

The Payment and Settlement Systems

Introduction

A payment system is defined as ‘a system that enables payment to be effected between a payer and a beneficiary, involving clearing, payment or settlement service or all of them, but does not include a stock exchange’, and includes ‘the systems enabling credit card operations, debit card operations, smart card operations, money transfer operations or similar operations’. Settlement means ‘settlement of payment instructions and includes the settlement of securities, foreign exchange or derivatives or other transactions which involve payment obligations’ (Payment and Settlement Systems Act, 2007). Clearing operations are subsumed in payment and settlement systems. A standard classification of the payment and settlement systems relevant for the reference period is shown in Table 8.1.

The economic liberalisation process had led to growth and innovation in financial markets, as well as increased risks. Responding to these challenges

Table 8.1 Classification of Payment and Settlement Systems

<i>Large Value Payment Systems*</i>	<i>Retail Payment Systems</i>
Interbank Cheque Clearing [†]	Cheque Clearing (MICR/non-MICR) [†]
High-Value Clearing [†]	Electronic Clearing Services (ECS [Debit] and ECS [Credit])
Negotiated Dealing System	Electronic Funds Transfer Systems (EFT/NEFT)
Foreign exchange Clearing	Card Payments
Real Time Gross Settlement System	Electronic Benefit Transfer System
	Mobile Payments

Source: Adapted from RBI, *Annual Report, 2002–03*, and as updated at the end of 2007–08.

Notes: * Considered as Systemically Important Payment Systems (SIPS).

[†] Paper-based systems in contrast with other retail payments which are electronic.

and opportunities, the Reserve Bank redesigned and developed the payment and settlement infrastructure. Several major initiatives had begun before 1997, including the introduction of magnetic ink character recognition (MICR) technology, electronic clearing service (ECS), electronic funds transfer (EFT) and delivery versus payment (DvP) in government securities transactions.¹ In the capital market, the National Securities Depository Ltd. (established in 1996) pioneered dematerialisation of securities. In 1996, the Bank set up the Institute for Development and Research in Banking Technology (IDRBT) in Hyderabad. From 1 January 1995, the Bank carved out a separate department, the Department of Information Technology (DIT) out of the Management Services Department. Until 2005, the DIT oversaw initiatives based on information technology (IT) within the Bank and the industry, and improved the infrastructure of the payment-and-settlement-related services. The organisational evolution culminated in March 2005 with the establishment of the Department of Payment and Settlement Systems (DPSS) and a Board for Regulation and Supervision of Payment and Settlement Systems (BPSS). A Payment and Settlement Systems Act, 2007, accorded regulatory and supervisory powers to the Bank over all payment systems in the country.

This chapter outlines the major initiatives undertaken and implemented by these bodies during the reference period to improve speed, convenience, efficiency and safety in financial transactions.

The System in 1997–98

The banking network as at the end of March 1998 consisted of 66,306 bank offices belonging to 299 commercial banks (27 in the public sector, 34 in the private sector, 42 foreign banks and 196 regional rural banks). In addition, there were 413 cooperative banks at the state and district levels, 1936 primary urban cooperative banks and 745 primary land development banks. Restricted banking facilities were provided by post offices numbering over 100,000.

Cash continued to be the dominant means of settling payments.² However, over the previous two decades, there had been a substantial growth of paper-based instruments such as cheques, demand drafts, travellers' cheques, payment orders and interest and dividend warrants. Banks also offered other means for funds transfer such as mail and telegraphic transfer. A small beginning

had been made in electronic payment instructions through ECS (credit and debit) and EFT. Banks had started using plastic cards such as credit cards. Automated teller machines (ATMs) for various banking transactions had also been set up through a shared payment network of banks.

Cheques were the most important form of payment apart from cash. In the previous two decades, the volumes of cheques had registered a growth of around 10 per cent a year. While it was recognised that the introduction of electronic substitutes might reduce the growth of cheques and other payment instruments, paper-based payment instruments would continue to play an important role in payment transactions in local and intercity payments.

Under the Negotiable Instruments Act, 1881, all instruments had to be physically presented for payment and settlement. Therefore, in both local and intercity clearing, payment instruments had to be transported physically from the collecting bank or branch to the paying bank or branch. The communication flow (originating and responding advice) was sent through the post, telephone and telegram. In 1990, the Bank set up the BANKNET telecommunication network which connected four metros and three other centres through intercity leased Department of Telecommunications lines. Dial-up connectivity to the network was provided through RBINET communication software.

Settlement of payment instruments took place in 860 clearing houses as at the end of March 1998. In fourteen major centres, the clearing houses were managed by the Bank, 840 were managed by State Bank of India (SBI) and its associates, and 6 by nationalised banks. Computerised cheque clearing settlement was available at four metros, with the cheque processing being done at the National Clearing Centres. Interbank settlements were done at the fifteen Deposit Account Departments of the Bank individually. Banks maintained a current account at each Deposit Account Department and these accounts were used to settle clearing and other payments. Interbank clearing settlement was done in the books of the Reserve Bank through an end-of-the-day netting system. The Bank did not guarantee the settlement as it was done on the basis of availability of funds. In other centres, the bank that managed the clearing house maintained the accounts of the participant banks and a netting settlement was done with respect to the clearing transactions. The Remittance Facility Scheme of the Bank enabled banks to transfer funds between their accounts in different Deposit Account Departments. In other centres, SBI and its associates provided the remittance facility as well as treasury functions as agents of the Reserve Bank.

All members of the clearing house maintained an account with the clearing bank managing the clearing house. In case of an adverse position in the clearing, a banker's cheque was issued to the clearing house. The branch managing the clearing house might either withdraw or deposit funds into the currency chest, without either decreasing or increasing the liquidity at that centre. Liquidity management was done at the controlling offices, where the Issue Departments of the Bank were located.

The introduction of MICR-based clearing in 1986 started the era of computerisation in payment systems in India. Initially confined to the four metropolitan centres, the MICR technology was expanded in phases to cover 26 centres by 1998. In the centres where MICR was yet to be introduced, computerised settlement operations had been introduced gradually to cover all clearing houses managed by the Bank. ECS was used for repetitive payments such as dividend, interest or salary or utility bill payments by a large number of customers. This service had been initiated in a limited way in the previous four years and was mainly confined to the four metropolitan centres. It was being extended to other cities.

EFT was started on an experimental basis between Mumbai and Chennai in 1996. The service, initially confined to twenty-seven public sector banks, was extended to all the four metropolitan centres and, subsequently, covered seven other major cities. All banks were allowed to participate in the EFT scheme at all the Bank centres where it was in operation. This was done through RBINET and extended to a very small aperture terminal (VSAT) based network as and when it was set up.³

The sale and purchase of government securities under the subsidiary general ledger accounts were done on a DvP basis in the Public Debt Office of the Bank. This was operational in Mumbai, Chennai, Bengaluru and Kolkata. The bulk of the transactions was concentrated in Mumbai.

The paper-based systems offered considerable flexibility to customers and were well understood by users. The main strength of the system was an extensive network of banks working on a strong legal basis.⁴ However, there were several weaknesses too. There was considerable delay in the settlement of a transaction because of the time lag between the issuance of a payment instruction and the completion of payment. Typically, the settlement of a local cheque could take a minimum of three days and that of an intercity cheque seven days. There was a problem of reconciliation of transactions, and entries were often not reconciled for months and even years. This gap would be open

to exploitation and frauds. The risk was high due to delay. Irregularities in securities transactions in 1992 were essentially a result of weaknesses in the settlement of government securities transactions. The system had low levels of security. Fund management by banks was not efficient because of the disaggregated nature of settlements and the absence of real-time information and funds transfer facilities.

