreement of the Deutsche Kreditwirtschaft (DK) is a system of rules implemented by four independently owned and operated networks and switches.
- There is no central infrastructure. The four ATM networks are connected by bilateral links. Settlement is accomplished using direct debits.
- The four networks do not compete with each other in any meaningful way. All are operated as captives of the banking associations whose members they also serve.
- All banks in Germany are technically members of the scheme.
- Access to these networks is via the financial institutions that are their members.
- Indirect access to the technical infrastructure is common. Telecommunications connectivity is highly standardized as well.
- Products other than cash withdrawals and balance inquiries are developed by individual financial institutions and networks.
- Liability and solvency matters are handled by the low-value bulk clearings, because interbank ATM transactions are cleared as direct debits. Dispute resolution, security, and resilience are matters for individual ATM networks, but they are not differentiated.

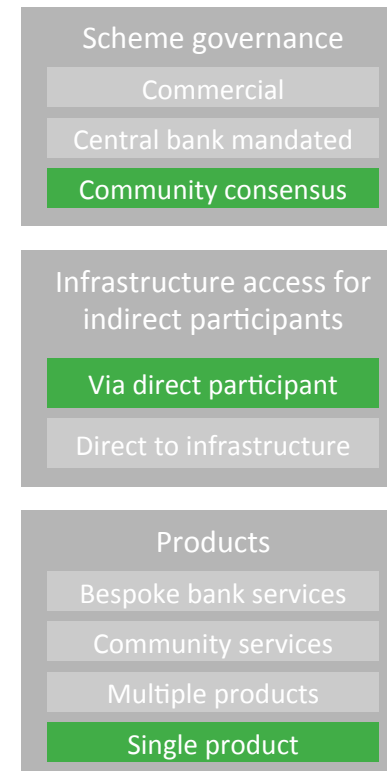
# Payment systems taxonomy

## Germany

### STEP2



### ATM



### Highlights

- Italy's payment system has both centralized and decentralized elements. Italy's central bank and the two domestic CSMs (ICBPI and SIA) play prominent roles in the payment system.
- As a Euro area country, Italy shares its RTGS and low-value bulk payment systems with other Euro area countries. Accordingly, the Eurosystem controls TARGET2, EBA Clearing controls EURO1, and the EPC sets rules for low-value payments. Clearing and settlement for low-value payments is competitive.
- Italy's low-value payments are netted via the BI-COMP system, a centralized netting system for EUR-denominated retail payments, operated by the Banca d'Italia. Settlement occurs in TARGET2.
- BI-COMP is divided into subsystems for paper and electronic clearing. These subsystems are made up of low-value clearings operated by ICBPI and SIA.
- Consorzio Bancomat owns the national ATM/POS scheme, setting rules and admitting participants.

### Recent evolution and drivers

The primary driver of change in Italian payment systems in the past 5 years has been the migration to SEPA. BI-COMP was made interoperable with other systems so that it could process cross-border SEPA CT and DD transactions. Some Italian banks have switched from their local ACH to STEP2, although the majority of SCT and SDD transactions still flow through the two domestic CSMs, ICBPI and SIA.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	1,347.2
Direct debits	624.3
ATM	952.7
High value	11.5
Cards	2,034.0
Population	60.4
Bank concentration ratio (CR <sub>5</sub> )	71.4%

### Tendering & outsourcing

The operation of Italy's national network (RNI), is outsourced to SIA. ICBPI outsources operation of its clearing house and data center to Equens S.p.A., the Italian subsidiary of Equens SE. EBA Clearing's STEP2 system has outsourced its technical processing to SIA.

# Italy's low-value payments market

## ICBPI & SIA overview

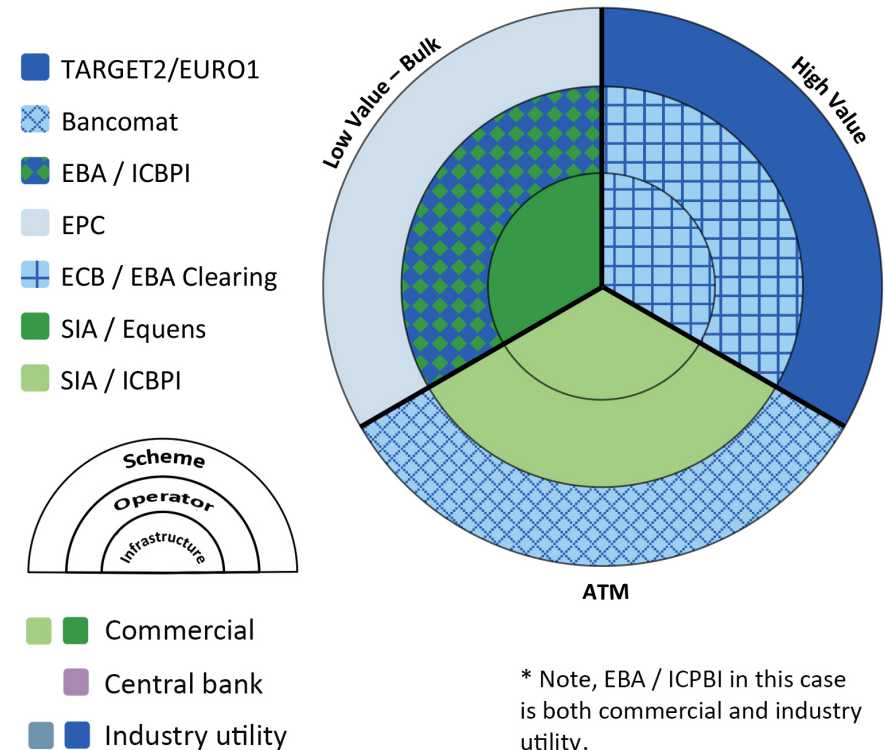
120

Both SIA and ICBPI provide technical infrastructure as well as operate application centers connecting participants to the retail clearings and processing payments. ICBPI has special relationships with the cooperative banks via ICCREA. ICCREA is the central institute for cooperative banks and together with ICBPI constitutes one CSM. Historically, ICBPI and SIA have competed for projects to build and operate infrastructure.

The SIA group manages key services for the domestic Italian and European financial system. SIA developed the national interbank network (RNI) for the exchange of information between financial institutions. Today SIA manages the RNI infrastructure which connects Banca d'Italia with banks and other financial institutions. SIA is also the technological service provider for the implementation and management of STEP2, the pan-European clearing house for low-value bulk payments.

The ICBPI group operates the other domestic clearing house in Italy. ICBPI specializes in payment products and services to domestic and international financial intermediaries. ICBPI and Equens established Equens Italia in 2008 as a 50/50 joint venture. As ICBPI's infrastructure provider, Equens plays a prominent role in Italian payments infrastructure provision. Equens operates ICBPI's clearing house and data center for communication with the National Interbank Network (RNI). In 2011, Equens Italia became a 100% subsidiary of Equens SE and the company has been renamed Equens S.p.A.

## Ownership in Italy's payment systems





# Access and settlement arrangements





## Italy

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### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
LV Bulk	ICBPI/SIA			
ATM	Bancomat			

#### Legend

-  Via direct participant
-  Direct to infrastructure
-  No relationship to infrastructure
-  Not yet known

### Access and settlement arrangements

- ICBPI and SIA have dual membership structures with both direct and indirect participants. Indirect participants, by definition, do not hold settlement accounts at the central bank and access the settlement system through a direct member sponsor bank. Indirect member banks are mostly small regional and local banks. These indirect members do not have the same access to services as direct members. This is due to technical limitations such as cut-off times. If the direct member has a cut-off time at 10:00, the indirect member needs to submit their data to the direct member earlier in order to give the direct member time to prepare its files in order to meet the cut-off time. Service level agreements are governed by bilateral agreements between the indirect and sponsor bank. Indirect participants cite the high fixed costs in respect to IT infrastructure as a barrier to becoming direct participants.
- Only direct participants access the technical infrastructure for the Bancomat ATM network. In theory financial intermediaries and other payments institutions are allowed to access the ATM networks, but no non-banks do.

# Low-value bulk & ATM

## ICBPI/SIA and Bancomat system details

### ICBPI/SIA

- The central bank owns, operates, and governs the BI-COMP netting system.
- There are two commercially operated and governed CSMs, ICBPI and SIA.
- ICBPI has outsourced the provision of its technical infrastructure to Equens. SIA is the infrastructure provider for EBA Clearing's STEP2 system.
- The Italian schemes follow EU & SEPA rules for payments including membership, access, liability, solvency, and dispute resolution.
- Indirect members access the clearings through direct member sponsors.
- Both ICBPI and SIA offer multiple clearing products and services.
- Pricing for ICBPI and SIA are competitive, BI-COMP is based on cost recovery.
- There are no overlay services for the system as a whole, both ICBPI and SIA are offering real-time P2P products that use SEPA CT for settlement.
- No significant events effecting security and resilience were recently reported.

