



BANK OF ENGLAND

# Bank of England's Real-Time Gross Settlement Service: Service Description

October 2017

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This document is an extract of the Service description section and relevant annexes from the Bank's full public disclosure and self-assessment against the *Principles for Financial Market Infrastructures*. Page and footnote numbering has been kept consistent with the longer document for ease of reference.

The Bank's full public disclosure and self-assessment can be found on the Bank's website, <http://www.bankofengland.co.uk/markets/Documents/paymentsystem/rtgspfmlisa.pdf>.

## IV. Service description

### General background of RTGS Service

- IV.1 The Real-Time Gross Settlement (RTGS) infrastructure is owned and operated by the Bank of England. It is an accounting system that allows eligible institutions to hold reserves balances at the Bank, and settle obligations to each other. 'Central bank money' (for sterling, primarily the money held in reserves accounts at the Bank) is the ultimate secure and liquid asset, and therefore offers the lowest-risk way for financial institutions to meet their payment obligations.
- IV.2 The Bank's mission is to promote the good of the people of the UK by maintaining monetary and financial stability. RTGS serves the Bank's mission in two ways:
- Eligible institutions hold reserves balances which facilitate the transmission of monetary policy and provide those institutions with access to central bank money to help manage their liquidity risks.
  - These balances can also be used during the day to settle the obligations arising from payments and securities transactions made by banks,<sup>16</sup> other eligible institutions, and their customers in real-time.
  - In addition, access to settlement accounts in RTGS has been widened to include non-bank Payment Service Providers in order to boost competition and system resilience.

### *Overview of the RTGS Service and functions*

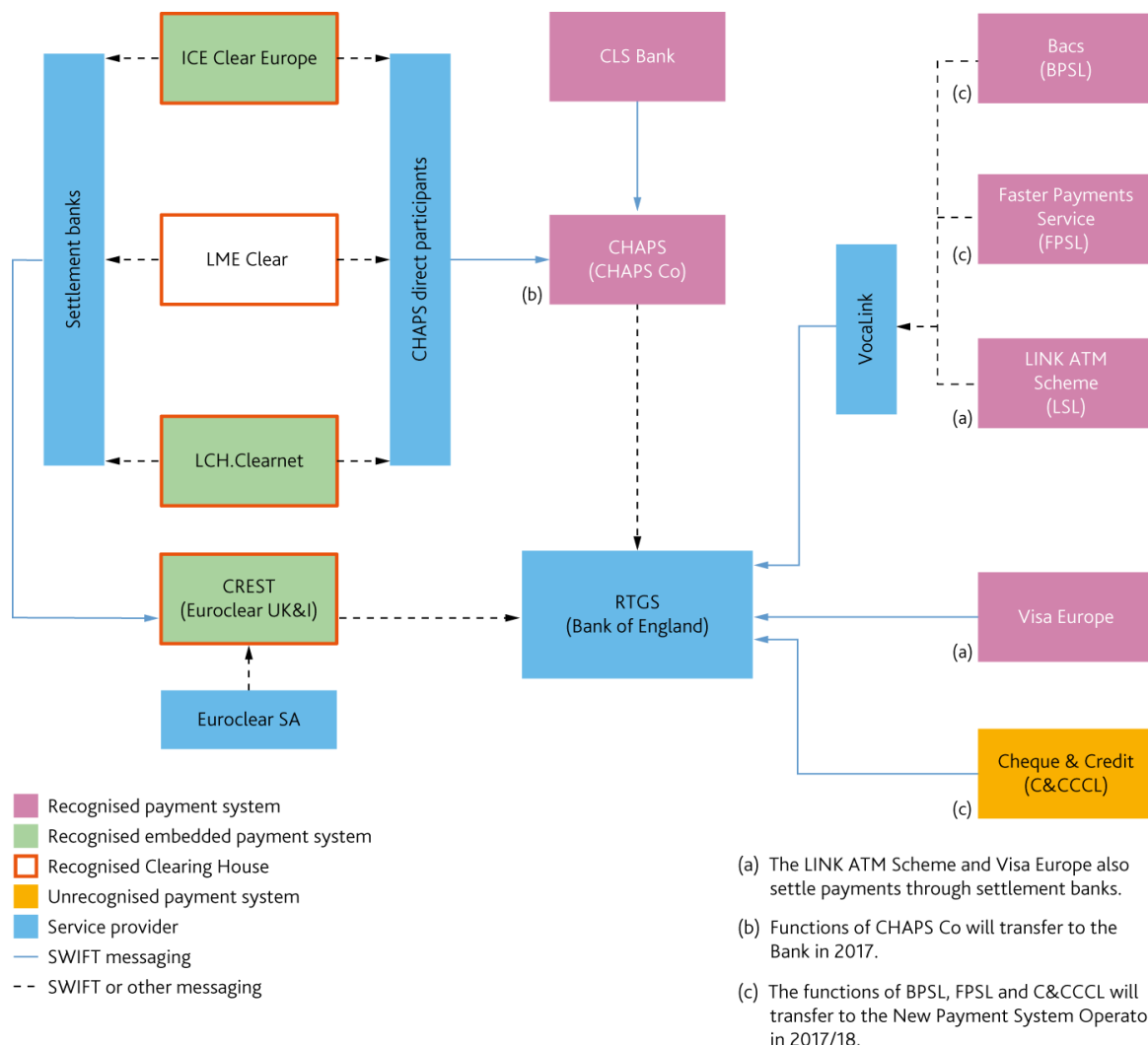
- IV.3 Institutions have accounts in RTGS so they can operate as:
- a settling participant in any of the payment systems for which the Bank acts as settlement agent; and/or
  - a member of the Bank's reserves scheme (which since 2006 has been part of the operational framework for delivering the Bank's monetary policy decisions).
- IV.4 The Bank provides sterling settlement services for seven payment systems: Bacs, CHAPS, Cheque & Credit, CREST, Faster Payments, LINK and Visa. Around fifty institutions use their accounts in RTGS to settle in one or more payment systems. A number of other FMIs use CHAPS to complete the relevant payment obligations. CLS Bank is a Direct Participant in CHAPS for this purpose and central counterparties and their members typically have relationships with various banks to access CHAPS either directly or indirectly. Account holders in RTGS communicate with the RTGS infrastructure via SWIFT. Figure 1 provides a

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<sup>16</sup> Unless stated otherwise, references to banks include building societies.

simplified illustration of some of the interlinkages between RTGS, settling participants and FMIs.

**Figure 1: Interlinkages between RTGS and Financial Market Infrastructures**



IV.5 The RTGS Service forms an integral part of two systemically important payment systems: CHAPS and the payment arrangements embedded within CREST.

IV.6 The UK’s High-Value Payment System (CHAPS) is currently operated and managed by CHAPS Co;<sup>17</sup> the Bank provides the underlying infrastructure for settlement. Individual CHAPS settlement instructions are routed via the SWIFT network to RTGS and settled across the sending and receiving CHAPS Direct Participants’ accounts. Transactions settled using CHAPS include wholesale financial market, corporate, housing, government and financial market infrastructure transactions.

<sup>17</sup> The Bank will become the operator of the CHAPS system in 2017, taking over the function from CHAPS Co.