Early Institutional Arrangements

While several initiatives had been taken since the early 1980s with regard to the modernisation and development of payment and settlement systems in the country, the emphasis was laid on technology-based solutions, and what was missing was a holistic approach to issues pertaining to payment and settlement systems. The need for a comprehensive approach to strengthening the system was raised in December 1997 by Executive Director A. Vasudevan, in his report on the Conference of Managing Change in Payment Systems.⁵ The idea was endorsed by Deputy Governor S. P. Talwar and Governor Jalan, and an Internal Group on Payment Systems was formed on 30 December 1997.⁶

The group was asked to make an operational plan for the establishment of a Payment Systems Group within the DIT. On 1 January 1998, Vasudevan submitted a note on the 'Information Technology Strategy' for the Bank. The note observed that while the DIT had played a role in technological modernisation since 1995, there had been no definitive strategy, nor a well-established policy of IT for the Bank. The note attempted to present the main elements of an IT strategy of the Bank for the next three years. The DIT's present work relating to the payment system of the economy needed to be taken care of by a special group within the DIT. Such a Payment Systems Group had to be multi-disciplinary, with experience in banking, law, economics and technology.⁷ An internal group was formed. Its report (1 February 1998) paved the way for a Payment Systems Group in the DIT.⁸ The Payment Systems Group met every week. It prepared position papers after internal discussions and with the department concerned and then put up the papers before the Payment System Advisory Committee. The committee was an advisory body and met every month.

Improvements in payment and settlement systems necessarily required constant technology upgrading. The report of the Committee on Banking Sector Reforms (Narasimham Committee II) laid emphasis on this

requirement. To examine the issues pertaining to technology in the banking sector, the Bank appointed, in September 1998, a Committee on Technology Upgradation in the Banking Sector.⁹ The committee was asked to suggest, among other steps, necessary legislative changes for implementation of electronic funds transfer; computerisation of government accounts; development and utilisation of a satellite-based wide-area-network by financial institutions; standards relating to security, messages and smart cards; data warehousing and data mining; management information system; and guidelines for outsourcing of programme development and implementation.

The committee in its report of 7 May 1999 made a number of specific recommendations on these matters.¹⁰ An action plan was drawn up and three subgroups were formed to review security policies, legal issues and computerisation in banks. Each bank was asked to prepare a five-year computerisation plan and follow it up.

The internal group had recommended setting up of a National Payments Council (NPC). The NPC was formed in June 1999 with Deputy Governor S. P. Talwar as the Chairman and members drawn from major commercial banks, Ministry of Finance, stock exchanges, Securities and Exchange Board of India (SEBI) and non-banking financial companies (NBFCs).¹¹ The objectives of the NPC included coordination of the reform process; giving policy directions; laying down parameters for design and development of an integrated payment and settlement system, and undertaking periodical reviews. To meet these aims, the NPC appointed five regular task forces: (a) Monetary Policy and Related Issues (Chairman: A. Vasudevan), (b) Payment and Settlement Systems Oversight (Chairman: Janakiraman, Deputy Managing Director, SBI), (c) Legal Issues (Chairman: A.T. Pannir Selvam, Chairman, Indian Banks' Association [IBA]), (d) Technology Related Issues (Chairman: R.H. Patil, National Stock Exchange) and (e) Systems and Procedures (Chairman: Rashid Jilani, Chairman and Managing Director, Punjab National Bank).

With these institutional arrangements in place, the DIT transformed from being a department looking after computerisation within the Bank into an agent of change. It played a catalytic role in the design and development of payment and settlement systems, and in promoting new and upgraded technologies in the banking sector in tune with the rest of the world by following the recommendations of the Committee on Technology Upgradation in the Banking Sector. The NPC continued to perform its advisory role until 2005.

The Bank in consultation with market participants had started publishing 'vision documents' for payment systems. The first such document was released in December 2001 and covered a three-year period. It emphasised consolidation, development and integration of the payment and settlement systems. An evaluation revealed that most of the goals outlined had been met while a few were at various stages of implementation.¹² Major achievements related to payment system offerings such as real time gross settlement (RTGS), centralised funds management system (CFMS), negotiated dealing system (NDS), conditions for the setting up of the Clearing Corporation of India Ltd (CCIL), securities settlement systems (SSS), ECS, EFT, new MICR centres, and compliance with the core principles of the Bank for International Settlements (BIS).

This document was followed up by another vision document for 2005–08 (May 2005). The mission was to achieve safe and efficient payment and settlement systems for the country. A summary of an internal assessment of these two vision documents is provided in Appendix 8A.1.

Developing the Communication Backbone: VSAT Technology and the INFINET

In the early 1990s, one of the major bottlenecks in the banking system was the lack of fast, safe and secure intrabank and interbank communication. Most complaints against banks then related to the time taken for the transfer of funds across banks and between cities and to the delays in the collection of outstation cheques. The functioning of the terrestrial line networks was not very efficient. The wide geographical spread of branches of banks and the terrain of the country made a reliable communication backbone an imperative.

The solution was a satellite-based network using VSAT technology. Without VSAT technology, it would be difficult to initiate the Indian Financial Network (INFINET), which was the telecommunications backbone for the banking and financial sectors.¹³

While the Bank and the IDBFT were in the process of setting up the VSAT-based INFINET as the main communication backbone, the project met with resistance from the Society for Worldwide Interbank Financial Telecommunication (SWIFT).¹⁴ Although SWIFT was present in India since 1992, banks used SWIFT only for transmitting international messages for settlement of international transactions. SWIFT prepared a country plan

for India in 1998, sent it to the IBA, and sought a meeting with it. The IBA sent this plan to the Bank. The country plan reviewed the status of the Indian financial system and SWIFT's position and plans in the country. DIT in its note (by G. Srinivas, 7 November 1998) took exception to some of the observations in the country report. SWIFT had used unusually harsh language in describing the Bank and public sector banks. The Bank was described as an 'authoritarian and strong central bank' and public sector banks as being 'overstaffed, bureaucratic, inward focussed and with a low international profile'. The use of the obsolete telex by banks in India, the report observed, was due to the Bank and the telecom authorities not permitting banks in India to use SWIFT for domestic messages.

Deputy Governor Talwar recorded on the note, 'I recollect on State Bank of India approaching us for more SWIFT centres, we have said "no" since we are contemplating VSAT to commence operations soon. [I] would like an approach paper in response to SWIFT letter so that we should brief IBA properly to enable them to know our perspective.'

The approach paper on 'Domestic Use of SWIFT' explained that the Bank had taken a consistent view from 1994 when the issue was first mooted, that SWIFT could not be used for the exchange of domestic messages. The process of a typical message transfer over SWIFT was the following: a domestic message from bank 'X' over SWIFT would travel to SWIFT's overseas server (Holland or USA) through the Indian gateway and would be re-routed once again to the Indian gateway as the destination is a branch of bank 'Y' in India. The responsibility of SWIFT was limited to delivering the message to the gateway and it was the responsibility of the user to log into the gateway and download the message, that is, there was no point-to-point delivery of messages. In view of this limitation, it was felt that INFINET would provide a better solution as messages between branches would not have to travel overseas and then reside at a particular node waiting to be downloaded but could be exchanged directly between the branches. The added advantage would be the settlement of interbank funds, as the Bank would be the service provider.

The approach paper added that in February 1996, officials from SWIFT held a meeting with the top management of the Bank, spread over two days, on the issue of domestic use of SWIFT. SWIFT was requested to provide its systems and application software to the Bank on payment of one-time licence fees, which would then run on INFINET. This proposal had the advantage of

incorporating both settlement services as well as point-to-point delivery of messages. The officials from SWIFT, however, expressed their reservations on licensing their software as it would directly eat into their revenues.

In February 1996, the Department of Telecommunications, while renewing the licence for operation of the SWIFT network, removed all restrictions on the use of SWIFT, throwing it open for domestic as well as international message transfer. The Bank as the main hirer, while conveying its acceptance of the terms and conditions of the Department's licence, reiterated that its formal acceptance was subject to the Department retaining the clause that SWIFT would be used for only international financial messages. The information gathered by the DIT revealed that there were no restrictions on the use of SWIFT in most countries. However, a meeting with S. Ramani, Director, National Commission on Science and Technology, Mumbai, brought out the fact that permitting the domestic use of SWIFT would starve INFINET of message traffic, make the expenditure incurred on setting up the network redundant and compromise national security by exposing domestic banking transactions to foreign scrutiny. It was, therefore, decided that INFINET needed to be operationalised and stabilised; the users of INFINET be made conversant with all aspects of its functioning; and after these aims were met, the Bank would examine whether SWIFT along with INFINET could be used for domestic messages. A final decision would be taken thereafter.