### Bancomat

- Consorzio Bancomat is the owner of the ATM scheme and responsible for scheme governance.
- ATMs use the RNI network and ISO 8583 format for authorization requests.
- Application centers run by ICBPI/ICCREA and SIA process authorizations.
- Clearing and settlement for ATM transactions use the low-value bulk channels from ICBPI and SIA.
- Italian ATMs support multiple products including bill payment and mobile top-ups.
- Interchange fees are regulated by Bancomat in accordance with EU standards.
- No significant events effecting security and resilience have been recently reported.

# Payment systems taxonomy

## Italy

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### ICBPI/SIA

Scheme governance

Commercial

Central bank mandated

Community consensus

Infrastructure access for  
indirect participants

Via direct participant

Direct to infrastructure

Products

Bespoke bank services

Community services

Multiple products

Single product

### Bancomat

Scheme governance

Commercial

Central bank mandated

Community consensus

Infrastructure access for  
indirect participants

Via direct participant

Direct to infrastructure

Products

Bespoke bank services

Community services

Multiple products

Single product

### Highlights

- Three local banks dominate in Singapore's consolidated banking market: DBS Bank, OCBC Bank, and UOB.
- The Monetary Authority of Singapore (MAS) oversees all payment systems recognized as Systemically Important Payments System (SIPS). This includes bulk low-value, RTGS, and real-time systems.
- The Singapore Clearing House Association (SCHA), chaired by MAS, operates the FAST and Interbank GIRO systems, while MAS operates the MEPS+ RTGS system.
- Banking Computer Services Pte Ltd (BCS) provides the technical infrastructure for IBG and FAST systems. BCS is a privately-owned company.
- VocaLink provided a platform to BCS for the FAST system.

### Market data (2014, millions)

Credit transfers	40.6
Direct debits	57.2
ATM	229.4
High value	5.2
Cards	581.0
Population	5.4
Bank concentration ratio (CR <sub>5</sub> )	97.9%

### Recent evolution and drivers

Payment systems in Singapore have undergone major developments in recent years, most notably the introduction of the FAST real-time system, which went live in 2014 and currently has 19 members. There have been no major developments in the IBG system or the various ATM networks over the past 5 years. The RTGS system operated by MAS underwent a significant overhaul in 2006. MAS is exploring uses for alternative electronic payments and payment providers and established the FinTech & Innovation Group to set policy and respond to market developments in the FinTech sector.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

The provision of infrastructure for Singapore's low-value bulk system, Interbank GIRO, and the low-value real-time system, FAST, are both outsourced, though not tendered. BCS has the contract for both of these systems, and VocaLink provided the real-time platform for the FAST system.

# Central infrastructure provision

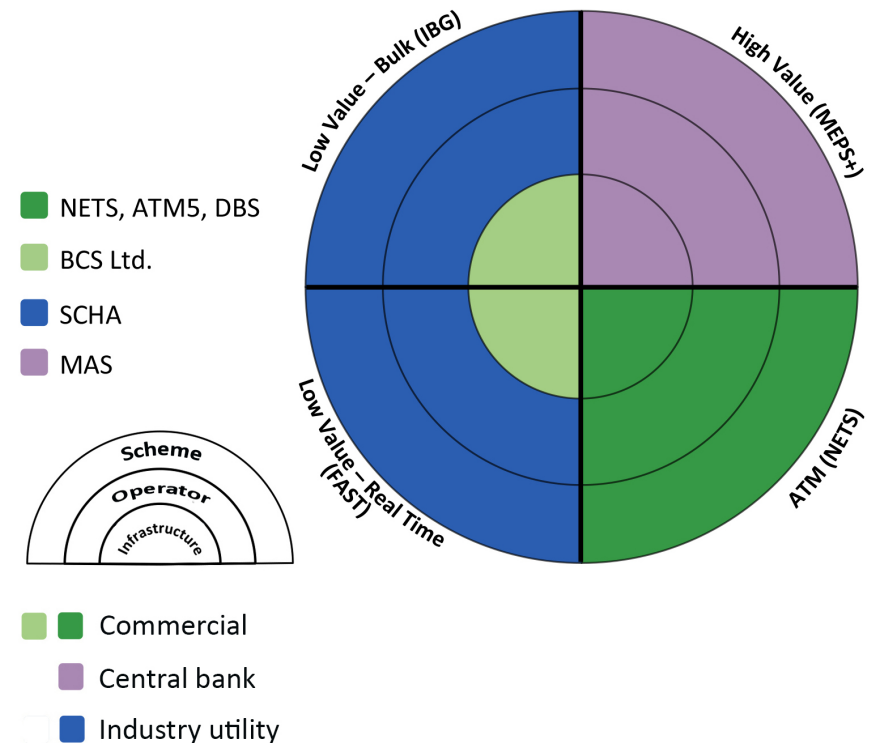
## Singapore

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Singapore's RTGS system, MEPS+, is owned and operated by the Monetary Authority of Singapore (MAS), and functions as a system for high-value interbank transfers as well as the settlement system for most low-value payment systems. The Singapore Clearing House Association (SCHA) provides clearing services for the low-value bulk system, Interbank GIRO (IBG), which settles in MEPS+. SCHA also oversees the Fast and Secure Transfers (FAST) real-time payment system, which went live in March 2014. Participation in FAST is voluntary and currently has 19 bank members. The technical infrastructure for both IBG and FAST is provided by Banking Computer Services Pte Ltd (BCS), which is a privately-owned payments processor.

Singapore lacks a centralized ATM infrastructure; instead, there are three main ATM networks in Singapore: the NETS network (used by OCBC and UOB), the DBS-POSB network, and the ATM<sup>5</sup> network (used by 7 foreign banks). The provision of infrastructure in each of these networks varies. NETS provides the technical infrastructure for its ATM and EFTPOS networks, while ATM<sup>5</sup> is operated by MasterCard. The DBS-POSB network is a proprietary ATM network originally developed by the Post Office Savings Bank (POSB), which was acquired by DBS Bank in 1998. DBS Bank was one of the founding members of NETS, and still uses it for POS transactions.

## Ownership in Singapore's payment systems



# Access and settlement arrangements

## Singapore

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	MEPS+			
LV Bulk	IBG			
LV Real-time	FAST			
ATM	Various			

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- MEPS+ currently has 63 direct participants and 77 indirect participants. Indirect participants clear and settle transactions in MEPS+ via a direct member agent. All local banks in Singapore are direct participants, along with a number of foreign banks, whereas indirect participants are all foreign banks. Indirect participants are not required to hold a current account at MAS. The agreement by which an indirect participant accesses the system is agreed to on a bilateral basis with the settlement agent, with MAS providing limited service, allowing the indirect participant to transfer funds from their current account with MAS.
- Access to IBG is open to all authorized banks in Singapore. In 2001, IBG developed eGIRO, a browser-based system. eGIRO capabilities were updated in 2008, forming eGIRO+, which enabled full STP of SCHA files.
- Access to FAST is only open to registered banks in Singapore. Of the 121 full members in the Association of Banks in Singapore (ABS), only 19 are currently using the system, which began with 8 participants in March 2014. According to one industry insider, increase in membership has been steady since the system's launch as more banks see the benefits to end users that real-time payments can bring. There are no plans to make FAST mandatory for all Singapore banks.
- Access to ATM networks is currently limited to direct banks. Smaller banks or non-banks could theoretically join an ATM network and settle via a bank that holds a settlement account at MAS, but there is no evidence of any such entity accessing any ATM network currently. Banks access ATM networks in accordance with technical requirements and scheme rules of NETS or ATM<sup>5</sup>. All DBS ATMs are connected to the bank's proprietary network.

# High value & ATM

## System details

### MEPS+

- MEPS+ is owned and operated by the Monetary Authority of Singapore (MAS).
- MEPS+ processes and settles high-value payments and acts as the settlement system for low-value payment systems. Transactions are irrevocable immediately following settlement.
- Settlement accounts are held at MAS.
- MEPS+ is designated as a systemically important payment system under the Payment Systems Oversight Act.
- MEPS+ has both direct and indirect participants. Indirect members access the system and settle via a direct member bank.
- MEPS+ is fully based on SWIFT standards.
- MAS regularly tests MEPS+ to protect against operational risks and uses processes such as two-factor authentication and one-time passwords to enhance security.