IV.7 The UK's securities settlement system (CREST) is operated and managed by Euroclear UK & Ireland (EUI). CREST settles securities such as gilts, equities and money market instruments in sterling, euro and US dollars. The Bank only provides settlement for sterling obligations. CREST functions on a Delivery versus Payment (DvP) basis. To underpin securities settlement, CREST has an 'embedded payment system' where the CREST settlement banks settle in central bank money and all other CREST participants settle using facilities provided by these settlement banks. The accounts in RTGS used for CREST settlement hold zero balances overnight; CREST settlement banks transfer funds each morning from their primary reserves/settlement account into their CREST account, and at the end of the CREST day, balances are automatically swept back up to the primary reserves/settlement account.

IV.8 Accounts in RTGS are also used to settle the sterling net obligations arising from customer transactions for five retail payment systems. Each retail system settles on a multilateral, deferred net basis:

- Bacs: The UK's automated clearing house, processing Direct Debits (utility bills, subscriptions) and Direct Credits (salaries, pensions, benefits) across a three day cycle with net settlement taking place once a business day in RTGS.
- Cheque & Credit: Net settlement of cheques and paper credits<sup>18</sup> takes place once a business day in RTGS; the clearing system operates on a three day cycle.
- Faster Payments: Faster Payments provides near real-time payments 24/7 and is used for standing orders, internet and telephone banking payments. Faster Payments settles net, three times every business day in RTGS.
- LINK: The UK's ATM network settles in 24 hour cycles; cycles that take place over the weekend and on public holidays all settle on a net basis on the following business day in RTGS.
- Visa: One of the card systems (for Visa debit, credit and prepaid cards) which settles in 24 hour cycles. Cycles that take place over the weekend and on public holidays all settle on a net basis on the following business day in RTGS.

IV.9 The Bank provides additional services in relation to Bacs, Faster Payments and Cheque & Credit to help reduce, or eliminate credit risk between the Direct Settlement Participants.

- For Bacs and Faster Payments, Direct Settlement Participants hold cash in special accounts to cover the maximum possible net debit positions they could reach (this is

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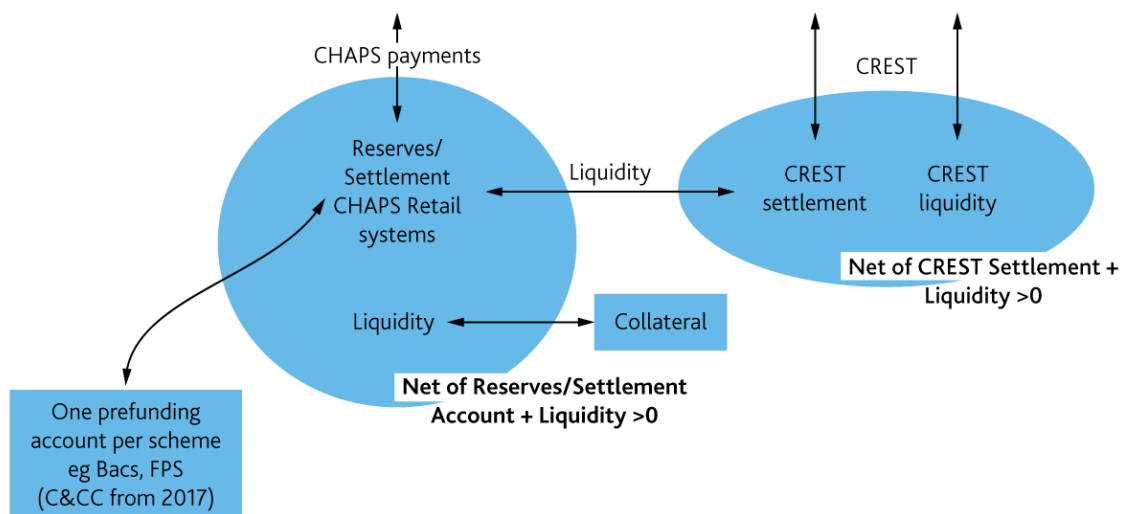
<sup>18</sup> The paper cheque & credit clearings are expected to be retired in 2018, following the launch of cheque imaging and a period of overlap.

known as 'prefunding'). If a Direct Settlement Participant defaults, the cash set aside can be used to complete settlement for the relevant system.

- For Cheque & Credit, the Bank manages a pool of collateral provided by Direct Participants to cover a failure or significant delay in settling by one or more Direct Participants. The Image Clearing System will use the same prefunding model described above.

IV.10 Figure 2 provides a simplified illustration of how accounts in RTGS are grouped and used. The illustration is for a participant which settles in the payment systems which settle across RTGS. CHAPS and the retail systems all settle from an account holder's primary reserves/settlement account. Cash for Bacs and Faster Payments prefunding is held in separate accounts but forms part of an eligible institution's overall reserves balance. CREST settlement is through a distinct account with liquidity moved to and from the primary reserves/settlement account each day. Further information on the different settlement models is set out in paragraphs IV.37 – IV.51.

**Figure 2: Typical hierarchy of accounts in RTGS**



IV.11 An expanded explanation of the Bank's RTGS service has been published in the Bank's Quarterly Bulletin series.<sup>19</sup>

### Key RTGS statistics

#### Participants

IV.12 At 31 August 2017, account holders at RTGS included:

<sup>19</sup> See <http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb120304.pdf>.

- 27 CHAPS Direct Participants;
- 20 CREST settlement banks; and
- more than 180 reserves account holders.

### RTGS volume and value statistics

**Table 1: Average daily RTGS settlement volumes and values**

	2012	2013	2014	2015	2016
CHAPS values (£mn)	£284,591	£277,229	£268,615	£270,400	£298,710
CHAPS volumes	134,665	138,245	144,353	148,412	154,006
CREST DvP values (£mn)	£293,293	£303,717	£274,257	£240,480	£220,970
CREST DvP volumes	7,325	8,388	9,050	9,391	10,883
Faster Payments net values (£mn)	£502	£586	£606	£663	£677
Bacs net values (£mn)	£3,190	£3,071	£3,122	£3,159	£3,193
Cheque & Credit net values (£mn)	£232	£211	£196	£190	£156
LINK net values (£mn)	£235	£249	£271	£294	£315
Visa net values (£mn)	NA	£1,144	£1,149	£1,425	£1,531

#### Notes:

- All data are daily averages of transactions settled within the RTGS system.
- CREST DvP activity in RTGS is measured by the debits applied to CREST settlement accounts at the end of each CREST settlement cycle, not the total volume or value of transactions in CREST itself.
- Retail payment system (Bacs, Cheque & Credit, Faster Payments, LINK, Visa) values represent the net value of each system's settlement across RTGS. Net settlement for retail payment systems takes place within defined clearing cycles at specific points during the RTGS operating day. Therefore, no volume data are available.
- Visa began settling its sterling net obligations across RTGS in November 2013.

### Stock of Reserves

IV.13 As at end-February 2017, 77% of the Bank's total consolidated balance sheet liabilities was held within the RTGS system, in the form of the banking systems' reserves (£406bn on 28 February 2017).

### Liquidity provision

IV.14 The settlement of CHAPS and CREST on a real-time gross basis means direct participants account holders must have the ability to source intra-day liquidity from the Bank to supplement reserves if needed to fund outgoing payments, where eligible to participate in

the SMF. On average in 2016, the Bank's balance sheet increased by £39bn intra-day, of which £18bn of was provided for CHAPS intra-day liquidity and £21bn automatically generated via the auto-collateralised repo facility within CREST.