In February 1998, the Department of External Investment and Operations mooted the idea of using SWIFT for Asian currency unit transactions, but the proposal was rejected by the DIT. On several occasions of exchange with other banks and SWIFT itself, the Bank stuck to its position that it would be appropriate to use SWIFT for international messages only.

Meanwhile, a group of Members of Parliament (MPs) opposed the Bank's stance on the issue.¹⁵ In separate letters, MPs Ghulam Nabi Azad and D. P. Yadav wrote to the Finance Minister expressing apprehensions about the Bank's move to set up its own communication backbone. D. P. Yadav sent letters to thirty-four members of the telecom consultative committee. The government seemed to have received similar letters from other MPs too. The letters stated that the central bank wanted to set up a proprietary VSAT network to monitor operations at its branches and that the Bank, which was essentially a central bank and not a telecom company, might not be able to operate and maintain the network system at optimum efficiency levels. Such levels of efficiency on a special network could only be maintained by specialist operators or organisations with proven track records.

In 1998, the DIT and IDRBT progressed in their mission to set up a wide-area satellite-based network using VSAT technology. The network was inaugurated by Deputy Governor Talwar and went live on 19 June 1999. To evolve a common approach to tackle issues of mutual interest, an INFINET user group of member banks was constituted. In the first phase, the network was made available to all public sector banks and the Bank. Membership was soon extended to private banks, cooperative banks and branches of foreign banks and financial institutions, such as primary dealers (PDs) in government securities, which merited connectivity to the network. A subgroup on standardisation of message formats set by the INFINET user group recommended SWIFT message format for all interbank and intrabank applications with modifications to take care of Y2K compliance.

INFINET became a milestone in the way banking transactions were to be conducted in the future. It was significantly supported by the user group, which made a number of key recommendations that achieved standardisation of message formats and facilitated interbank applications. The Working Group on Design of Message Formats (October 1999), for example, recommended message formats for applications, such as customer payments and cheques, financial institution transfers, cash management and customer status, and common group and system messages, which would be implemented in the first stage. The working group's recommendations for message formats for government transactions, currency chest transfers and some segments of government securities transactions were taken up in the second stage. The INFINET user group of member banks met on a regular basis. They set up the Working Group on Design of Message Formats and a subgroup to identify interbank applications and vendors, and another subgroup on structured financial messaging backbone solution.

An important prerequisite for a complete communication system was the message transfer utilities. The structured financial messaging solution (SFMS), which provided this facility on INFINET, was launched on 14 December 2001 by extending the facility to the three banks (Canara Bank, Punjab National Bank and Bank of Maharashtra) that participated in the trial run. The SFMS used message formats similar to those of SWIFT to enable banks to use the SFMS with ease. Banks were urged to take necessary steps to further strengthen their infrastructure base with respect to standardisation, high levels of security, and communication and networking to make full use of these resources.

The development of the CFMS, which was initially available for use only by the public sector banks, was extended to all banks and financial institutions as part of a closed user group. The NDS and the CFMS were common interbank applications running over INFINET, introduced during 2001–02. Implementation of a terrestrial network in the form of leased lines, connecting twenty-one important financial centres of the country had been completed during this period.¹⁶ Although INFINET had been functioning as an efficient and cost-effective communication backbone for the banking and financial sectors, there was a concern that its usage continued to be limited.¹⁷ To provide security in messages transmitted over INFINET, a ‘public key infrastructure’ was developed for the SFMS and for common interbank applications. The public key infrastructure matched international standards and was equipped with smartcard-based access control systems at the user end.

During 2002–03, INFINET was upgraded with higher capacity intercity terrestrial communication lines. INFINET membership continually increased, and the bandwidth of the network was considerably enhanced to meet the growing demand and for improving performance and availability. INFINET had become a hybrid network with satellite, terrestrial and integrated service digital network connectivity. Wireless connectivity in the form of radio frequency links was also being tested to enhance its robustness. To address each constituent of the INFINET/SFMS system uniquely, a system of Indian Financial System Code (IFSC) was designed during 2002–03, similar in approach to that of SWIFT (Box 8.1).

In 2004–05, the bandwidth of the intercity telecommunication links, which were part of INFINET, was upgraded. This resulted in the existence of 2 megabytes per second (mbps) links across all the offices of the Bank. Technical improvements were made to minimise downtime in the event of any disruption of services at any of the centres, and periodical testing of the systems at the backup centre was also undertaken during the year. In 2005–06, in major offices of the Bank, the bandwidth of telecommunication links was upgraded to 8 mbps.

In 2006–07, the IDRBT initiated the move from the closed user group network of INFINET to multi-protocol label switching with further development in network-based computing. It provided for virtual private networks to communicate in a secure manner. This improved efficiency and reduced costs, while ensuring adequate safety and security levels. This activity gained further momentum in 2007–08. By the end of the reference period,

Box 8.1 Indian Financial System Code

INFINET, a VSAT-based satellite and leased line network, is for the exclusive use of the banking and financial sectors. Standardisation of message formats is a concurrent objective along with optimising the use of INFINET. Consequently, the SFMS has emerged as the electronic data interchange system for banks, allowing the exchange of secure and structured messaging within the banks and between banks using INFINET.

After a detailed study of message formats available in other systems, such as SWIFT, United Nations/Electronic Data Interchange for Administration, Commerce and Transport, and computerised message transfer standards, the choice has devolved on SWIFT message formats for intrabank and interbank communication message transmission with suitable modifications. Alongside, the IFSC, a uniform coding structure, was developed to uniquely identify every bank branch in the country in the routing of payment messages and 'straight through processing'. The pattern adopted has also been drawn from that used by SWIFT. The IFSC system can also be effectively used for national routing of SWIFT international messages with the help of a suitable interface at INFINET.

The IFSC has been designed as an eleven-digit alphanumeric routing number. This is in consonance with the number of digits in the SWIFT coding system, which follows the ISO standard (9362) for identifying banks/branches. The composition of bank code and branch code is as follows:

The four-digit alphanumeric codes for banks are the same as registered with SWIFT. In the last six spaces, most banks use the 'basic statistical returns' codes allotted by the Bank for reporting statistics while some use their own existing internal branch codes. As a member of INFINET, the Bank would use SFMS for financial and non-financial communication between its own offices and the banking and financial sectors. For this purpose, the Bank has assigned IFSC codes for its own departments in the central office and regional offices.

various interbank and intrabank applications were being implemented using INFINET as the backbone.

Legal Issues

The Indian payment system did not satisfy the principle that 'the system should have a well-founded legal basis under all relevant jurisdictions'.¹⁸

There were several problems. First, all payment and settlement operations were contractual in nature, governed by the Indian Contract Act, 1872, which provided weak statutory backing. Second, 'netting' and 'settlement privately' had no legal backing. Third, there were no legal provisions for electronic cheques and cheque truncation. Fourth, the Bank was not empowered statutorily to regulate and supervise the payment and settlement systems. These issues had to be resolved.

The Negotiable Instruments Act, 1881, defined promissory notes, bills of exchange and cheques but did not recognise electronic means of transfers and payments. The Information Technology Act, 2000, provided the legal basis for activities related to electronic transaction processing. It also stipulated the security features that were necessary to maintain the confidentiality, integrity and authenticity of such transactions, provided legality for digital signatures and encryption of data, and enabled electronically stored information to be equivalent to documentary evidence. A committee under the chairmanship of the Principal Legal Adviser of the Bank suggested amendments to the Negotiable Instruments Act to the government. Accordingly, after the enactment of the Information Technology Act, amendments were made to the Negotiable Instruments Act to provide for electronic cheques and cheque truncation.