### ATM networks

- The ATM market is highly decentralized, with three main ATM networks that are not interoperable.
- MAS oversees ATM networks but is not an active regulator.
- 2 of the 3 main ATM networks are bank-owned, with the third being wholly owned by MasterCard.
- Membership in ATM networks is only open to banks.
- ATM pricing is set on a cost-plus basis.
- NETS is also used for POS transactions and covers 70% of POS transactions in Singapore.
- Common ATM services include cash withdrawals, balance inquiries, and bank transfers. There are no additional overlay services offered.
- Liability and solvency requirements differ by network. Dispute resolution procedures for NETS is the same as those for IBG.
- Security and resilience figures are not made public.

# Low-value bulk & low-value real-time

## System details

### IBG

- Interbank GIRO (IBG) is a bulk low-value clearing system that processes credit transfers and direct debits. Payments are settled once daily and are posted on a D+3 basis.
- IBG is overseen and operated by the Singapore Clearing House Association (SCHA), which is chaired by MAS. Membership is open to all authorized banks in Singapore.
- The technical infrastructure for IBG has been outsourced to BCS.
- IBG has a direct and indirect access model. Indirect participants settle transactions via direct members.
- IBG is designated as a systemically important payment system under the Payment Systems Oversight Act.
- Many banks use BCSIS software to connect to IBG, specifically the IS Bulk Payment product.
- Participants who cannot meet their settlement obligations for IBG can be suspended from the system by MAS.
- Information on pricing, overlay services, and security are not made public.

### FAST

- FAST is a real-time low-value payment system that typically posts transactions within seconds. Settlement occurs twice daily at MEPS+.
- FAST is operated by the Singapore Clearing House Association, which has outsourced infrastructure provision to Banking Computer Services Ltd (BCS).
- MAS instigated the development of FAST, with a group of 8 commercial banks collaborating on use cases, business requirements, and functional specifications.
- Participation in FAST is voluntary. Current membership includes 19 banks.
- FAST uses ISO 20022 for messaging.
- Connectivity solutions are provided by BCSIS.
- FAST is designated as a systemically important payment system under the Payment Systems Oversight Act.
- The development of overlay services using the FAST infrastructure has not become widespread.
- Participant banks pay a transaction fee that is billed on a monthly basis. End users are priced at different rates. Consumers typically do not pay a fee for FAST transactions, while corporates are charged differently by each bank, with fees not exceeding SGD 10 (GBP 4.72).



# Payment systems taxonomy

## Singapore

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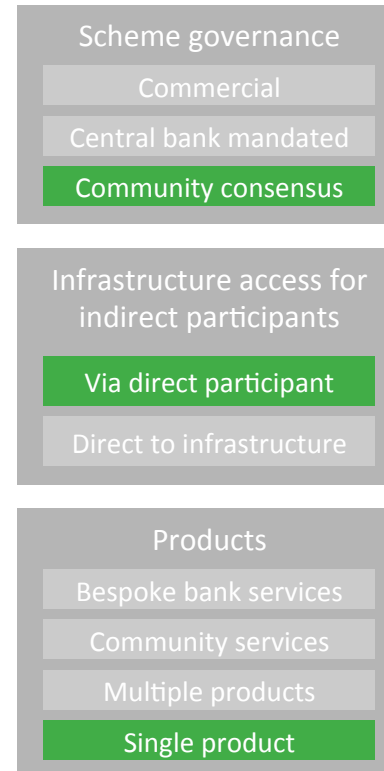
### MEPS+



### IBG



### FAST



### ATM networks



### Highlights

- The ownership and operation of Sweden's payment systems are highly centralized.
- Sweden has individual infrastructures for each of its various payment systems, although Bankgirot plays a major role in several of them.
- Payment systems in Sweden are regulated by the Swedish Financial Supervisory Authority along with the Swedish central bank, the Riksbank.
- Bankgirot operates three national payment schemes for clearing low-value bulk (2 schemes) and real-time payments in Sweden. It also facilitates settlement for Bankomat.
- Bankomat owns and operates the main ATM network, connecting and switching transactions between participants. Several smaller networks operate non-bank owned ATMs.

### Market data (2014, millions)

Credit transfers	957.0
Direct debits	323.0
ATM	216.0
High value	4.1
Cards	2,619.9
Population	9.69
Bank concentration ratio (CR <sub>5</sub> )	94.0%

### Recent evolution and drivers

Swedish payments have undergone major changes in the last 5 years due to the development of the low-value real-time system BiR/PRT. This system, which was commercially developed by Bankgirot at the behest of bank members, has enabled a variety of payment advancements, including a mobile payment application for P2P transactions called SWISH, the reduction of legacy payment flows in the low-value bulk system, and the current development of mobile-based C2B and B2B transactions.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

Bankgirot outsources part of its processing and development to VocaLink. The outsourcing of the Riksbank's IT software was awarded by public tender to Evry AB and a later project to Perago.

# Central infrastructure provision

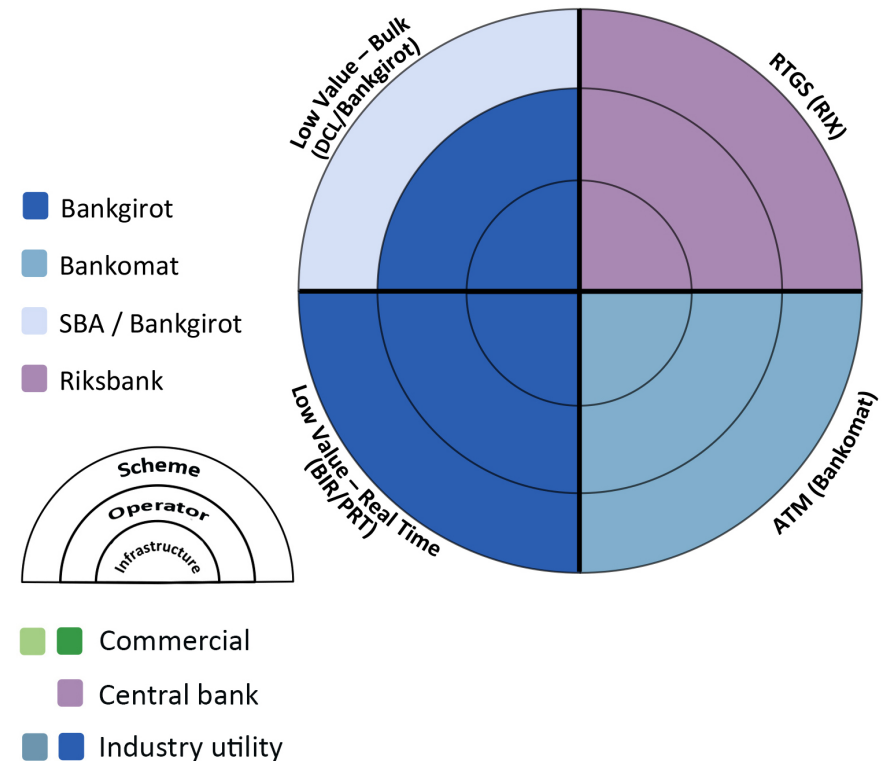
## Sweden

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The Swedish payments community operates several central infrastructures, each focusing on a different payment type, and each with its own governance and ownership structure. The overlap among controlling organizations is high. Sweden's RTGS infrastructure is owned and operated by the Riksbank, Sweden's central bank. It provides settlement for RTGS payments and sets rules for those transactions. For low-value payments, Bankgirot (Bg), which is owned by 7 banks, sets scheme rules and provides the technical infrastructure for payment clearing and settlement. The ATM network, Bankomat, is also owned by the largest 5 banks in Sweden and is a separate entity from Bankgirot. Bankomat is both the technical operator and the scheme owner of the ATM network.

A number of projects to update the Bankgirot systems have recently been completed; most prominently, a new real-time system was added. This system, BiR/PRT, tendered the development of the mobile system called Swish. Sweden's RTGS system recently underwent renovation. The Riksbank completed three major projects in response to a network disturbance that occurred in May 2013.