*Overview of operational stability and resilience*

IV.15 As the final record of sterling transfers, the operational stability and resilience of the RTGS system is of paramount importance to the Bank:

- Changes to RTGS are carefully considered and tested – the Bank engages on potential changes with the systems that settle in RTGS and relevant directly-settling participants of those systems.
- RTGS operates on fault-tolerant computer hardware which is replicated on a second site; and with the business operation also conducted on a split site basis.
- The Bank also has the option of using a third site and alternative technology in the form of SWIFT's 'Market Infrastructure Resiliency Service' (MIRS). MIRS is an additional contingency infrastructure that could be used in the event of a failure of its principal RTGS infrastructure. MIRS ensures that banks can continue to settle CHAPS payments in the event of a disruption without resorting to a deferred net settlement model. It also facilitates the net settlement of the retail payment systems.

**Table 2: Availability of RTGS Service in 2016<sup>20</sup>**

Service Availability	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RTGS infrastructure for 'urgent' CHAPS settlement (%)	100	100	100	100	100	100	100	100	100	100	100	100
RTGS infrastructure for 'non-urgent' CHAPS settlement (%)	100	100	100	100	100	100	100	100	100	100	100	100
Ability of RTGS and the RTGS-CREST link to support settlement in CREST (%)	100	100	99.89	100	100	100	100	100	100	100	100	100
Delays to net interbank settlement of retail payment systems (minutes)	0	0	0	0	0	0	0	0	0	0	0	0
RTGS Enquiry Link (%)	100	100	100	100	100	100	100	100	100	100	100	100

<sup>20</sup> Historic data are published on the Bank's website. See <http://www.bankofengland.co.uk/markets/Pages/paymentsystem/serviceavailability.aspx>



**Table 3: Availability of RTGS Service in 2017**

<b>Service Availability</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>
RTGS infrastructure for 'urgent' CHAPS settlement (%)	100	100	99.76	100	100	100	100	100
RTGS infrastructure for 'non-urgent' CHAPS settlement (%)	100	100	99.64	100	100	100	100	100
Ability of RTGS and the RTGS-CREST link to support settlement in CREST (%)	100	100	100	100	100	100	100	100
Delays to net interbank settlement of retail payment systems (minutes)	0	0	0	0	0	0	0	0
RTGS Enquiry Link (%)	100	100	100	100	100	99.67	100	100

#### *Cost recovery*

IV.16 The Bank operates the RTGS Service with a public objective to recover its costs fully over the medium term – typically a four year rolling horizon. Costs are recovered directly from RTGS account holders who use the RTGS Service. Tariffs are set annually in accordance with principles agreed with relevant users to align income with budgeted cost. The costs of RTGS renewal will be recovered through the RTGS tariff, but the Bank does not intend to begin recovery in advance of the delivery of the first tranche of functionality. As in the past, the Bank will amortise these costs, but the scale of the programme means that the period of which costs are amortised is likely to be somewhat longer than usual.

*Recent developments*

**Table 4: Major developments in RTGS in the last ten years:**

<b>Date</b>	<b>Development</b>
<b>May 2008</b>	Automated net settlement introduced, enabling operators of Deferred Net Settlement systems to deliver settlement data to RTGS via SWIFT.
<b>Sep 2010</b>	Full FIN Copy Service replaced Partial Service, thus copying full CHAPS payment data to the RTGS Processor. This was a pre-requisite for Business Intelligence services.
<b>Jan 2012</b>	A business intelligence service for RTGS data (RTBI) became available to CHAPS direct participants, assisting them in meeting their regulatory reporting requirements.
<b>Apr 2013</b>	Introduction of Liquidity Saving Mechanism (LSM) into RTGS: LSM uses algorithms to match up groups of broadly offsetting CHAPS payments and then settle them simultaneously to reduce CHAPS direct participants' intra-day liquidity requirements.
<b>Feb 2014</b>	Introduction of Market Infrastructure Resiliency Service (MIRS): the Bank became the first central bank to adopt MIRS as its contingency RTGS infrastructure that could be used in the event of a failure of its principal RTGS infrastructure.
<b>Oct 2014</b>	Introduction of a new collateral management system: the system uses a collateral pooling model to manage the collateral it accepts for official operations and for intra-day liquidity in RTGS.
<b>Nov 2014</b>	Extension of the eligibility criteria for membership of the reserves scheme to include central counterparties and broker dealers.
<b>Mar 2015</b>	The RTGS Strategy Board was reconstituted from March 2015. This was in response to a recommendation made in Deloitte's independent review into the causes of a nine hour RTGS outage in October 2014.
<b>Sep 2015</b>	Introduction of prefunding for Bacs and Faster Payments: Prefunding addresses the settlement risk which arises as a result of a build-up of obligations in the deferred net settlement systems.
<b>Jun 2016</b>	RTGS operating hours: The Bank extended the RTGS settlement day by one hour and forty minutes. Extended settlement days were also implemented for the CHAPS and CREST systems.
<b>May 2017</b>	Blueprint for RTGS: The Bank announced a number of significant policy changes and the intention to renew the RTGS Service.
<b>Jul 2017</b>	The Bank announced that non-bank PSPs became eligible to apply for a settlement account in RTGS.

## **General organisation of the RTGS Service**

### *Bank-wide governance and risk management*

- IV.17 The Bank's governing body is its Board of Directors, known as the Court. The framework for governance and accountability is set by the Bank of England Act 1998, with some modifications made by the Banking Act 2009 and the Financial Services Act 2012. The Court is responsible for managing the Bank's affairs, other than the formulation of monetary policy which is the responsibility of the Monetary Policy Committee, the stability of the financial systems of the United Kingdom, which is the responsibility of the Financial Policy Committee and prudential regulation and supervision of banks, building societies, credit unions, insurers and major investment firms, which is the responsibility of the Prudential Regulation Committee (PRC).
- IV.18 The executive management of the Bank lies with the Governors and Executive Directors. Court delegates the day-to-day management of the Bank to the Governor and through him to other members of the executive. But it reserves to itself a number of key decisions. These 'matters reserved to Court' are reviewed annually and are published on the Bank's website. The Governors serve as the Bank's top level executive team, and are responsible, in conjunction with the Bank's policy committees, for overseeing the fulfilment of the Bank's mission. Each Deputy Governor is assigned functional responsibility for a particular aspect of the Bank's work. The Executive Directors' Committee is accountable to Governors, the PRC (where applicable) and ultimately to Court.
- IV.19 The Bank's governance structure includes a clear and documented risk management framework at an enterprise-wide level.

### *RTGS-specific governance and risk management*

- IV.20 The Bank's Deputy Governor for Markets & Banking has overall responsibility for the Bank's payment services operations under the Bank's internal application of the Senior Managers Regime.<sup>21</sup> The Executive Director for Banking, Payments and Financial Resilience oversees the operation and strategic development of the Bank's provision of payment system services, including the RTGS Service. The Head of Market Services Division runs the RTGS Service on a day-to-day basis.

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<sup>21</sup> See [www.bankofengland.co.uk/about/Documents/smr.pdf](http://www.bankofengland.co.uk/about/Documents/smr.pdf)

IV.21 The Bank has dedicated governance arrangements for the RTGS Service. These governance committees each have codified roles, compositions and reporting lines. Ultimately, these committees are accountable to the Governor, and through him, to the Bank's Court, the responsibilities for which are set out in legislation.