Recognising the need for a legal basis for electronic transactions introduced in 1995, an expert committee had been appointed.¹⁹ The committee prepared draft regulations to be made under Section 58 of the Reserve Bank of India (RBI) Act. Many rounds of deliberations among the Bank, the Ministry of Finance, the Law Ministry and the Legislative Department, Government of India, followed. The government finally cleared the Bank EFT Regulations on 28 August 2001. N. R. Narayana Murthy, the Chairman of Infosys, was asked by the Central Board to examine the regulations, and these were finalised after considering his suggestions. With the Information Technology Act in place, an amendment to the RBI Act was made by inserting a clause, adding future regulation of funds transfer through electronic means.

The BPSS, in its first meeting on 8 June 2005, suggested the framing of separate regulations for electronic funds transfer under the RBI Act, pending the enactment of the Payment and Settlement Systems Bill. The draft of the EFT Regulations was placed before the Central Board in its meeting held on 4 March 2006. The EFT Regulations would eventually be denotified on the enactment of the Bill, and fresh regulations for each of the payment systems

would be framed. The regulations specified the conditions subject to which banks and other financial institutions would participate in funds transfer, the manner of such transfer, and the rights and obligations of the participants.

By far, the most important legislation governing the payment and settlement systems was the Payment and Settlement Systems Act, 2007, and the Payment and Settlement Systems Regulations, 2008. The Act and the Regulations came into effect in August 2008, but much of the groundwork had been done during the reference period. The passing of this Act was prompted by two important considerations. First, there was no explicit legal basis for the regulation and supervision of the payment and settlement systems in the country. And second, there was no legal basis for multilateral netting and settlement finality, which were the twin pillars for the deferred net settlement systems in vogue.

The Indian Contract Act set forth the principles of contracts in India. Clearing systems operated by the Reserve Bank and the banks were governed by the Uniform Regulations and Rules of Bankers' Clearing Houses. The rules covered the operation of clearing houses.²⁰ Originally, the rules and each system's local procedural guidelines were contractually agreed between the clearing house and its members. Under this arrangement, multilateral netting had no sound legal backing and settlements were not guaranteed.²¹ These contracts gained full legal recognition under the Payment and Settlement Systems Act, 2007. Furthermore, the payment and settlement systems lacked a sound legal framework. These gaps were rectified by the passage of the Act and the associated regulations.

The drafting and passage of the Payment and Settlement Systems Act went through an elaborate process. The BIS in its core principles for Systemically Important Payment Systems (SIPS) insisted on a well-founded legal base for netting systems (Appendix 8A.2).²² They also incorporated the responsibilities of the central bank in applying the principles, the important one being that the central bank should oversee compliance with the core principles. Based on the experiences of other countries where such legislation existed, the Bank decided in 2000–01 to initiate payment system legislation.²³ A Task Force on Legal Issues set up by the NPC examined the need to frame new laws for the regulation of multiple electronic payments. Simultaneously, work on drafting a Payment Systems Act to provide for all the requirements of payment and settlement systems was undertaken.

The DIT prepared a draft Payment and Settlement Systems Bill in 2003–04 in coordination with the Legal Department. It was sent to the Ministry

of Finance and approved by the BPSS at its first meeting on 8 June 2005. The draft Bill was discussed with officials of the Ministry of Finance and the Ministry of Law and Justice on 23 December 2005.²⁴ The Parliament's Standing Committee on Finance recommended the enactment of the Bill after certain modification to which the Bank agreed. The Bill became an Act on 20 December 2007. Following this, the regulations under the Act were framed and forwarded to the government. The Payment and Settlement Systems Act designated the Bank as the authority that regulates payment and settlement systems and empowered the Bank to determine standards, call for information, reports and documents, and audit and conduct on-site and off-site inspections of payment systems, among other powers.

A few other laws had an important influence on payment and settlement systems. While Sections 20 and 21A of the RBI Act gave powers to the Bank to act as a debt manager to the central and state governments by statute or by agreements, before 2006 the Public Debt Act, 1944, provided the framework for regulating transactions in the government securities market (see Chapter 7). This Act was superseded by the Government Securities Act, 2006, from 1 December 2007. Some of the changes brought about by the Act were legal recognition to the lien, pledge and hypothecation of government securities, simpler procedural formalities with regard to the transfer of title in the event of the death of the titleholder, and legal recognition for constituent subsidiary general ledger accounts. The RBI Act was amended to insert a separate Chapter III D in 2006 to provide clarity over regulation by the Bank, empowering it to regulate and determine policy and give directions to all or any agencies dealing in government securities, money market instruments, foreign exchange, derivatives or other such instruments as the Bank might specify.

The Securities Contracts (Regulation) Act, 1956, conferred powers on the Government of India to regulate and supervise all stock exchanges and securities transactions. This Act also applied to government securities. The central government had delegated its powers under the Act to the Bank in March 2000 (Chapter 6). These powers related to contracts in government securities, money market securities, gold-related securities and derivatives, as well as repurchase agreements in bonds, debentures, debenture stock, securitised debt and other debt securities. All other segments of the securities market were regulated by SEBI.

Formation of the BPSS and the DPSS

On 15 December 2003, the Central Board approved the formation of a committee called the Board for Regulation and Supervision of Payment and Settlement Systems (BPSS) and of a Department (DPSS) for making regulations on its behalf.²⁵ The BPSS would lay down policies and standards, authorise payment and settlement systems, oversee rules and guidelines, and create the necessary infrastructure for ensuring effective regulation and supervision, pending enactment of the Payment and Settlement Systems Act.²⁶

The BPSS started functioning in March 2005.²⁷ In 2005–06, the BPSS provided direction to the vision document for 2005–08, the draft Bill relating to payment and settlement systems, EFT Regulations, standards of operational efficiency for MICR cheque processing centres, the comparative study of India's position vis-à-vis a few developed countries on best practices, RTGS systems, and the move from cash/paper-based payment systems to electronic payment systems. In 2006–07, the main thrust was on this last issue. Specific directions of the Board related to migration from paper-based funds transfer to electronic payment systems; bringing RTGS-enabled branches under the national electronic funds transfer (NEFT); a low-cost cross-border remittance system with neighbouring countries, especially Nepal; and the feasibility of a few large banks providing associate membership to the smaller banks to participate in the cheque truncation system (see later). The BPSS met five times in 2007–08. The thrust was on law, risk mitigation and customer service.²⁸

Following the directions of the Board, the consolidated information on service charges was available on the Bank's website, with links provided to the websites of the respective banks. The regulatory circulars on customer charges for use of ATMs and the mandatory use of the electronic mode of payment for a transaction above a certain size between the Bank-regulated entities and markets were issued and implemented by banks, despite some misgivings on the part of the IBA (Appendix 8A.3). Draft guidelines on mobile payments were also placed on the website.

Oversight

The need for a formal structure for oversight was felt following the enactment of the Payment and Settlement Systems Bill.²⁹ The annual report of the BPSS for 2006–07 noted that the oversight of payment systems was recognised as a core responsibility of central banks. Oversight meant putting in place systems

and procedures that (a) defined the power and capacity of the central bank to carry out oversight, (b) ensured the smooth and efficient provision of payment services to all participants, (c) minimised the risk of transmitting shocks through the economy caused by failures of individual participants to settle their obligations and (d) ensured development of infrastructure to meet the growing needs of the country. As a step in the direction of better oversight of payment systems, the Minimum Standards for Operational Efficiency of MICR cheque processing centres were framed, and the MICR cheque processing centres were required to submit a quarterly self-assessment report on compliance to these standards. There were 1,047 clearing houses in the country, of which MICR-based cheque processing centres were available at only 59 centres. The other centres operated manually. The Bank took the initiative of computerising of the settlement by implementing the magnetic media-based clearing system (MMBCS) at centres where there were more than thirty participant banks. The MICR clearing system had stabilised over a period of time and people had confidence in the system. However, to ensure business continuity in case the bank managing the clearing house was not able to provide service, the need for a system at the second-largest bank in the centre was felt.

The annual report of the BPSS for the year 2007–08 noted that the Bank did not yet have explicit legal sanction to perform oversight of payment and settlement systems and that it had been using its regulatory and supervisory powers over banks for the purpose.³⁰ Further, for clearing houses, a structured approach for conducting oversight, the minimum standards for operational efficiency of MICR cheque processing centres were framed.³¹ A self-evaluation of RTGS revealed that the system was compliant with the core principles.