## Ownership in Sweden's payment systems



# Access and settlement arrangements

## Sweden

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	RIX	Via direct participant	No relationship to infrastructure	No relationship to infrastructure
LV Bulk	DCL	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure
LV Real-time	BiR/PRT	Direct to infrastructure	No relationship to infrastructure	No relationship to infrastructure
ATM	Bankomat	Via direct participant	No relationship to infrastructure	No relationship to infrastructure

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- Only direct participants have a legal relationship with the Riksbank pertaining to the RIX scheme. Indirect participants have no relationship with the RIX scheme, instead they form bilateral relationships with sponsor banks.
- There are three categories of Bankgirot participants that can access the clearing directly: direct participants, indirect (banks), and corporations. Indirect participants have direct technical access to the payment system infrastructure, submitting payment instructions directly to Bankgirot. All categories of participants directly access Bankgirot's low-value bulk clearing system, but only direct participants can directly access the settlement system. To be a direct participant in the settlement system, members are required to hold a settlement account with the central bank. Indirect participants without Riksbank accounts access the settlement system via direct participants.
- There are currently 9 direct members and 1 indirect member in the BiR/PRT real-time system. Though not a policy, all 10 participants are banks. All participants, both indirect and direct, can submit payment instructions directly to the real-time clearing system. Settlement of indirect participants is accomplished through a sponsoring direct member's account at the Riksbank. All settlement in the BiR/PRT system is prefunded, direct members allocate a portion of their prefunded collateral for the settlement of indirect member obligations.
- Access to the Bankomat ATM network is limited to its member banks. All Bankomat member banks must access the switch using connectivity services provided by a single company, Evry. Other banks and non-banks can access other networks (e.g., Visa or MasterCard) based on their scheme access requirements.

# High value & ATM

## System details

### RIX

- RIX is the real-time gross settlement (RTGS) system in Sweden owned and operated by Sweden's central bank, the Riksbank.
- All payments above SEK 500,000 (approx. GBP 39,000) are processed in RIX.
- Settlement is affected immediately on a transaction-by-transaction basis.
- Funds are transferred electronically between settlement accounts held at the Riksbank.
- Membership is limited to Swedish banks, regulated financial institutions, clearing organizations, and the national debt office.
- Only direct members access the system using SWIFT or a proprietary network. Indirect members access via direct members.
- The RIX system supports credit transfers and has no overlay services.
- Pricing encompasses an annual fee, per transaction fees, and separate fees to SWIFT.
- In its 2013 risk assessment, the Riksbank reported that there were three disruptions affecting the formal availability of the RIX system in 2013, the most serious of which meant that RIX did not function for 360 minutes.

### ATM networks

- There are multiple ATM networks in Sweden, the largest is operated by Bankomat.
- Bankomat sets its own scheme rules and operates a switch.
- Bankomat ATM transactions are cleared and settled once a day through Bankgirot.
- Bankomat is owned and governed by the large Swedish banks.
- Bankomat supports cash related products, e.g. withdrawals and deposits, and account information.
- No overlay services are available in the system.
- Bankomat sets pricing for interchange and membership fees.
- No recent events affecting security and resilience of the ATM system have been reported.

# Low-value bulk & low-value real-time

## System details

### Bankgirot/DCL

- There are two low-value bulk clearing systems in Sweden, Bankgirot and DCL.
- The SBA sets the rules for DCL; Bankgirot for the Bankgirot clearing. Bankgirot is a private company owned by the 7 largest banks in Sweden.
- Bankgirot operates both systems, with settlement occurring at the Riksbank.
- Membership is open to regulated banks, financial institutions, and non-bank PSPs in Sweden.
- Indirect participants submit payment instructions directly to the clearings.
- Financial institutions connect to Bankgirot using a variety of SWIFT services.
- Both DCL and Bankgirot support multiple products. No overlay services are currently offered.
- In 2014, availability in the Bankgirot system was 99.8%.

### BiR/PRT

- BiR/PRT is a real-time credit transfer system owned and operated by Bankgirot.
- BiR/PRT processes continually on a 24/7 basis.
- The Swedish BiR/PRT infrastructure uses 2-layer architecture. Bankgirot BiR/PRT is the interbank infrastructure. The first commercial application accessing the real-time system, Swish, is a P2P mobile platform developed as a collaboration between Swedish banks.
- 10 banks, 9 direct and 1 indirect, are currently participating in BiR/PRT.
- Indirect participants submit payment instructions directly to the clearing system.
- Currently one overlay service, Swish, a mobile P2P application uses the system.
- Settlement is prefunded and occurs in real time, thereby eliminating settlement risk.
- Availability in the Bankgirot system was 99.8% in 2014.

# Payment systems taxonomy

## Sweden

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### RIX

Scheme governance
Commercial
Central bank mandated
Community consensus

Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure

Products
Bespoke bank services
Community services
Multiple products
Single product

### DCL

Scheme governance
Commercial
Central bank mandated
Community consensus

Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure

Products
Bespoke bank services
Community services
Multiple products
Single product

### BiR/PRT

Scheme governance
Commercial
Central bank mandated
Community consensus

Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure

Products
Bespoke bank services
Community services
Multiple products
Single product

### Bankomat

Scheme governance
Commercial
Central bank mandated
Community consensus

Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure

Products
Bespoke bank services
Community services
Multiple products
Single product

# United Kingdom

## Payment market overview

### Highlights

- The UK's payment system infrastructure is centralized and includes unique features.
- Member-owned scheme companies (or scheme companies limited by guarantee), with greatly overlapping ownership, set rules for the clearing and switching of transactions
- Vocalink provides the technical infrastructure for Bacs, Faster Payments, and LINK. The Bank of England operates the infrastructure for CHAPS.
- Indirect participants can access the technical infrastructure for Bacs and LINK directly. Plans are in place for allowing this for Faster Payments as well. CHAPS requires access via a direct participant.
- Direct membership in Bacs, Faster Payments, and CHAPS is only open to banks and building societies. Membership in the LINK scheme is also open to non-banks. Participants in all 4 systems must either hold a settlement account at the BOE or settle via a direct member.
- HM Treasury has designated 8 systems to be regulated by the Payment Systems Regulator (PSR), including all 4 systems examined in this report.

### Market data (2014, millions)

Credit transfers	3,270.1
Direct debits	3672.0
ATM	2,830.0
High value	36.5
Cards	13,010.0
Population	64.5
Bank concentration ratio (CR <sub>5</sub> )	76.7%

### Recent evolution and drivers

The past decade has seen major changes in payment system development (with the introduction of the Faster Payments system), the regulatory regime for payment systems, payment service providers, and payment system participants (establishment of FCA, PRA, and PSR), settlement (move to pre-funded settlement for Bacs and Faster Payments), and value-added services (Current Account Switch Service, Paym, and Zapp, which has yet to go live). Changes to UK payment systems have come from a mix of regulatory mandate and commercial interest.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Tendering & outsourcing

There are significant instances of outsourcing and tendering in 3 of the 4 UK's payments systems in scope for this study. Vocalink provides the infrastructure for Bacs, Faster Payments, and LINK. The contract for Faster Payments was tendered, while Bacs was not. Vocalink also owns the LINK scheme.



# Central infrastructure provision

## United Kingdom

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The UK has separate scheme companies for each of its major payment systems. Each of the scheme companies are supported financially by their respective members.

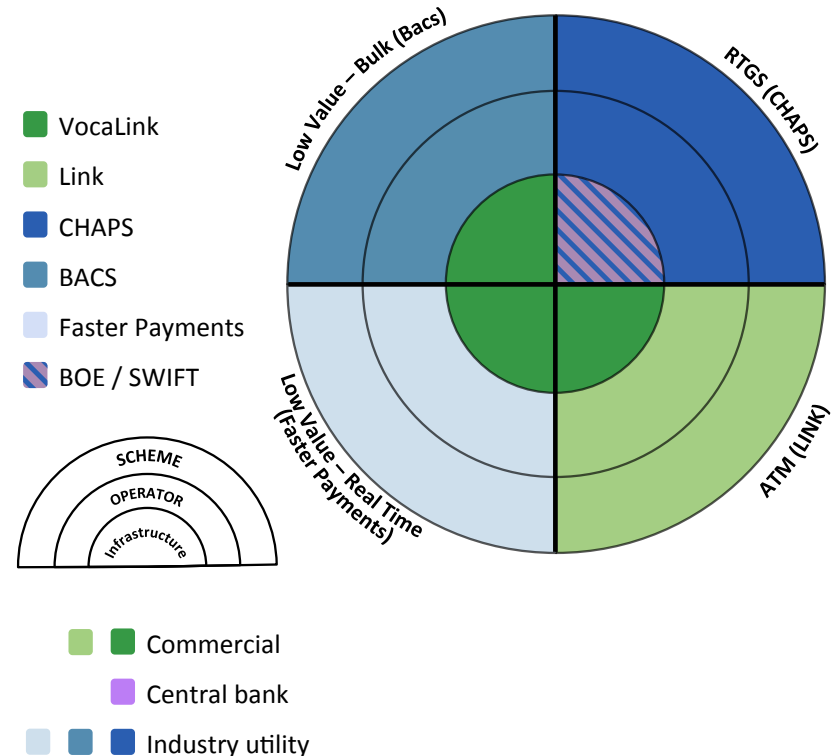
In the case of the LINK ATM network, VocaLink owns the scheme company and provides the infrastructure.