*Key committees for the RTGS Service<sup>22</sup>*

IV.22 The key governance committees for the RTGS Service are:

- RTGS Strategy Board: Chaired by the Deputy Governor for Markets & Banking, and responsible for the overall strategic direction and delivery of the RTGS Service.
- RTGS Delivery Board: Chaired by the Executive Director for Banking, Payments and Financial Resilience, and responsible for supporting the management responsible for the RTGS Service to meet the agreed strategy and service standards and reporting to the RTGS Strategy Board.

IV.23 Attendees for the above committees are drawn from across the Bank, providing expertise and challenge, including those with line responsibility for day-to-day management of the RTGS Service, the Bank's technology function, risk and audit functions and other business areas with relevant expertise.

*Legal framework*

IV.24 The Bank articulates the legal basis for its activities in legal documents that are made readily available to relevant stakeholders. The documents are governed by, and enforceable under English Law. These include:

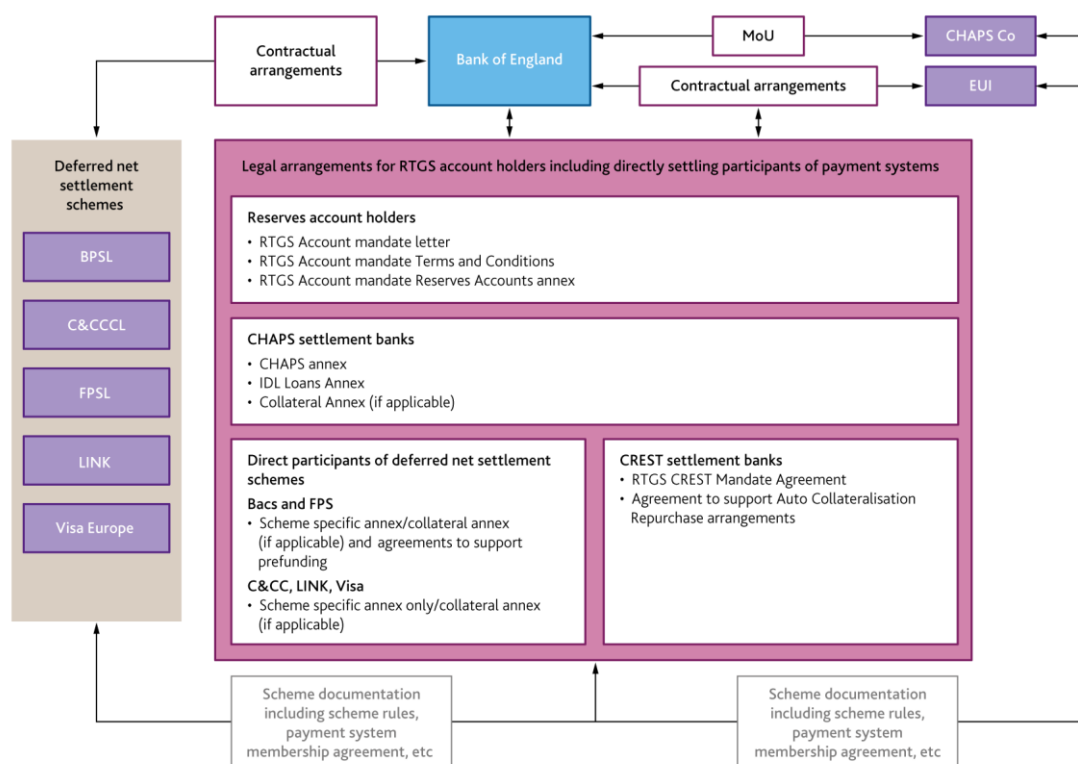
- RTGS Account Mandate Terms and Conditions (owned by the Bank);
- Multilateral agreements between the Bank, payment system operators and directly-settling participant(s) (typically owned by the operator, for example, the prefunding arrangements for Bacs and Faster Payments); and
- Bilateral agreements with the payment system operators.

Figure 3 sets out a summary of the legal arrangements concerning payment system operators in relation to RTGS.

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<sup>22</sup> A combined governance structure for RTGS and CHAPS will be put in place when the HVPS transitions to a direct delivery model.

**Figure 3: Legal documentation framework for services provided to payment system operators and their directly-settling participants**



IV.25 In addition to the above, where an institution wishes to participate in the Bank’s Sterling Monetary Framework (which has its own eligibility criteria) and have a reserves account, it is required to sign up to the Sterling Monetary Framework Terms & Conditions which govern, amongst other things, the provision of collateral to cover any RTGS exposures.

IV.26 The Bank’s management and operation of the RTGS Service does not currently fall under any regulatory, supervisory or oversight framework for FMI<sup>23</sup>. It is, however, subject to the Bank’s internal governance arrangements. Many of the payment system operators and other FMIs in the UK that directly or indirectly use the RTGS Service are subject to supervision by the Bank.

### System design and operations

IV.27 The main technical features of the RTGS Service are the RTGS processor and the Enquiry Link service.

<sup>23</sup> Under direct delivery, the delivery of the CHAPS service will be supervised by the Bank’s Financial Market Infrastructure Directorate at arm’s length to the same standards as other systemically important payment systems.

- IV.28 The RTGS processor (or central system) is host to all the accounts held in RTGS and carries out all the postings made to those accounts. All payment messages pass through a validation process on reaching the RTGS processor, where the RTGS processor checks that the payment is valid and that it is not a duplicate.
- IV.29 Within the RTGS processor is a central scheduler through which all CHAPS settlement instructions have to pass before actual settlement. CHAPS Direct Participants use the central scheduler to control the rate and order in which their instructions proceed to settlement, and in particular to distinguish between urgent and non-urgent CHAPS payments.
- IV.30 The RTGS processor also has:
- an interface with the SWIFT network to receive settlement instructions (and send confirmations);
  - a link to the CREST system, to support the real-time DvP settlement process; and
  - an interface with the Bank’s collateral system, to enable accounts to be credited with intra-day liquidity secured by collateral.
- IV.31 All account holders have access to the browser-based Enquiry Link service which is operated by the Bank. This enables account holders to monitor activity on, and receive information about, their account(s) in the RTGS processor, and in certain circumstances to transfer funds between accounts. Payment system operators that use cash prefunding also have access through the Enquiry Link.

*Reserves and settlement accounts*<sup>24</sup>

- IV.32 Reserves accounts in RTGS are effectively sterling current accounts for Sterling Monetary Framework participants – they are among the safest assets a bank can hold and are the ultimate means of payment between banks. Whenever payments are made between the accounts of customers at different commercial banks, they are ultimately settled by transferring central bank money (reserves) between the reserves accounts of those banks.
- IV.33 Reserves balances can be varied freely to meet day-to-day liquidity needs, for example, to accommodate unexpected end-of-day payment flows. In this way, reserves balances can be used as a liquidity buffer. The funds held in reserves accounts are considered liquid assets

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<sup>24</sup> The special, segregated, accounts used for prefunding in Bacs and Faster Payments are subject to different arrangements, see IV.50-IV.51.

for the purpose of the PRA's liquidity requirements. All reserves account balances earn Bank Rate.