The Payment and Settlement Systems Act empowered the Bank to regulate and supervise all payment systems in the country. The Bank had framed the minimum standards for MICR and non-MICR clearing houses, as well as for operation of ECS and NEFT. The oversight process relied on off-site surveillance and need-based on-site inspection, data and information collection, compilation and analysis, and a system of alerts complemented by market intelligence.³²

Inspection of CCIL

On 17 December 2003, the Department of External Investment and Operations raised the issue of inspecting foreign exchange clearing operations

of the CCIL with the DIT, and the scope of such an inspection. The DIT responded saying that the Reserve Bank, in the role of the regulator and supervisor, could carry out on-site inspection. The Bank felt that while supervision could be facilitated using off-site data collated from the CCIL, an on-site inspection would also be of utilitarian value.

The issue came up for discussion in the Financial Markets Committee in its meeting on 13 March 2004. The committee decided that on-site inspection of the CCIL might be undertaken by a group of officials drawn from different departments. The inspection, headed by an official from the Internal Debt Management Department, would focus on systems and procedures, and risk management policies and practices of the CCIL. The BIS would provide a benchmark for the purpose of evaluating the current state of affairs in the CCIL. Although there were no specific legal provisions, the Bank's regulatory authority over the functions and operations of the CCIL was a recognised fact. Accordingly, a team of officials visited the CCIL on June 2004. Based on the report, the CCIL framed a 'settlement bank risk management policy'. The second assessment of clearing systems run by the CCIL was carried out by a team of officers in August 2006. The assessment report was made available to the CCIL for compliance and was discussed by the BPSS in February 2008.

Real Time Gross Settlement System

In early 1997, the DIT had recognised the need for the introduction of a countrywide large-value funds transfer facility. Preferably, the system would be on RTGS basis, similar to Fedwire in the USA or BOJ-NET in Japan. The existing system of interbank fund transfers and settlement had several problems. Banks' current accounts in various Deposit Account Department offices were settled at different times during the business hours each day. The settlement arising out of the local, high-value and interbank clearing was done on a net basis, and at periodic intervals through the day. Banks could transfer funds between different Deposit Account Department accounts by means of telex transfers. These were usually done once in a day. At the end of the day, a statement of accounts was sent to banks, giving their current account position as on that day. As banks' current accounts were distributed over sixteen Deposit Account Departments, funds management in banks was seriously affected by the absence of a consolidated picture of the availability of funds on a real-time basis. The settlement system based on a netting system also had inherent

counter-party and liquidity risks. It was necessary that the settlement occurred instantaneously in the books of the central bank (on a real-time basis) and was gross (on a transaction-by-transaction basis). This was the RTGS. The RTGS was envisaged to be implemented in several stages to provide for the stable and smooth transition from the then existing independent Deposit Account Departments to a centralised one.

The DIT prepared a note in early 1997 on the 'RTGS Payment System in India – Requirement Analysis and Design Options'. It also prepared a Business Requirement Document. An interdepartmental meeting discussed this on 16 October 1997 and agreed on some of the broad features of the system. Executive Director A. Vasudevan conveyed to the IDRBT that the system would be implemented by them. Some of the members of the Payment Systems Group were deputed to various countries to study the functioning of the RTGS system internationally. System requirement specifications considered the international best practices and the specific requirements of Indian banking.

In the mid-term review of the monetary and credit policy announced in October 1998, Governor Jalan announced that the Bank would take a major initiative in establishing an RTGS system under the guidance of the NPC, which would be set up soon.³³ The role of the NPC was to lay down the broad policy parameters for designing and developing state-of-the-art and robust payment and settlement systems for the country. During the period, the NPC met on two occasions and took policy decisions on the introduction of RTGS, and discussed technology solutions as the gateway to RTGS.³⁴

The implementation of RTGS was a complex project involving many challenges, preconditions and reorientation of the users. It needed an industry-wide communication network, reliable computer platform, facilities for electronic-based payment and settlement, standardisation of message formats, security of international standards, proper business process re-engineering by each RTGS participant, and facilities for advanced liquidity management.³⁵ The implementation of RTGS, therefore, went through several rounds of discussions with banks and other market participants and covered several operational issues. The full system, which went operational in early 2004, consisted of a combination of an integrated accounting system (IAS) and RTGS, including interfaces with SSS, the CFMS and the SFMS.³⁶

In addition to being the service provider, the Bank was also a participant in the system. In developing it, the implicit policy preference of the Bank was that as long as it could afford to spend money on equipment and consultants, it

would not accept assistance from multilateral institutions, for such assistance came with conditions.³⁷

The implementation of RTGS was a milestone. The settlement of both large-value and retail interbank payments in India had been predominantly cheque-based. RTGS made it possible for large-value payments to be transacted in a faster, efficient and secure manner. After the stabilisation of RTGS, the need for continuing the deferred-net-settlement-based interbank clearing was examined and it was decided that interbank clearing should be done away with. Interbank clearing was discontinued in Mumbai in November 2004, followed by other centres.³⁸ Based on the satisfactory operations, migration to the total system took place on 12 August 2006.

There was a significant rise in the number and volume of RTGS transactions. The average daily processing volume rose to about 15,000, aggregating to a value of about ₹600 billion. Proposals were underway to shift small-value transactions to other electronic modes such as EFT and NEFT. Due to certain architectural deficiencies, the migration resulted in disruptions. The IT officers and treasury officers of about 110 banks had to stay late until updating at all banks were completed and a test run for the day was done. This happened on several occasions during August and September 2006. Following this, the Maharashtra unit of the All India Bank Officers' Confederation represented on 17 October 2006 to the Governor, requesting for immediate remedial action. Meanwhile, the DIT prepared a status report and actions taken to solve these teething problems in coordination with the vendor.

Although the measures taken yielded results and the system had been showing satisfactory performance, it was observed that the total solution offered by the vendor did not meet the performance requirement of the Bank and the current performance was one-third of the agreed one. It was felt that an independent performance audit of the system could be performed. The idea was to identify bottlenecks in the way of expansion of capacity. This task was assigned to Infosys Technologies Ltd. The relevant inputs from the report were forwarded to the vendor, Logica CMG, for implementation (February 2008). The system was also subject to an external information system audit.

On 10 July 2008, the DIT reported to the Central Board that one of the achievements during 2007–08 had been the stabilisation of RTGS. The system handled an all-time high volume of 48,500 transactions on a single day (31 March 2008), compared to a normal daily average volume of about 30,000.³⁹

Since the introduction of the RTGS system, large-value and interbank transactions had progressively migrated to the RTGS system. Settlement

of securities, foreign exchange, and collateralised borrowing and lending obligation (CBLO) transactions was also done in the RTGS system. The settlement of foreign exchange transactions had evolved from the direct settlement of transactions on a gross basis between trading members to multilateral net settlement with a guarantee from the CCIL, a central counter-party. The rupee side of the trade was settled in the RTGS system too. In addition, the CCIL had introduced FX-CLEAR, a foreign exchange trading system which offered both order-matching and negotiation modes for dealing.

RTGS operations were governed by the RTGS (Membership) Regulations, 2004, and the RTGS (Membership) Business Operating Guidelines, 2004.⁴⁰ Membership was open to banks, PDs (market-makers in the government securities market) and any other institution at the discretion of the Bank. Members were classified into different categories based on certain criteria.⁴¹

To settle transactions submitted to the RTGS system, members had to maintain an RTGS settlement account with the Bank in Mumbai. This account had to be funded at the beginning of each RTGS processing day from the member's current account with the Bank, and at the end of the day, the balance in the settlement account was transferred back to that current account. Since banks maintained current accounts with different offices of the Bank, they were allowed to transfer funds during the RTGS day between these current accounts and the RTGS settlement account.⁴²

Transactions that had passed all validity checks were taken up for settlement. All such transactions based on available balances in the settlement account were duly settled by debiting the account of the sending bank and crediting the account of the receiving bank. Settlement finality on a gross basis in real time was achieved when this process was complete. Members could obtain intra-day liquidity from the Bank (fully collateralised by government securities held by the members) free of interest to augment their available liquidity in the RTGS system.