While CHAPS Co sets the rules for the RTGS system, the technical infrastructure is operated by the Bank of England. Payment instructions are sent and received via SWIFT.

Bacs Payment Schemes Limited (BPSL) and Faster Payments Scheme Limited (FPSL) set rules for low-value bulk clearing and low-value real-time clearing respectively. Both schemes have a single contract on behalf of all scheme members for a central infrastructure.

There are no regular tenders for provision of services to BPSL and the contract has no precise expiry date. For FPSL, the previous contract was tendered by Chaps Co and then novated to the new FPSL entity. VocaLink is the only company that has ever provided the central infrastructure for both schemes.

## Ownership in UK payment systems



# Access and settlement arrangements

## United Kingdom

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank PSPs	Corporates
High value	CHAPS	Via direct participant	No relationship to infrastructure	No relationship to infrastructure
LV Bulk	Bacs	Direct to infrastructure	Direct to infrastructure	Direct to infrastructure
LV Real-time	Faster Payments	Direct to infrastructure	Direct to infrastructure	Direct to infrastructure
ATM	LINK	Direct to infrastructure	Direct to infrastructure	No relationship to infrastructure

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- There are currently 22 direct participants in CHAPS. Indirect participants use a CHAPS direct participant to send and receive CHAPS payments on their behalf. According to CHAPS, about a quarter of the volume of payments to indirect participants are the UK domestic leg of correspondent banking payments from financial institutions overseas. There are currently over 5,000 indirect participants in CHAPS. Indirect participants have a contractual arrangement with a direct participant and they do not communicate directly with CHAPS Co about normal day-to-day business.
- All participants in Bacs, whether direct or indirect, have access to the technical infrastructure operated by VocaLink. The chief difference is whether they settle on their own behalf (direct members) or whether they settle via a direct member (indirect or agency bank).
- Under its new access model, Faster Payments allows two types of indirect members: Direct Agency, which allows direct connection to the infrastructure, and Indirect Agency, which does not. Both types rely on a direct member for settlement.
- All members of the LINK scheme connect directly to the technical infrastructure, regardless of their settlement arrangements or regulatory classification.

# High value & ATM

## System details

### CHAPS

- CHAPS is owned by CHAPS Clearing Company Limited (CHAPS Co). The Bank of England's Market Services Division is responsible for technical operation of the RTGS system.
- As a recognized payment system, CHAPS is overseen by the Bank of England.
- Access to the CHAPS Scheme as a direct participant is limited to financial institutions. Indirect participants use a CHAPS direct participant to send and receive CHAPS payments on their behalf.
- CHAPS offers a single product: same-day, secure, and guaranteed credit transfers that cater to both consumers and corporates.
- Disputed transactions are not possible within CHAPS. All transactions are final and irrevocable once settled.
- CHAPS is considered a systemically important payment system and follows the guidelines issued by BIS-IOSCO.
- CHAPS and the BOE RTGS report 100% up time for the years 2010-2013. There was a (significant) outage in the BOE's RTGS system on 20 October 2014.

### LINK

- The LINK network is a centralized switch that connects nearly every bank and non-bank ATM operator and card issuer in the UK.
- LINK is an unincorporated, non-profit members association owned by its members. It outsources the operation of the technical infrastructure to Vocalink.
- LINK switches around 70% of total ATM transactions in the UK. The remainder are intrabank transactions that are not sent to the LINK central infrastructure.
- All LINK participants must either hold a settlement account at the BoE or settle via another member of the scheme.
- The Bank of England has not designated LINK as a systemically important payment system.
- LINK complies with the European Payments Council's SEPA Cards Framework (SCF).
- At least 97% of ATMs in the UK do not surcharge end users.

# Low-value bulk & low-value real-time

## System details

### Bacs

- Bacs Payment Scheme Limited (BPSL) is a not-for-profit corporation (limited by guarantee) that is guaranteed and funded by its direct members.
- Access to the Bacs scheme is open to banks and corporates.
- BPSL outsources the operation of technical infrastructure of the scheme to VocaLink.
- The core Bacs products are direct credit and direct debit payments. A number of other services (e.g., account switching, Biller Update Service, Cash ISA Service) are also provided by the Bacs scheme.
- BPSL operating costs are recovered through a combination of membership fees and income through other services.
- Settlement for Bacs and Faster Payments moved from a collateralized loss-sharing agreement to full pre-funding of all participant liabilities with cash held in each participant's reserve account at the BOE.
- As a designated systemically important payment system, BPSL assesses annually its compliance with CPMI-IOSCO guidelines.

### Faster Payments

- The Faster Payments scheme is managed by Faster Payments Scheme Ltd (FPSL), which sets the rules for Faster Payments and outsources the operation of the central infrastructure to VocaLink.
- The core product is a near real-time credit transfer, that typically takes only a few seconds to post (for direct participants). Net settlement is executed three times daily.
- At least two overlay products, the Paym proxy database and Zapp, a POS service soon to be offered by VocaLink rely on the Faster Payments platform.
- Faster Payments participants must cover the costs of operating the system. The amount an individual member pays is based on their proportion of total payment volume in the system.

# Payment systems taxonomy

## United Kingdom

### CHAPS

Scheme governance
Commercial
Central bank mandated
Community consensus
Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure
Products
Bespoke bank services
Community services
Multiple products
Single product

### Bacs

Scheme governance
Commercial
Central bank mandated
Community consensus
Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure
Products
Bespoke bank services
Community services
Multiple products
Single product

### Faster Payments

Scheme governance
Commercial
Central bank mandated
Community consensus
Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure
Products
Bespoke bank services
Community services
Multiple products
Single product

### LINK

Scheme governance
Commercial
Central bank mandated
Community consensus
Infrastructure access for indirect participants
Via direct participant
Direct to infrastructure
Products
Bespoke bank services
Community services
Multiple products
Single product

# United States

## Payment market overview

### Highlights

- The United States has a decentralized payments infrastructure.
- The Federal Reserve is generally responsible for financial system oversight, including payments, but regulation does not reside with one industry body and is very limited.
- The Clearing House and the Federal Reserve both operate high and low-value systems.
- NACHA sets rules to govern the ACH network.
- Thousands of banks participate directly in payment systems and governance structures.
- Most payment product innovation occurs outside of banks.
- TCH is developing a real-time payment system for its members and the Fed and NACHA are developing rules for faster processing of low-value bulk payments, specifically same-day ACH settlement.
- There is no central infrastructure for ATMs in the United States.

### Recent evolution and drivers

The US payments industry is evolving but not in unison. Low-value real-time payments are a key focus. NACHA adopted a rule for settling ACH payments 3x daily, a major increase in speed compared to current settlement time. The Fed began a public consultation on the future of US payment systems. This consultation addresses the potential need for faster settlement. The Clearing House and its member banks are building a real-time payment system, now in early development, expected to go live in 2017. The system is driven by commercial interest, and will offer customers a faster alternative to bulk clearing.

#### Changes in last 5 years

None

Minor

Major

#### Drivers of change

Regulation

Commercial interest

### Market data (2014, millions)

Credit transfers	8,763.0
Direct debits	14,237.0
ATM	5,804.4 (2012)
High value	244.4
Cards	84,220.5 (2013)
Population	316.4
Bank concentration ratio (CR <sub>5</sub> )	47.0%

### Tendering & outsourcing

Due to the lack of a central infrastructure, there is no significant tendering in the US payments market.

Outsourcing on commercial terms is common, particularly for small- and medium-sized banks.