IV.34 Settlement accounts exist in the context of payment system membership. The same account may be used to settle the obligations from several payment systems, and may also be used for non-settlement purposes. An institution only holds a settlement account at the Bank where it is a member of one or more payment systems for which the Bank acts as Settlement Service Provider. Eligible institutions wishing to become direct participants in a payment system may apply for membership of that system simultaneously with their application for an account at the Bank.

IV.35 For banks, building societies, CCPs and designated investment firms ('broker-dealers'), reserves accounts are also used as settlement accounts.

IV.36 In July 2017, the Bank, announced that it was extending direct access to RTGS to non-bank Payment Service Providers (non-bank PSPs) to enable broader access to sterling payment systems. This means that electronic money institutions and payment institutions authorised by the FCA<sup>25</sup> are now eligible to apply for settlement accounts with the Bank. They are not, however, eligible to participate in SMF and would therefore not have access to reserves accounts or intraday liquidity. As they will not hold reserves accounts, their settlement account balances will not be remunerated.<sup>26</sup>

#### *Typical lifecycle of the transaction process*

#### CHAPS settlement

IV.37 The Bank provides same-day settlement for CHAPS payments made between 6:00 and 18:00 (with the ability to extend to 20:00 in contingency).<sup>27</sup> Settlement can occur at any point during this period but is subject to constraints controlled by the relevant account holders, such as available liquidity, and subject to account holders' exposure limits. CHAPS Direct Participants settle their own and indirect participants' CHAPS payments across accounts in RTGS.

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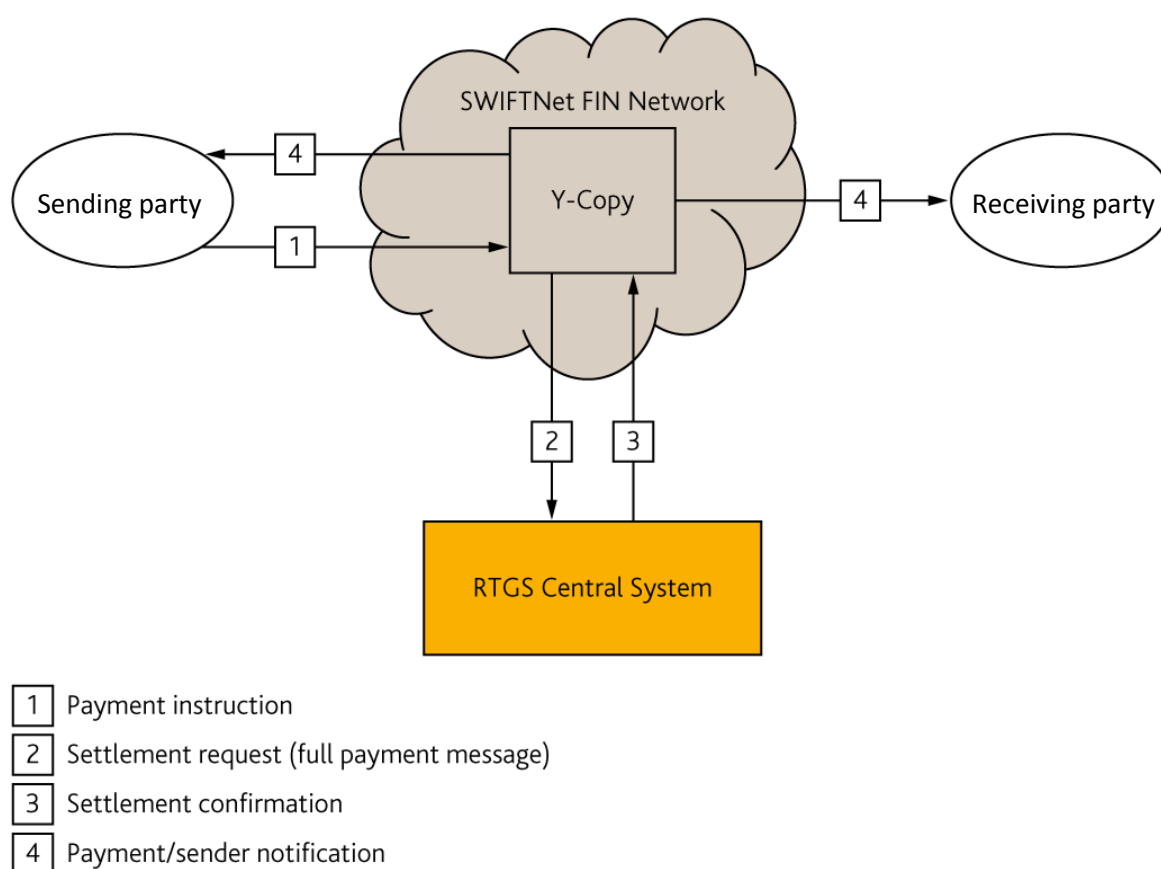
<sup>25</sup> As defined in the Electronic Money Regulations 2011 and the Payment Services Regulations 2009 respectively. For further information on non-Bank PSPs see page 12 of the Blueprint <http://www.bankofengland.co.uk/markets/Documents/paymentsystem/rtgsblueprint.pdf>

<sup>26</sup> Any overnight balances on collateralisation accounts will be remunerated.

<sup>27</sup> The end-of-day was 16:20 until 17 June 2016.

IV.38 Individual CHAPS payment instructions are routed via the SWIFT network to the RTGS system and settled across the sending and receiving CHAPS Direct Participants' settlement accounts. The message from the sending bank is stored within SWIFT FIN Copy while a full copy of the message is sent to the Bank for settlement. Once the payment is settled in RTGS with finality (sending bank's account debited, receiving bank's account credited), a confirmed is returned to SWIFT and the full payment message is then forwarded on to the receiving bank who then processes the payment as required in its own systems. Figure 4 illustrates this process.

**Figure 4: CHAPS settlement**



IV.39 Since mid-April 2013, the Bank has provided a Liquidity Saving Mechanism (LSM) within RTGS. This LSM contains the central scheduler that enables the CHAPS Direct Participants to manage their payment flows centrally. In particular, they can decide whether CHAPS payments should settle via 'urgent' or 'non-urgent' streams. RTGS settles urgent CHAPS payments one at a time and in much the same way as it has since RTGS was first introduced. However, every few minutes the LSM suspends urgent payment processing and switches to a 'matching cycle' that matches and then simultaneously settles batches of



offsetting non-urgent payments. Offsetting payments still settle gross from a legal standpoint but the simultaneous nature of the settlement means that banks economise on the use of liquidity.

IV.40 Each CHAPS Direct Participant provides liquidity to support the timely settlement of CHAPS payments in RTGS. Liquidity is primarily provided by holding balances on a reserves/settlement account, and can be supplemented through the provision of intra-day liquidity where eligible to receive (see below.)

#### DvP settlement for CREST

IV.41 CREST is the UK's securities settlement system, operated by Euroclear UK & Ireland, which since November 2001 has provided real-time cash against securities settlement (referred to as 'Delivery versus Payment' or DvP) for its members. The CREST system settles securities transactions in a series of very high-frequency cycles through the day; after each cycle the Bank's RTGS system is advised of the debits and credits to be made to the CREST settlement banks' accounts in central bank money as a result of the settlement activity performed by CREST in that cycle.