Settlement of transactions in RTGS on a gross basis eliminated credit risk. Liquidity risk was mitigated by the provision of intra-day liquidity, which facilitated the smooth settlement of transactions in the system. As the RTGS system became operational, the priority was to integrate other payment systems through RTGS to mitigate credit and liquidity risks present in those systems as well as to promote efficient liquidity management by participants. To this end, interfaces were built with the SSS and the foreign exchange transactions settlement mechanism. The settlement of these transactions took place in the

RTGS system, as also the settlement for the CBLO. The settlement of the clearing operations at Mumbai for cheque-based and electronic clearing was made in RTGS.

The system's development cost was borne by the Bank. The Bank levied no charge for transaction processing or intra-day liquidity usage until the end of the reference period, though the RTGS Regulations provided for such charges.⁴³ The RTGS system embodied settlement of transactions instantaneously, that is, on a gross basis, thereby obviating the need for any clearing arrangement in the transaction. The advantage of the deferred net settlement system was a lower level of collateral requirement for effecting payment transactions, but credit risk in the event of default was higher under the deferred net settlement. The Bank, as mentioned, provided intra-day liquidity to participants, which eliminated liquidity risk but the credit risk was transferred from participants to the central bank.

The underlying principle in an intra-day credit facility was that participants must extinguish it by the close of the day. Thus, the stock of reserve money, which expanded during the day, returned to its initial level. Following the recommendations of the Working Group on Intra-day Credit Facility to minimise credit risk, intra-day liquidity would be provided against government marketable securities. It was imperative that there existed a firewall between intra-day and inter-day funds. Accordingly, if a participant was unable to extinguish its intra-day repo position during the day, the outstanding amount would attract a penal rate pegged at twice the Bank Rate or twice the corresponding day's maximum call money rate, whichever was higher.⁴⁴

By the end of the reference period, the RTGS system had been in operation for nearly four years. The system had stabilised and witnessed a substantial increase in coverage in terms of bank branches and transaction volume.⁴⁵

Clearing Corporation of India (CCIL)

The setting up of the CCIL was a major development in the process of improving the technological infrastructure. The CCIL was set up under the Indian Companies Act and registered on 30 April 2001 with the SBI and five other banks and financial institutions as shareholders. The CCIL started working in February 2002. It guaranteed settlement of foreign exchange clearing operations. Before the CCIL, transactions in foreign exchange markets were settled bilaterally by trading members through their

correspondent banking arrangements. The introduction of the guaranteed settlement facility for USD–INR trades through novation (substitution of one contract with another) by the CCIL with itself as the central counter-party in 2002 substantially increased the efficiency of such trades. Foreign exchange transactions that were not settled through the CCIL still made use of corresponding banking arrangements. In June 2003, the CCIL set up a wholly owned subsidiary, Clearcorp Dealing Systems (India) Ltd, to provide dealing systems and platforms for CBLOs, repos and money market instruments of any kind, as well as for foreign exchange.

The Reserve Bank played an instrumental role in setting up the CCIL. The Bank served as the custodian and central securities depository for government securities. To facilitate faster settlement of trades in government securities in dematerialised form, the Bank, in February 2002, introduced an electronic negotiation-based trading and reporting platform called the NDS (see Chapter 7). To enhance the trading infrastructure in the government securities market, the Bank introduced in August 2005 an electronic order-matching system (NDS-OM). The NDS and NDS-OM were both parts of the SSS known as the ‘negotiated dealing settlement system’. The system provided final settlement for government securities transactions, facilitated monetary operations of the central bank, especially the liquidity adjustment facility, and transmitted interest rate signals to Indian money markets. All secondary operations in government securities where the CCIL acted as the central counter-party were also settled in the system.

The CCIL soon occupied a significant position in the country’s payment system. It functioned as a central counter-party, guaranteeing settlement of a substantial portion of transactions in the money, foreign exchange and government securities markets. This reduced risks in the payment systems and encouraged more transactions in the money market and the repo market. The CCIL operated a settlement guarantee fund made up of contributions from its members and backed by lines of credit from commercial banks. The Reserve Bank regulated the clearing and settlement of these instruments by the CCIL. Since it provided guaranteed settlement to participants in these markets, the respective regulatory departments within the Bank were in close contact with the CCIL concerning its policies and procedures. It also reported all exceptional activities to the Bank. Participants in these markets had to become members of the CCIL for each segment separately and contributed

to CCIL's settlement guarantee fund. It offered a platform for the settlement of foreign exchange trades through the Continuous Linked Settlement Bank, using the third-party services of a settlement bank. It offered a multilateral netting mechanism through a process of novation for interbank spot and forward USD–INR transactions. While the US dollar leg of transactions was settled through the CCIL's account with its settlement agent in the US, the rupee leg was settled through the member banks' current accounts maintained with the Bank in Mumbai.

The CCIL also provided non-guaranteed settlement facilities for transactions routed via the National Financial Switch, which was the main switch for ATM transactions. In this case, the CCIL neither acted as a central counter-party nor did it provide a guaranteed settlement. The settlement file was routed through the CCIL to the Bank where the final settlement took place in central bank money. The CCIL, thus, reduced the number of transactions for settlement.

Securities Settlement Systems and Related Developments

The development of the market for government securities necessitated the setting up of the SSS, which was a software-driven trading and settlement system. Two basic modules were developed, the NDS and the SSS, both of which envisaged the setting up of a centralised Public Debt Office software. The access to the modules by the constituents, including the primary dealers, in government securities, was through INFINET.

Until 2001–02, transactions in government securities were required to be settled on the trade date or next working day unless the transaction was through a broker of a permitted stock exchange, in which case the settlement could be on 'T+5' working days basis (transaction date plus five days). With the progress made in computerisation of the Public Debt Office, it was possible to have a pooled terminal facility located at regional offices across the country, and member-terminals paving the way for an NDS. In short, this was an integrated project of computerisation of the Public Debt Office and NDS, set up to facilitate online negotiated dealing in money and government securities.⁴⁶

Live operations of the NDS commenced on 15 February 2002 after a three-month testing period. Membership in the NDS was open to all institutions that were members of INFINET and were maintaining subsidiary general

ledger accounts with the Bank. The NDS provided for screen-based trading in government securities to member banks and PDs, with a facility to strike online deals anonymously. The process involved the reporting of deals to the CCIL, which generated the settlement. At the end of the day, the settlement information was transmitted to the Bank.⁴⁷

Centralised Funds Management System

The Bank being the banker to banks, the Deposit Account Department maintained the current accounts of scheduled commercial banks and other institutions. The Department was the nucleus of the Bank's accounting system where all the classified accounts of the Bank were maintained in a systematic manner. Some common cash withdrawals, clearing adjustments, interbank transfers, and purchase and sale of foreign exchange remittance facilities were also performed through the current accounts of constituents at the Department. The Bank maintained the accounts in the form of principal current accounts, and subsidiary and secondary current accounts at various regional offices.

One of the tools for efficient funds management was information on the balances at all regional offices of the Bank where current accounts were maintained. Until 1999–2000, there was no mechanism to provide the balances in various accounts at different locations in a central place. Therefore, it was not possible for the fund manager of a bank to know on a real-time basis his/her bank's overall current account balance with the Bank. This gap affected the efforts of the fund managers of banks to make optimum use of the available funds.

The CFMS envisaged the creation of an intermediate service facility to the funds and treasury managers to obtain a consolidated position of their balances with all Deposit Account Departments. This was an achievable objective with INFINET, which had many banks as its user members.⁴⁸ The project was formally approved the same year. It consisted of a 'centralised funds enquiry system' based on the accounts maintained with the Bank and a 'centralised funds transfer system' to enable movement of funds across various offices. The first phase of the project was implemented in 2000–01. The funds transfer facility came into operation since 2005–06. The coverage of the system extended to seventy-one member banks and all Reserve Bank offices by 2007–08.