# Central infrastructure provision

## United States

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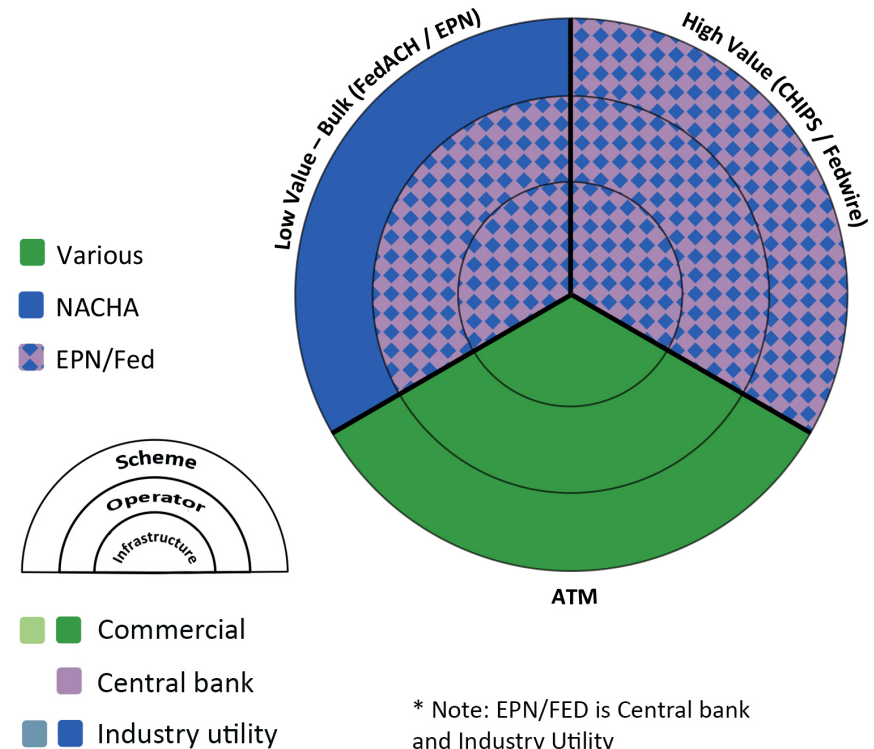
None of the payment systems in the United States has a single central infrastructure. All have multiple operators. The US banking market and infrastructure is decentralized and includes thousands of banks.

The Federal Reserve provides high and low-value clearing and settlement services to all depository institutions regardless of size and volume of transactions processed. The Clearing House (cooperatively-owned & commercial) provides high and low-value services primarily to large banks. NACHA sets rules and standards for low-value bulk electronic payments.

Most services offered by the Fed are not tendered but developed in-house due to security concerns. As a private organization, The Clearing House is not obligated to use an open tender process and awards contracts on a purely commercial basis.

The at least 12 ATM networks in the United States are highly competitive. There is no central infrastructure for ATMs, but rather a plethora of competing ATM networks and a patchwork of agreements to switch transactions bilaterally among them.

## Ownership in US payment systems



# Access and settlement arrangements

## United States

### Technical access to payment systems

Type	Name	Indirect participants	Non-bank P2Ps	Corporates
High value	Fedwire/CHIPS	■	■	
LV Bulk	FedACH/EPN	■	■	
LV Real-time	nap			
ATM	Various	■		

#### Legend

- Via direct participant
- Direct to infrastructure
- No relationship to infrastructure
- Not yet known

### Access and settlement arrangements

- There are approximately 7,300 Fedwire participants. All banking institutions in the United States have direct access to settlement accounts at the Federal Reserve. Some choose, however, to clear indirectly, and are known as correspondents.
- There are approximately 50 participants in CHIPS. In addition to the 24 direct members, there are an additional 26 correspondent members, who do not have technical access to CHIPS but utilize a direct member for clearing and settlement. Each direct participant must have sufficient liquidity to sponsor a correspondent and must be able to manage its operations in a way that will not incur operational risk.
- There are 5,000 direct members in FedACH and 450 in EPN. The two ACH operators in the United States differ in their definition of indirect participation. The Clearing House claims to have no indirect participants, but provides indirect participation without technical access—a category known as correspondent access. The Federal Reserve offers direct connection to all members but a large majority of bank members (approx. 8,000) are medium to small size banks who outsource their data processing, payment processing, and IT to third party data aggregators. In essence, these are direct participants with indirect technical access.
- ATM access requirements are decided on a network by network basis but some elements are common. All networks require non-bank members to access the ATM network via a direct bank member. Bank sponsorship of non-bank PSPs is a common occurrence in the market. Non-banks must agree to abide by ATM network rules in order to join or, in the case of bank sponsorship, the sponsoring bank must agree to assume all liability for the non-bank member.



# High value & ATM

## System details

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### Fedwire/ CHIPS

- There are two high-value payment systems in the United States: Fedwire, owned and operated by the Federal Reserve, and CHIPS, owned and operated by The Clearing House. Fedwire is a conventional RTGS system while CHIPS uses a proprietary netting algorithm to offset transactions throughout the day.
- Each system sets its own rules and access criteria. All financial institutions in the US are eligible to use Fedwire, and nearly 8,000 do.
- Indirect participants (called correspondents) connect via direct participants or third party processors and settle via direct participants. All US banks are entitled to a settlement account at the Federal Reserve, although many smaller banks choose to settle via direct participants.
- There are no additional overlay services offered by The Clearing House or Fedwire for high-value payments.
- Fedwire and CHIPS charge fees to both the originating institution and receiving institution as well as annual fees.
- There are two key differentiators between the two services. The Fed provides intraday overdrafts for Fedwire participants to reduce liquidity queuing delays. CHIPS features a netting algorithm, which saves cost and liquidity without sacrificing finality and security.
- There are no marked differences between the two systems regarding security and resilience.

### ATM networks

- ATM networks in the United States are highly competitive and decentralized.
- There is no central infrastructure for ATMs. There are at least 12 separate regional and national networks in the United States.
- The size of these networks run from very small to quasi-national level.
- Access requirements, products, and services are all determined by the individual networks, which are run by technology companies, banks, card networks, and individual operators.
- Regulation is provided by the Federal Reserve and the Consumer Finance Protection Bureau (CFPB).
- The networks compete with others on price, reliability, and bundling of ATM services with other processing services.

# Low-value bulk

## FedACH and EPN system details

### FedACH/EPN

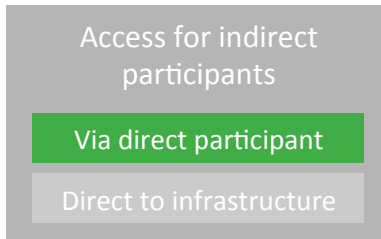
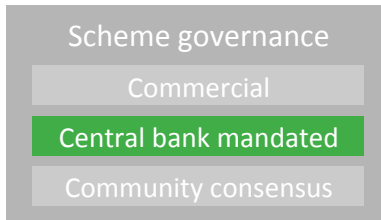
- The Federal Reserve's FedACH and The Clearing House's Electronic Payments Network (EPN) are the two operators for ACH payments in the United States.
- Both operators process payments under rules set by NACHA, a non-profit association. There is little difference between pricing and quality of service between the two operators.
- All financial institutions can access the ACH network directly through FedACH, although some choose to do so as indirect members (correspondents) and others use third-party processors.
- EPN access is split into two categories of participants: direct participants and correspondents. Correspondents and indirect participants utilize direct participants and do not have technical access.
- NACHA defines a number of optional overlay services, including bill presentment and payment, ecommerce payments, and others.
- Overlay services are offered by non banks and are specifically targeted to reach POS and P2P customer segments. These services tend to run over debit or credit card networks.
- In no case do members of either FedACH or EPN share liability for potential losses incurred from the insolvency of another member of the clearing.
- Both FedACH and EPN have contingency plans in place and fully functional back-up centers.

# Payment systems taxonomy

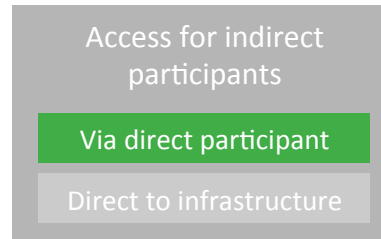
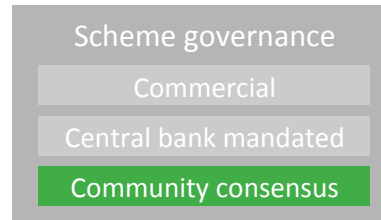
## United States

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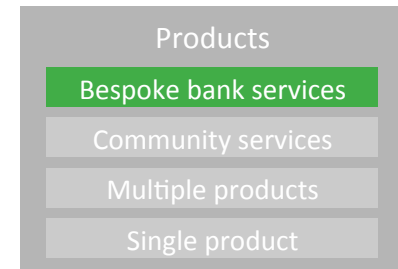
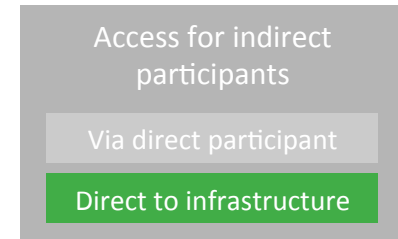
### RTGS/ Chips & FedWire



### Bulk/ EPN & FedACH



### ATM networks



- Executive summary
- Scope, methodology, and basic data
- Drivers of change
- Ownership, governance, outsourcing, and tendering
- Product diversity & features index
- Indirect access
  - Access models / network topology
  - Role of SWIFT
  - Scheme membership criteria & indirect participation
- Conclusions
- **Appendices**
  - Condensed country profiles
  - **Definitions and glossary of abbreviations**
  - Detailed methodology

**Account switching services**

Rules or technologies to assist customers in switching account balances, direct debit authorizations, and standing orders from one PSP to another.