IV.42 The settlement instructions to CREST settlement banks' accounts are underpinned by irrevocable and unconditional undertakings by the Bank to debit the paying CREST settlement bank in RTGS and credit the payee CREST settlement bank in RTGS.<sup>28</sup> In the unlikely event that a CREST software error creates an overdraft in RTGS, CREST settlement is suspended while the overdrawn account holder covers the overdraft. If it is unable, the Bank may invoke the Operational Error Lending Scheme (OELS) to ensure that any credit risk incurred from such an error is mitigated. Under OELS, account holders that are prematurely enriched due to an operational error may temporarily lend an equivalent amount of liquidity back to the 'overdrawn' CREST settlement bank on an unsecured intra-day basis.

IV.43 There are around 17,000 CREST members, all with securities and cash accounts in the CREST system. Every CREST member must have a banking relationship with one or more CREST settlement banks. This relationship is reflected in the members' Cash Memorandum Accounts (CMAs) within CREST – against which all cash payments and receipts in respect of securities-related transactions are posted. Settlement banks set secured and unsecured

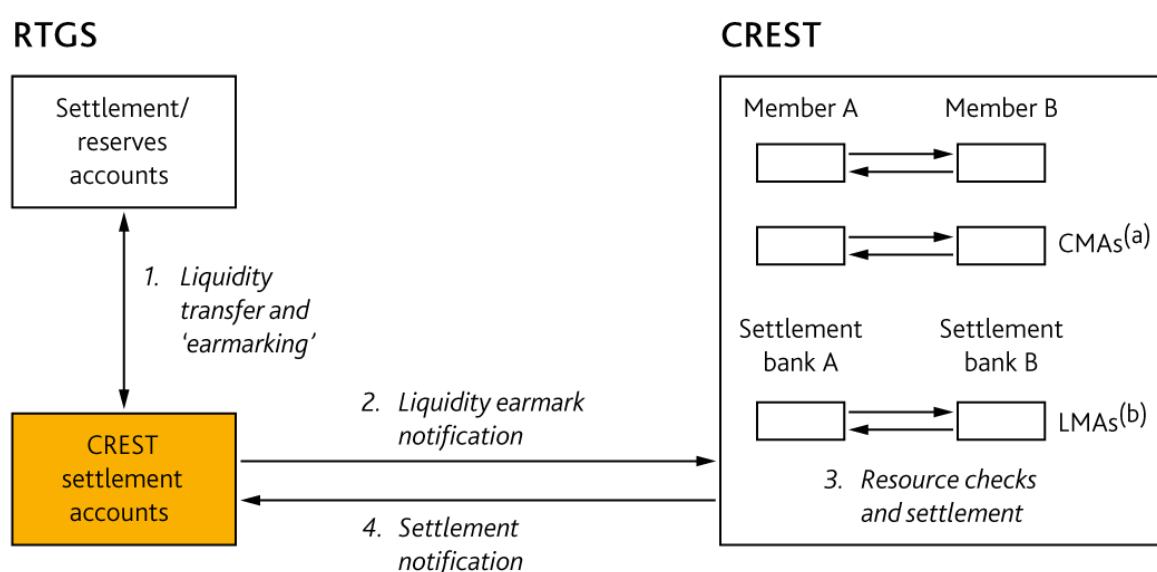
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<sup>28</sup> See Chapter 6 of EUI's CREST Reference manual for further information: [https://my.euroclear.com/dam/EUI/Legal information/CREST-Reference-Manual.pdf](https://my.euroclear.com/dam/EUI/Legal%20information/CREST-Reference-Manual.pdf) (click 'Access as a guest').

credit caps to the CMAs of the CREST members that they represent, and which the CREST system operates on the settlement banks' behalf through the CREST business day.

IV.44 CREST settlement accounts in RTGS have zero balances overnight. Before the start of CREST settlement each morning (and the sending of the first liquidity 'earmark' to CREST), settlement banks transfer funds to their CREST settlement accounts. During the day (between settlement cycles), settlement banks can add to or reduce the balance on their CREST settlement accounts. At the end of the CREST day, balances are automatically swept back up to the primary reserves/settlement account. Figure 5 illustrates this process.

**Figure 5: CREST settlement**



- (a) Cash Memorandum Accounts.
- (b) Liquidity Memorandum Accounts.

IV.45 As with CHAPS transfers, the Bank supports the real-time settlement process in CREST through the provision of intra-day liquidity to the CREST settlement banks; and again this is provided via an intra-day repo (under a procedure known as auto-collateralisation, which is carried out on the Bank's behalf by the CREST system).

Intra-day liquidity

IV.46 The Bank operates a collateral pooling model to support its official operations, which includes intra-day liquidity. Under this model, each SMF Participant maintains a collateral pool of securities within the Bank's collateral management system, which is used by the Bank to collateralise its current exposures.

IV.47 Intra-day liquidity is generated when there is excess eligible collateral in a member's main collateral pool. At the start of each Business Day, the Bank will credit the SMF Participant's liquidity account within the Payment Minimum Balance Group to the value of the excess eligible collateral available in the SMF Participant's main collateral pool; up to the 'intraday liquidity cap' set by each participant. At the end of each business day the Bank will debit the SMF Participant's Payment Minimum Balance Group of the intra-day liquidity amount, and the value of the excess collateral compared to exposures in the collateral pool will increase accordingly. During the operational day the value of the intra-day liquidity loan can be varied by the SMF Participant adjusting the value of excess eligible collateral in their main collateral pool.

#### Deferred net settlement

IV.48 The RTGS Service provides same-day settlement on the value date for systems where multilateral net interbank obligations are settled on a deferred basis relative to the clearing of bilateral gross payments. These deferred settlements are scheduled at fixed points during the RTGS day, but may settle later than planned if there are operational delays or an account holder due to be debited lacks funds. The Bank supports multiple settlements per day per system – for example, Faster Payments currently settles three times per business day.

IV.49 Each deferred net settlement system determines its own access criteria as well as the number and duration of settlement cycles:

- For Bacs, CHAPS, Cheque & Credit, CREST and Faster Payments their Direct Participants (settlement bank in the case of CREST) must, under their respective access criteria, hold an account in RTGS which can be used for settlement.
- For the LINK and Visa systems, a Direct Participant requires access to an account held in RTGS which can be used for settlement. Institutions ineligible for an account in RTGS may use the services of one of the other Direct Participants to settle their obligations arising from the payment system.

IV.50 The operators of Bacs and Faster Payments require their Direct Participants to prefund their maximum net settlement exposures. This involves a separate 'reserves/settlement collateralisation account' (RCA or SCA)<sup>29</sup> in RTGS for each directly-settling participant in Bacs and Faster Payments. Each RCA/SCA is linked to the relevant account holders' primary settlement account. Account balances in the RCA/SCA must always be greater than,

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<sup>29</sup> SCAs will be required for participants in prefunded systems ineligible for reserves accounts (primarily non-bank PSPs).

or equal to, the size of a participant's 'cap' value (the maximum net debit position they are allowed to incur) in the relevant payment system.

IV.51 Balances held in RCAs/SCAs that are in excess of the minima required to prefund deferred net settlement payment systems are withdrawable at times of stress. The 'minima required' refers to payments that are irrevocable but not yet settled. The caps set in Bacs and FPS can and therefore the associated minimum balances set on RCA/SCA can be lowered to the 'minima required' at the request of the firm.