Retail Payment Systems

Retail payments are defined as mainly consumer payments of relatively low value. A retail funds transfer system is defined as a system that handles a large volume of payments of relatively low value in the form of cheques, credit transfers, direct debits, ATM and EFT at point-of-sale transactions.⁴⁹ Clearly, the user base for retail payment systems is very large as they touch every economic activity. In terms of volumes, paper-based and electronic retail payment systems far exceed large-value payment transactions. Retail payment systems in India at the close of the reference period included cheque clearing, various electronic fund transfer systems and various modes of card payments.

Cheque Clearing

The main medium for non-cash payments in India was the cheque. Other paper instruments included banker's cheques and payment orders. Cheque volumes had risen substantially over the three decades prior to 2007–08, owing to the expansion of banking branch networks and banking services. The share of cheque payments in the total value of cashless payments had, however, declined since 2004–05, as large-value interbank and some customer transactions were settled through the RTGS system.

As we have seen, under the Negotiable Instruments Act, cheques must be presented physically to the bank branch on which they are drawn, causing delays in payments. Automated cheque processing was introduced from the mid-1980s when the first MICR cheque processing centres were set up. Intercity clearing started in the early 1990s and by 2003–04, the coverage of inter-city cheque clearing was expanded to cover fourteen cities in all. From the mid-1990s, the MMBCS helped substantially reduce clearing and settlement times. It provided for an electronic settlement based on electronically submitted settlement data, although processing was manual. The Negotiable Instruments Act was amended in 2001 to allow scanned cheque images, paving the way for cheque truncation initiative (see later).

The bankers' clearing houses were the nodes in the retail payment system. Before 1986, there were no uniform rules governing the clearing houses, which made dispute settlements difficult. In 1986, the Bank formulated a set of guidelines, the Uniform Regulations and Rules of Bankers' Clearing Houses, to harmonise the framework governing the conduct of the clearing houses. These guidelines had also become necessary in the backdrop of increasing

computerisation in the banking industry. In its early stage of development, the rules represented a significant step forward in providing a formal institutional framework for the payment system in the country.

Reduction of the time taken to process paper-based instruments had drawn the Bank's attention. To the extent that the physical instruments needed to be transported from the collecting bank branch to the drawee bank branch, the delay was in-built into the paper-based mechanism. The cheque truncation system was one of the measures adopted in several countries to remove this handicap. Payment instruments did not get transported all the way but stopped or were truncated at a point in the cycle and, thereafter, only information about the instrument and/or its image flowed electronically to the drawee bank branch for payment. The cheque truncation system enabled the realisation of cheques on the same day, thereby improving the operational efficiency of the clearing process. It was also a more cost-efficient mode of settlement than manual and MICR clearings.

Necessary amendments were, therefore, made to the Negotiable Instruments Act for providing legal recognition to the electronic image of the truncated cheque.⁵⁰ Based on a working group report, an action plan was agreed.⁵¹ The Bank accepted the plan. But there was resistance from commercial banks. They felt that printing of new cheque books and setting up of specified computer terminals in branches would add to their costs. Further, they were not sure if the counter staff would be able to use the system.

Nevertheless, preparatory steps for the implementation of the cheque truncation system on a pilot basis were initiated in the National Capital Region (NCR) during 2003–04. The technical and commercial evaluation phase of the project was over in 2004–05. The contract for the project was signed on 16 June 2006 with M/s NCR Corporation of India Pvt. Ltd for supply, installation and operationalisation of cheque truncation solution in Delhi. By the terms of the contract, the project was to be implemented by December 2006. The technology, which was already used in small city nations such as Singapore and Hong Kong, would need an enormous scaling up in India. M/s NCR took time. On their request, the implementation was postponed to April 2007, again to July 2007, when another postponement was sought. The 'user acceptance test' was to start from 10 September 2007 but called off at the last minute. The DPSS on 14 September 2007 sent a letter to the legal counsel of M/s NCR, expressing extreme displeasure at the pace of progress of the project. Finally, the DPSS certified completion of installation

and operationalisation on 30 January 2008. The cheque truncation system was launched on a pilot basis in Delhi on 1 February 2008 with the participation of ten banks.⁵²

In a meeting held at Delhi on 10 November 2004, it was decided that the Comptroller General of Accounts would form a committee to consider amendments to the Civil Accounts Manual and Central Treasury Rules, governing payment of physical instruments.⁵³ By the end of the reference period, however, the implementation of the system was still a work in progress.

High-value clearing (HVC) was a service introduced in the 1980s where select branches located in close proximity to the clearing house, service branch or central commercial district presented instruments with a value of ₹0.1 million and above, deposited by their customers within the specified time to the clearing house. HVC at some centres had been extended in 2004–05 to cover the entire jurisdiction of the clearing house. The settlement was carried out through the MMBCS. The return clearing was also held on the same day, which resulted in the final settlement being concluded on that day. HVC was a deferred net settlement system. A working group looked into the associated risks and made several recommendations.⁵⁴ As of August 2007, HVC was in operation in twenty-seven centres and the volume and value of transactions continued to be quite substantial, notwithstanding significant developments in electronic modes of funds transfer. However, it posed significant operational risks to banks since the time available to them between presentation and return of high-value cheques was less than three hours. The Bank, therefore, started taking steps towards the end of the reference period to discontinue HVC.⁵⁵

During the reference period, several other steps were taken to improve the efficiency and oversight of MICR. As late as in 2007–08, cheques continued to be the predominant mode of retail payment, though the share of retail electronic mode of payment increased during 2007–08. To improve efficiency in the non-MICR centres, more than 800 clearing houses were computerised where the settlement was done electronically, while the instruments continued to be sorted manually. To further improve paper-based clearing, the BPSS recommended ‘cluster clearing’ – linking major cities to the nearest metro to form a cluster. A pilot scheme was launched linking Mumbai and Pune.⁵⁶ Speed clearing, a new method of clearing intercity cheques drawn on core banking branches of banks, was introduced on a pilot basis in June 2008. This had been started in Kolkata. This would be part of the main MICR clearing, in which cheques drawn on core branches would be cleared locally irrespective

of the location of the drawee branch. Cheques were routinely used for bulk and repetitive payments, such as collection of utility payments or payment of dividends. The Bank took several steps to develop and promote retail electronic payments infrastructure, as discussed earlier.

The ECS had two variants – credit clearing and debit clearing. While credit clearing operated on the principle of ‘single-debit-multiple-credits’, and was used for making payment of salary, pension, dividend and interest, debit clearing functioned on the principle of ‘single-credit-multiple-debits’ and was used for collecting payments by utility service providers like electricity, telephone bills as well as by banks for housing and personal loan repayment. The ECS package was developed in-house by the DIT. It was subjected to external audit by the National Institute of Bank Management and additional security features were incorporated as suggested by the institute.

The debit scheme was the only direct debit scheme in India for payments to electricity, telephone, insurance or credit card companies, or payments of loan instalments. It aggregated a large number of debits into a single credit to the beneficiary. The system worked on pre-authorised debits, which is a signed mandate obtained from the customers by the utility company. The account holder’s account was debited on the agreed date and the amounts were credited to the beneficiary. Final settlement took place both in central bank money and in commercial bank money (in those centres where the Bank did not have an office). In Mumbai, the settlement took place in RTGS.

Electronic Funds Transfer/National Electronic Funds Transfer

EFT was a mechanism for effecting payments on a one-to-one basis electronically from one originating branch of a bank to a destination branch of any other bank.⁵⁷ While ECS-Credit and ECS-Debit systems were for bulk payments akin to the automated clearing houses elsewhere, the EFT system was for individual transactions. In 2003–04, multiple daily settlements for EFT were introduced.

The Bank was in the process of implementing the NEFT system from 2002–03 onwards. As a first step, a special electronic funds transfer (SEFT) system was implemented with effect from 1 April 2003. This helped increase the coverage of the EFT scheme and provided for funds transfers in a quicker manner. SEFT was available across branches of banks that were computerised and connected through a network so that electronic messages could travel

to the receiving branch straight. The system was designed to provide for same-day interbank transfer of funds between accounts maintained in any of the designated participating branches, which were networked, so that SEFT messages could be transmitted electronically. This facility was available across identified computerised branches at various cities and towns having last-mile connectivity. SEFT provided for multiple daily settlements and had outreach much larger than Reserve Bank centres. It facilitated electronic retail transfers between bank branches using the SFMS and secured by 'public key infrastructure' technology. The EFT system that was previously in use had been discontinued effective February 2006 except for government payments.