**Account-masking services**

Systems that allow receivers of payments, typically corporates, to register for a virtual account number that can be associated with any account.

**ACH**

Automated Clearing House

**B2B**

Bank-to-bank

**B2C**

Bank-to-corporate

**Bulk payment**

Credit transfers or direct debits submitted in files. A single file can contain hundreds or thousands of individual payments.

**Corporate**

A business or public sector organization that wishes to participate in the payments scheme.

**Credit transfer (CT)**

A payment originated by a debtor and “pushed” to a creditor.

**Direct debit (DD)**

A payment originated by a creditor and “pulled” from a debtor.

**Direct debit mandate**

A legal authorization for an originator to debit a debtor’s account using a direct debit.

**Direct participants**

PSPs that settle on their own behalf in the payment system.

**Euro area**

Member states of the European Union whose currency is the euro.

**Gross settlement**

Settlement of the gross amount of payment messages or files.

**IAP**

Indirect Access Provider

**Indirect input/output**

Direct submission from indirect banks (correspondents) to the infrastructure.

**Indirect participant**

A PSP that settles on the books of a direct participant.

**Infrastructure**

The infrastructure provider is the entity that provides the technical infrastructure for a payment system. It is common for payment system operators to outsource the provision of infrastructure to another party.

**Interoperability**

Agreements between clearing houses that allow payments to be delivered to banks that are outside of its circle of participants.

**IOSCO**

International Organization Of Securities Commissions

**KYC**

Know your customer

**Net settlement**

Settlement of the net amount due as the result of many payment mergers or files.

**NFC**

Near field communication, typically associated with mobile payments.

**Non-bank PSP**

A Payment Service Provider that is not a licensed bank.

**Not-for-profit organization**

Not-for-profit: Organizations such as associations or nominal companies whose owners are also their customers, making them *de facto* non-profits.

**Operator**

The operator is the entity tasked with implementing scheme rules and developing payments infrastructure. Operators may be central banks, commercial businesses or not-for-profit organizations. Payment system direct participants have a legal relationship with the operator, indirect participants may or may not.

**Order of operations**

The order in which settlement, posting, and output occur in a given system.

**Overlay services**

Products and services defined as overlay services in this report are services that offer significant added functionality and to all or most payment system participants in a particular country or region. They must rely on underlying payment systems for operation.

**Output**

The step in the payment process where payment messages or files are outputted to the receiving PSP. Can take place before or after settlement.

**P2P**

Person-to-person payment

**Payment scheme**

A set of rules, technical standards, and implementation guidelines for processing payments uniformly within a given community.

**Payment system**

The totality of the set of rules for clearing payments, settling payments, and the technical infrastructure for processing them.

**PSP**

Payment Services Provider

**Real-time posting**

Funds are posted to a beneficiary's account in less than one minute after payment initiation.

**Real-time settlement**

Real-time settlement accomplishes settlement within a few seconds after a payment is initiated. It can occur independently of when a payment is posted.

**Same-day system**

System that either requires or typically post to receivers' accounts within minutes or hours of payment initiation. These systems process payments and exchange files in real-time.

**Scheme**

A set of rules that governs a payment system. These rules are often developed by a scheme company whose members may include banks, central banks, regulators, non-bank PSPs, software vendors, and corporates.

**Settlement frequency**

The frequency with which the system settles and outputs data.

**Settlement method**

Systems settle transactions multilaterally or bilaterally, in net or gross amounts. Funds are transferred on accounts held at a commercial or central bank.

**Standing order**

A recurring credit.

**Third-party direct input/output**

Direct submission from third-party processors to the infrastructure.

**Third-party processor**

A company contracted by a PSP to carry out some part of the payment transaction management,

**Time of posting to beneficiary's account**

Time stipulated by the system by which transactions must be posted to the beneficiary's account.

- Executive summary
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# Methodology

## Extensive research and trusted frameworks the basis of the report

This engagement proceeded in three phases: collecting data through research and interviews, organizing data by producing the country profiles, and analyzing the data with the help of proprietary frameworks to create the comparative analysis. The first phase relied on a structured research plan that included extensive research from internal and external sources, as well as over 50 executive interviews with senior-level contacts in each country in scope. Our experienced analyst team ensured the quality of the information and produced the country profiles. These profiles enabled the comparative analysis, which involved comprehensive benchmarking and the use of our proprietary features index to draw out similarities and differences between markets and systems, examine possible correlations between systems, and compare these results with payment systems in the United Kingdom.

Structured research plan

Extensive desk research of  
primary and secondary  
sources

Lipis Advisors internal  
information database

Thorough fact-checking

Global network of senior-  
level contacts

Experienced analyst team

50+ executive interviews

Comprehensive  
benchmarking

Proprietary features index



# Collecting the data

Desk research, internal database, and executive interviews keys to project

## Ensuring data quality

The research process began by detailing the information required by the PSR for this engagement, with a focus on details related to ownership and access, operational details of payment systems, communication between central infrastructures and payment service providers, and indicators of quality and innovation.

After detailing the research requirements, Lipis Advisors compiled the relevant data from our internal database, which features detailed information on payment systems in over 50 markets. We then benchmarked this data to the requirements list to determine where we would need to find new information and/or update existing information.

The process of collecting new information was completed using desk research and executive interviews. The desk research involved investigating primary sources (such as regulations and operating guides) and secondary sources (such as existing research documents and conference presentations).

The desk research enabled the Lipis Advisors team to compile quantitative data (such as volume and value figures), regulatory requirements, and operational details for systems in scope. This enabled the research team to meet some of the research requirements. This data was supplemented with information from executive interviews in order to gain a complete picture of each system in scope.

## Executive interviews

The Lipis Advisors executive interview methodology has been crafted to provide depth and insight into payment system operations and trends. The interviews rely on our global network of in-country experts and decision makers holding senior level positions at banks, payment processors, regulatory agencies, central bankers, payment associations, and software providers.

At the outset of the interview process, Lipis Advisors compiles a list of contacts and develops a generic interview guide covering the information needed. Before each individual interview, the interview guide is customized based on the interviewee, the organization they work for, and the type of information needed. The interview itself takes the form of a dialogue or discussion via telephone or in person between the interviewee and an experienced senior consultant, it is not meant to be a scripted question-and-answer session. Follow ups are completed via email, but sometimes a second interview is arranged.

Over 50 executive interviews were completed with senior-level stakeholders in each country in scope, covering nearly every individual payment system. All interviewee responses have been anonymized in the report, with neither the interviewee nor their organization named. Information deemed politically or commercially sensitive has not been published.

# Organizing the data

## Research and analysis

### Structured research plan and data integrity

Before collecting the information needed for the report, the research team developed a structured research plan to determine what information is needed, where to find it, who needs to be interviewed, and how long each step will take.

As the information was collected from our internal database, extensive desk research, and executive interviews, senior team members checked to ensure the integrity of the data.

- Desk research was collected from primary sources and some secondary sources and was checked against these sources (as well as with interview contacts if needed) to guarantee that the facts in the document are correct.
- Interviewees were also asked to provide sources and public documents wherever possible.

The seniority of our interview contacts (typically executive-level or at the supervisor level in a particular department), coupled with our extensive research process and source material helped ensure the accuracy of our data.

Where issues were disputed and public sources could not be found, we consulted interview contacts for confirmation. If a particular issue or fact could not be confirmed, it was not included in the report.

### Payment system typologies

Lipis Advisors created payment system typologies that were applied to each country and payment system in scope. The purpose of the typologies is two-fold: to help structure the thousands of data points that make up the country profiles and to enable cross tabulations used in the comparative analysis.

The typologies are based on Lipis Advisors' proprietary scorecard framework, which enables comparisons between payment systems with differing levels of functionality. Some of the typologies focused on entire markets, while others focused on individual payment systems within a given market.