Implementation of prefunding for Cheque & Credit, alongside the introduction of cheque imaging, is planned for the second half of 2017.

**Table 5: Summary of RTGS daily timetable**

<b>RTGS, CHAPS and Net Settlement Events</b>	<b>Time</b>	<b>CREST Event</b>	<b>Time</b>
Transfers between own accounts and Enquiry Link access enabled; and Notes Circulation Scheme settlement	<b>05:15</b>		
Start of CHAPS settlement	<b>06:00</b>	Start of Delivery vs. Payment (DvP)/Free of Payment (FOP) <sup>30</sup> settlement	<b>06:00</b>
Hourly CLS pay-in and/or pay-out deadlines	<b>07:00 to 11:00</b>		
Faster Payments settlement	<b>07:05</b>		
Bacs settlement	<b>09:30</b>		
Cheque & Credit settlements (up to six settlements between 10:40 and 11:10)	<b>10:40</b>		
LINK settlement	<b>11:00</b>		
Faster Payments settlement	<b>13:05</b>		
Visa settlement	<b>14:00</b>		
		End of equity and gilt DvP settlement	<b>14:55</b>
		Start of Delivery By Value (DBV) settlement <sup>31</sup>	<b>15:00</b>
Faster Payments settlement	<b>17:05</b>		
		End of DBV settlement	<b>17:30</b>
End of CHAPS settlement for customer payments (MT103)	<b>17:40</b>		
End of CHAPS settlement for interbank payments (MT202)	<b>18:00</b>	End of FOP settlement	<b>18:00</b>
Notes Circulation Scheme settlement	<b>18:30</b>		
Latest end of contingency extension	<b>20:00</b>	Latest end of contingency extension	<b>19:30</b>

<sup>30</sup> FOP refers to free of payment, a delivery of securities which is not linked to a corresponding transfer of funds.

<sup>31</sup> DBV refers to Delivery-by-Value, whereby a member may borrow or lend cash against collateral in CREST for an agreed term. The system selects and delivers an agreed value of collateral securities meeting pre-determined criteria against cash from the account of the cash borrower to the account of the cash lender and reverses the transaction at the end of the agreed term.

## RTGS Renewal Programme

- IV.52 On 9 May 2017, the Bank published a Blueprint for RTGS renewal.<sup>32</sup> The Bank will design the renewed RTGS to deliver a resilient, flexible and innovative sterling payment system for the United Kingdom to meet the challenges posed by a rapidly changing landscape. This followed a significant phase of stakeholder engagement and consultation. The renewed RTGS service will be delivered through a multi-year programme of work. The Bank will ensure that RTGS renewal is an open and collaborative effort with extensive stakeholder engagement at all stages.
- IV.53 The renewed RTGS will deliver a range of new features and capabilities. This is necessary because the way payments are made has changed dramatically in recent years, reflecting changes in the needs of households and companies, changes in technology, and an evolving regulatory landscape.
- IV.54 The Bank's vision for the renewed RTGS is organised around five key features:
- Higher resilience: The Bank will further strengthen the resilience of RTGS and flexibility to respond to emerging threats, including through enhanced contingency messaging channels.
  - Broader access: The Bank will facilitate greater access to central bank money settlement for institutions and infrastructures. The Bank has already announced extended access for non-bank Payment Service Providers. Further changes will target streamlining testing, connectivity and on-boarding as well as reducing the cost of access. The Bank will also require institutions above a certain value threshold to access CHAPS directly.
  - Wider interoperability: The Bank will promote harmonisation and convergence with critical domestic and international payment systems. The Bank will adopt ISO 20022 messaging, facilitate synchronisation with other infrastructures, and promote alternative processing arrangements for time-critical retail payments.
  - Improved user functionality: The Bank will support emerging user needs in a changing payment environment. Enhancements include near 24x7 technological capability, use of Application Programme Interface (API), and other tools to track and manage payments.
  - End-to-end risk management: The Bank will move to direct delivery of the HVPS (CHAPS system) before end 2017 to enable end-to-end risk management.(See paragraphs II.19-II.20)

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<sup>32</sup> <http://www.bankofengland.co.uk/markets/Pages/paymentsystem/strategy.aspx>

## **Annex 1 – Key documents relating to the RTGS Service**

### Legal documentation

#### *Published documents:*

- [RTGS Account Mandate Terms & Conditions](#)
- [Reserves Accounts Annex](#)
- [CHAPS Sterling Payments Annex](#)
- [Bacs Settlement Annex](#)
- [C&CC Settlement Annex](#)
- [Faster Payments Settlement Annex](#)
- [LINK Settlement Annex](#)
- [Visa Settlement Annex](#)
- [NCS Payments Annex](#)
- [IDL Loans Annex](#)
- [Collateral Annex](#)

#### *Documents shared with current and prospective account holders and payment system operators:*

- Bespoke agreements with payment system operators
- Additional documentation for CREST settlement banks
- RTGS Reference Manual

## Annex 2 – Useful links

### General information relating to RTGS

- [Access to accounts in RTGS](#)
- [Deferred net settlement service](#)
- [RTGS service availability](#)
- [RTGS Strategy Review](#)
- [RTGS Tariffs](#)
- [Settlement Accounts](#)

### Quarterly Bulletin articles

- [Enhancing the resilience of the Bank of England's Real-Time Gross Settlement infrastructure](#)
- [The Bank of England's Real-Time Gross Settlement Infrastructure](#)
- [How has the Liquidity Saving Mechanism reduced banks' intraday liquidity costs in CHAPS?](#)

### General information relating to the Sterling Monetary Framework

- [Sterling Monetary Framework](#)
- [Sterling Monetary Framework - Documentation](#)
- [Sterling Monetary Framework – The Red Book](#)
- [Reserves Accounts](#)
- [Reserves Accounts in RTGS – Quick reference guide](#)

### General information relating to the Bank and related functions

- [Bank of England Annual Reports and Accounts](#)
- [Bank of England governance](#)
- [Bank's application of the Senior Managers Regime](#)
- [FMI Supervision Annual Report 2017](#)

### Websites of the payment system operators

- [Bacs](#)
- [CHAPS Co](#)
- [Cheque & Credit](#)
- [CLS](#)
- [Euroclear UK & Ireland](#)



- [Faster Payments](#)
- [LINK](#)
- [Visa Europe](#)

#### Principles for financial market infrastructures publications

- [Principles for financial market infrastructures](#)
- [Principles for FMIs: Disclosure framework and assessment methodology](#)
- [Application of the Principles for financial market infrastructures to central bank FMIs](#)

#### RTGS Renewal Programme

- [A blueprint for a new RTGS service for the United Kingdom](#)
- [New Heart for a Changing Payments System](#)
- [RTGS Consultation Paper](#)

## Annex 3 – Glossary

**Auto-Collateralising Repo (ACR)** – For the purpose of transactions settling in CREST, the repo generated by the CREST system between a CREST Settlement Bank’s repo member account and/or its linked member account and the Bank, delivering collateral against which liquidity is provided by the Bank in the event of that CREST Settlement Bank having insufficient liquidity available in CREST to settle a transaction. The Bank enters into an agreement covering ACRs with each CREST Settlement Bank.