Country-wide typologies include:

- Changes in the last 5 years and drivers of change

System-specific typologies cover:

- Scheme governance
- Access to scheme and access to technical infrastructures
- Products and services

A more detailed explanation of the typologies can be found on the next page.

# Comparing features across different systems

## Payment system typologies in detail

### Country-specific

Changes in last 5 years

None

Minor

Major

Drivers of change

Regulation

Commercial interest

Issues considered major changes include the introduction of a new payment system or data standard, changes made to settlement method or settlement guarantees, or the overhaul of a legacy payment system. It is important to note here that regulation and commercial interest are not mutually exclusive drivers of change.

### System-specific

Infrastructure access for indirect participants

Via direct participant

Direct to infrastructure

Direct participants in a payment system always have direct access to infrastructures. In cases where indirect participants (banks, non-banks, or corporates) have access to a payment scheme, a distinction is made between whether or not they access the technical infrastructure via a direct participant or if these entities connect directly to the technical infrastructure.

### System-specific

Scheme governance

Commercial

Central bank mandated

Community consensus

Even within a single country, the governance of different payment system schemes may vary. Community consensus represents a collaborative approach to governance that includes both commercial and central bank/government participation.

### System-specific

Products

Bespoke bank services

Community services

Multiple products

Single product

The payment systems in scope vary in terms of the richness and leanness of functionality offered by the central infrastructure. Lean systems tend to offer a single product (such as low-value bulk electronic payments), while richer systems may also offer community services (such as account switching) or bespoke bank services (such as back-office processing).

# Analyzing the data

## Features scorecard in detail

### What was measured...

All systems analyzed in the study are included on a country-by-country basis.

Each system was ranked on the richness of functionality scale based on the type of services it offers ranging from low to medium to high.

Four additional country-wide system features were included that are indicative of the overall level of functionality within a country's payment systems.

For countries that have multiple infrastructures for a single payments system (such as low-value bulk in the USA or high-value payments in the Euro area), the scores indicate the richest functionality available to the market as a whole.

We recognize an inherent bias to the methodology toward features in LV bulk systems, as these systems typically have the greatest diversity of functionality. In order to limit this bias, we have added additional categories specific to other types of systems and weighted each category to arrive at a more holistic features score for each market.

Please see the next page for details of the categories and their weightings.

### ... and how it was counted

After filling out the scorecard for each of the 13 countries in scope, weights were added to the individual categories in order to demonstrate their overall importance to the payments market and the level of innovation occurring in that area. These weights are the same across all countries.

Services considered of “low” importance include: high-value (due to a lack of innovation), and DD mandate management; “medium” importance included LV bulk, ATM switch, indirect participant & corporate access, and non-payment messaging; “high” importance included LV RT and account switching & masking.

These weights (1 for low, 2 for medium, and 3 for high) were then multiplied by the corresponding score for each category (1 for low, 2 for medium, and 3 for high) to come up with a score for that category. These category scores were then added together to arrive at a country score, which was then used to broadly compare all countries in scope.

We then grouped the countries into 4 groups based on their scores.

# Payment system features scorecard

## Methodology and rubric

Lean ← → Rich			
Payment system features	High-value	How many products does the system offer? One? Many? Or bespoke products for individual participants?	Low
	Bulk LV	How many products does the system offer? One? Many? Or bespoke products for individual participants?	Medium
	Bulk LV direct debits scheme	Does the system offer direct debits? With or without mandate management?	High
	Real-time LV	How many products does the system offer? One? Many? Or bespoke products for individual participants?	Medium
	ATM switching	What types of products does the system offer? Just withdrawals and balance enquiries? Overlay services? Or bespoke products for individual participants?	High
	Account switching and masking	Does the system provide automated account switching or account number masking services for some payment types? A comprehensive service of one type? Or both?	Low
	Indirect participant & corporate access	Via which channel does the system allow for indirect participant and corporates access? Via direct participants? Via a single national network? Direct to the infrastructure?	Medium
	Non-payment messaging	Does the system allow non-payment messages? Do these inform of one-time events? Are they for ongoing information management? Are they driven by a central database?	Medium
			Weight

# Analyzing the data

## Access models, scheme membership & indirect participation

### What was measured...

Three access models were examined in regards to direct and indirect participant access across all countries in scope. These network topologies encompass the collective systems, i.e. high-value, low-value bulk, low-value real-time, and ATM switches. Topologies examined are as follows:

**Infrastructure centric model**—All direct and indirect participants connect directly to a technical infrastructure.

**Direct participant centric model**—Indirect participants connect to the infrastructure through a sponsor (direct participant).

**Multi-network centric model**—Multiple networks connect participants to each other, either bilaterally or through a central switch.

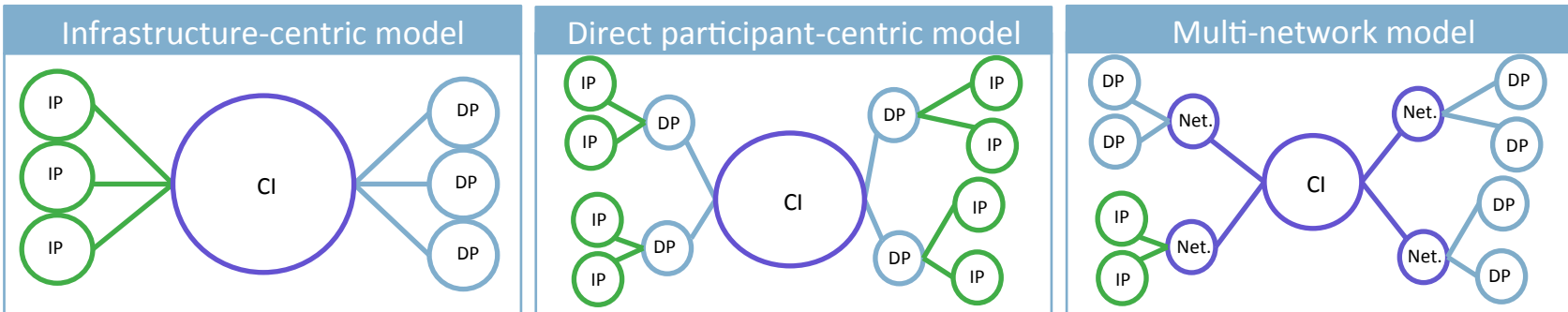
Scheme membership criteria and indirect participation was also analyzed through document review and through interviews with experts in individual markets and systems. Individual responses have been aggregated by system type and presented along with key findings. Where there is more than one access model in a market, the most open form of access is reported.

### ... and how it was analyzed

- Access models were depicted as distinct network topologies for each system type. Data was then aggregated across system type and across countries to reveal similarities and differences.
- Scheme membership and the degree of indirect participation within a system was analyzed in the same graph. These bar charts are split down the middle, where the top half represents the degree of scheme membership and the bottom half represents the degree of indirect participation on a country by country basis for each type of system in scope, i.e. all high-value systems are examined, then all low-value bulk systems, and so on.
- Meaningful examples were highlighted and explained in detail.

# Participant access models

Each model has its own advantages and disadvantages



A **centralized infrastructure/network (CI)** is the entity that facilitates interbank transfers between connected participants. For the purposes of the present analysis, the bilateral or multilateral nature of the CI is not considered.

**Direct participants (DP)** connect to the central infrastructure via a number of networks (SWIFT, VPNs, prop, etc.), whereas **indirect participants (IP)** usually connect via a direct participant, except where noted.

- In an infrastructure-centric model,** all users, including direct and indirect participants, and corporate originators submit payments directly to the infrastructure.
- The central infrastructure is responsible for enforcing security policies and credit risk limits, for indirect participants, as set by sponsoring banks.**
- In a direct participant centric model,** each sponsor bank communicates with its sponsored participants. Only direct participants connect to the central infrastructure.
- This is the most common model among high-value and low-value bulk systems, and is also widely used in LV RT and ATM systems.**
- Multiple networks connect participants to each other, either bilaterally or through a central switch.**
- This model is commonly found in ATM networks.**

# Scheme access & participation

## Methodology

The framework below is used to depict scheme membership criteria and indirect participant access by system type across the countries in scope. The example below (from high-value systems) is annotated to explain the terminology used throughout this section, which applies the framework to all countries and system types in scope. Note that categories are cumulative, i.e. responses of indirect participants include direct participants. Also, a country or market view is taken, i.e. where multiple systems exist within a market the most open response is presented. The individual country profiles include more detailed system level information.