**Bank or Bank of England** – The Governor and Company of the Bank of England.

**CHAPS** – Clearing House Automated Payment System. Refers to the same-day payment system operated by CHAPS Co.

**CHAPS Co** – The CHAPS Clearing Company Limited, the company which is responsible for the day-to-day management of CHAPS. The Bank will directly deliver the CHAPS System, replacing CHAPS Co as operator, from late 2017.

**CREST** – The securities settlement system operated by Euroclear UK & Ireland Limited to facilitate the transfer of gilts, eligible debt, equity securities and other uncertified securities.

**Collateralisation Account** – A segregated account held at the Bank of England used for prefunding. There are two types of Collateralisation Account: Reserves Collateralisation Accounts (RCAs) for members of the SMF already holding a reserves account; and Settlement Collateralisation Accounts (SCAs) for institutions ineligible for SMF membership. Each member of a Deferred Net Settlement Payment System that uses prefunding has a separate collateralisation account for each payment system. The Minimum Balance on each collateralisation account is maintained by the operator of the relevant Deferred Net Settlement Payment System to correspond to the net debit cap of the payment system, and a balance equal to or in excess of the net debit cap will need to remain in place at all times. The balance on an RCA forms part of an institution’s total reserves account balance. All collateralisation accounts (RCA and SCA) will be remunerated at the same rate as reserves accounts.

**Deferred Net Settlement (DNS) Payment System** – A payment system that settles on a multilateral, deferred net basis. Settlement in RTGS takes place after the individual customer payments are cleared and exchanged.

**Delivery versus Payment (DvP)** – A mechanism in an exchange for value settlement system that ensures that the final transfer of one asset occurs if and only if the final transfer of (an)other asset(s) occur.

**Enquiry Link** – The system that allows RTGS account holders and certain other organisations to interrogate balance and other information and to perform certain other functions.

**Euroclear UK and Ireland Ltd (EUI)** – The organisation that owns and operates the CREST system; part of the Euroclear group.

**Financial Markets and Insolvency (Settlement Finality) Regulations 1999** – Directive 98/26/EC of 19 May 1998 on settlement finality in payment and securities settlement systems, implemented in UK law by the Financial Markets and Insolvency (Settlement Finality) Regulations 1999. The Regulations provide designated payment and settlement systems with some protections against the normal operation of insolvency law, in order to reduce the likelihood of disruption to financial stability.

**Intra-day liquidity** – Liquidity provided to certain CHAPS Direct Participants and CREST Settlement Banks to help ensure that they are able to make sterling payments, in addition to drawing on their reserves balances.

**ISAE 3402** – The International Standard on Assurance Engagements (ISAE) 3402 replaces SAS 70 (the Statement on Auditing Standards No. 70), which defined the standards an auditor must employ in order to assess the contracted internal controls of a service organisation.

**Level A collateral** – Level A collateral is a subset of the highest rated sovereign debt, with low credit, liquidity and market risk. This is published in the Bank's Red Book, as well as on the Bank's website.

**Liquidity Saving Mechanism (LSM)** – Functionality within the RTGS Processor which matches pairs or groups of CHAPS Payments, settling them in batches simultaneously to offset their liquidity needs against one another. CHAPS Direct Participants use the Central Scheduler to manage their payment flows within the RTGS Processor and the Matching Process employs algorithms to attempt to offset the queued payments.

**Main Collateral Pool** – A collateral pool held in the Bank's collateral management system that is used by the Bank to collateralise its current exposures to an SMF participant.

**Market Infrastructure Resiliency Service (MIRS)** – A contingency payment settlement service provided by SWIFT that offers a market infrastructure operational resilience in the event of unavailability of its RTGS system. Once activated, MIRS calculates accurate balances for all RTGS accounts and provides final settlement in central bank money.

**MT103** – SWIFT message type for single customer credit transfers.

**MT202** – SWIFT message type for general financial institution transfers.

**Operational Error Lending Scheme (OELS)** – Part of the DVP error handling procedures, governing how the Bank and EUI may request CREST settlement banks, that are prematurely enriched due to an operational error, to temporarily lend an equivalent amount of liquidity back to the 'overdrawn' bank, on an unsecured intra-day basis.

**Non-CHAPS transfers** – Non-CHAPS transfers include the transfers account holders may make between their own accounts and interest credited to reserves accounts. A full list is set out in the RTGS Reference Manual.

**Payment Minimum Balance Group** – A group of accounts in RTGS all held by the same account holder. The prime account within the group is the Payment Settlement Account (which may be the Reserves Account) across which all CHAPS payments are settled. Other accounts within the group are liquidity accounts. The prime account within the group may go overdrawn intra-day providing it is supported by funds on the Liquidity Accounts, i.e. the Minimum Balance Group as a whole may not go overdrawn.

**Payment Settlement Account / Settlement Account** – Prime account in the Payment Minimum Balance Group denominated in sterling maintained by an account holder in the RTGS System over which CHAPS payments are settled.

**Prefunding** – A model for collateralising Deferred Net Settlement Payment Systems that uses cash balances. Each member always has the necessary resources set aside in a reserves or settlement collateralisation account to meet their maximum possible settlement obligation. Prefunding is used by Bacs and Faster Payments. It will be used by the Image Clearing System once that system has gone live.

**Real-Time Gross Settlement (RTGS)** – The accounting arrangements established for the settlement in real-time of sterling payments across settlement accounts maintained in the RTGS System.

**Red Book** – The framework for the Bank's operations in the sterling money markets is set out in the Bank's 'Red Book'. The Red Book is periodically updated to reflect changes to the Bank's operations. (See Sterling Monetary Framework.)

**Reserves Account** – An account held at the Bank of England for the purpose of the Bank's reserves account facility as described in the “Documentation for the Bank of England's Sterling Money Market Operations” as published by the Bank and amended from time to time.

**RTGS Delivery Board** – Chaired by the Executive Director for Banking, Payments and Financial Resilience, the Board supports the management responsible for RTGS Service to meet the agreed strategy and service standards and reports to the RTGS Strategy Board.

**RTGS Reference Manual** – A manual describing the RTGS facility provided by the Bank for account holders in accordance with and subject to any limitations contained in their mandate agreement. It also contains the operating procedures describing intra-day liquidity advances between the Bank and relevant account holders

**RTGS Strategy Board** – Chaired by the Deputy Governor for Markets & Banking, the Board is responsible for the overall strategic direction and delivery of the RTGS Service.

**RTGS Terms & Conditions** – A document that all RTGS account holders are required to sign up to, detailing the legal basis for the Bank's operation of RTGS, and the rights and obligations of the Bank and account holders in the provision and use of this service.

**Settlement Service Provider Agreement** – An agreement between the Bank of England and each Deferred Net Settlement Payment System operator that governs the relationship between the Bank and each operator.

**Settlement Account** – Term used for a reserves account used to settle obligations in a payment system which settles across RTGS or an account held in RTGS for the purpose of settling obligations in a payment system which settles across RTGS by an institution ineligible for a reserves account.

**Sterling Monetary Framework (SMF)** – The Bank's framework for its operations in the sterling money markets is set out in the Red Book (see above). The operations are designed to implement the Monetary Policy Committee's decisions in order to meet the inflation target and reduce the cost of disruption to the critical financial services, including liquidity and payment services, supplied by SMF participants to the UK economy.