In the case of EFT, all branches of banks in fifteen locations were part of the scheme, irrespective of whether they were networked or not. To broad-base the facilities of EFT and to provide for integration with the SFMS of INFINET, it was decided to implement a new variant of EFT called NEFT in November 2005. NEFT used the SFMS for EFT message creation and transmission from a branch to the bank's gateway and to the NEFT centre, considerably enhancing the security in funds transfer operations. To increase the coverage of NEFT to bank customers in semi-urban and rural areas, an enhancement of NEFT called the NEFT-X was proposed, where the last-leg connectivity would continue to be either through electronic mode or paper-based.

The RTGS system, which was used mainly for large-value payments, settled both interbank and customer transactions. A threshold value had been prescribed for customer transactions in RTGS, while there was no such limit under NEFT. It was envisaged that all RTGS-enabled bank branches would also be NEFT-enabled and the customer would have a choice between the RTGS and the NEFT systems.⁵⁸

At the end of the reference period, the National ECS was being developed by the Bank to enable centralised processing of ECS transactions, in contrast to the previous system that had decentralised operations at seventy locations all over the country. Under the National ECS, the processing of all the ECS transactions would be centralised at the National Clearing Cell at Nariman Point, Mumbai, and sponsor banks would need to only upload the relative files to a web server that had online data validation facility. Destination banks would receive their inward clearing data, or file, at a central location through the web server. The National ECS would leverage the 'core banking' platform of the commercial banks, to enable around 50,000 branches of the various banks to make use of this service.

Card Transactions

Card-based transactions registered phenomenal growth during the latter part of the reference period. Cards, especially debit cards, were becoming the preferred electronic payment mode for both consumers and retailers. Credit cards were introduced in India in the late 1980s and had since gained large-scale acceptance. During the reference period, debit card issuance and usage had grown much faster than those of credit cards. Banks in India also offered combined ATM and debit cards. The number of cards issued by banks increased from 26.9 million (end of December 2003) to 43.3 million (end of December 2004). The increased use of cards highlighted the need for the introduction of measures to meet the best customer service standards.⁵⁹

The major ATM networks in India were National Financial Switch, Cash Tree, BANCS, Cashnet, and the SBI Group network. In addition, most ATM switches were also linked to Visa or MasterCard gateways. The terminals were interoperable except for the terminals belonging to American Express. The National Financial Switch was the largest of these networks. It was set up by the IDRBT and started operations from 28 August 2004. Banks could connect to the National Financial Switch either from their own switches or through the switch of their group. It was operated by the NPCI after it was set up in 2008. The CCIL was the settlement agent for all transactions routed through the National Financial Switch.

The Bank partnered a pilot project on smart cards in 1999 to provide for large-scale use of smart cards for financial transactions.⁶⁰ The pilot project, known as the SMART Rupees System, explored the viability and standards suited to the Indian context. Following up the project, the Bank set up a working group.⁶¹ Its recommendations were the source for the standards proposed in the new system. The report also recommended that banks and service providers could enter into contractual agreements, all players needed to be encouraged to adopt the standards, and there was a need for a payments oversight or surveillance body, among other measures. The report was forwarded to the BIS with a request that the standards proposed therein might be adopted as National Standards by the Bureau.

The Bank had issued detailed operational guidelines for banks issuing credit cards based on the recommendations of the working group. The guidelines required that the banks and NBFCs issuing credit cards should have a well-documented policy and a Fair Practices Code for credit card

operations. Adherence to know-your-customer (KYC) norms and adequate internal control and monitoring systems were also stressed in the guidelines.

The number of ATMs increased from 800 to 34,789 between 1999 and March 2008. However, non-transparent service discouraged the customers from making more use of this facility. The Reserve Bank examined the issues related to the use of the banks' own ATMs and ATMs of other banks and issued new guidelines. These included making the use of own bank's ATMs free (from 10 March 2008), and setting limits on charges for use of other banks' ATMs (from 1 April 2009). The Bank was especially concerned about depositors like pensioners. Large banks with a substantial share of ATMs felt that the use of their ATMs by customers of other banks would eat into their profits. The Bank pointed out to them that they got a substantial transfer fee from smaller banks in such transactions.⁶²

E-Commerce

The BPSS in its annual report of 2006–07 stated that the rapid growth of e-commerce and the use of the internet had led to the development of new payment mechanisms capable of exploiting the internet's unique potential for speed and convenience. Similarly, the broader use of mobile phones encouraged banks and non-banks to develop new payment services for their customers. Internet and mobile payments were defined by the channel through which the payment instruction was entered into the system. The use of this mode of transaction was often preferred as it could be done from anywhere at convenience. The Board directed a study of this mode of payment to make it cheaper and widely used.

Several state governments introduced social welfare programmes that involved payment to beneficiaries. Payments were made either through government offices or banks, or through instruments like money orders. The transfer system required the identification of the beneficiaries correctly. A committee was appointed in 2007–08 to study the feasibility of an electronic benefit transfer system for adoption by all the state governments.⁶³ The committee examined the advantages and disadvantages of three models of electronic benefit transfer: bank-branch model, bank-led model and non-bank model. It preferred a bank-led model over the other two models of disbursement of government benefits. The committee felt that to easily implement and monitor the feasibility of electronic benefit transfer systems,

one district-one-bank approach could be adopted. The places where the one-district-multiple-banks approach was already working satisfactorily, the same arrangement could continue. Elsewhere, the government needed to identify the bank in consultation with the Reserve Bank.

Delivery of government benefits at the place of habitation of the beneficiary should be the ultimate desirable goal. A two-stage approach was preferable. Initially, disbursements could be made at *gram panchayat* level through the bank or its business correspondents. Subsequently, disbursement could move to individual villages. The feasibility of e-governance kiosks could be considered. Payment information should flow electronically from end to end so that a database was created for policy purposes.

Many countries encourage the use of the mobile phone as a tool for delivery of banking services. With the rapid growth in the number of mobile phone subscribers in India, banks had been exploring the feasibility of using mobile phones as an alternative channel of delivery of banking services. A few banks had also started offering, through the mobile phone, information-based services like balance enquiry, stop-payment instruction of cheques, a record of last five transactions, and so on. There were about 265 million mobile phone connections in the country (end of March 2008) and about 8 million new connections were being added every month. Considering that the use of this technology for the banking services was relatively new and called for appropriate safeguards to ensure the security of transactions, the Bank formulated the 'Draft Operating Guidelines for Mobile Payments in India' in June 2008. The guidelines were placed on the Bank's website for public comments.

The availability of a reliable communication network was an important prerequisite for facilitating electronic modes of payment. However, the non-availability of a terrestrial communication link in many parts of the country, such as the hilly areas, was an obstacle to greater penetration of electronic payment services. For such terrain, satellite connectivity was an appropriate mode of connecting the branches. A paper prepared by a member of the BPSS, on the use of satellite communication technology, made a proposal on this point. A technical group examined the proposal and recommended the use of satellite connectivity in these regions. However, the cost of the policy was high. The Bank considered the provision of a financial incentive to banks for adopting this technology. The Bank would bear a part of the leased rentals for the satellite connectivity, provided banks used it for connecting their branches.⁶⁴

Trends in retail payments transactions were impressive, as shown in Table 8.2, especially after 2003–04.

Table 8.2 Trends in Retail Payment Transactions

		<i>Volume in Million</i>					<i>Value in ₹ Billion</i>				
		2003–04	2004–05	2005–06	2006–07	2007–08	2003–04	2004–05	2005–06	2006–07	2007–08
Electronic	ECS-Credit	20.30	40.05 (97.3)	44.22 (10.4)	69.02 (56.1)	78.37 (13.5)	102.28	201.8 (97.3)	323.24 (60.2)	832.73 (157.6)	7,822.22 (839.3)
	ECS-Debit	7.90	15.3 (93.7)	35.96 (135.0)	75.2 (109.1)	127.12 (69.0)	22.54	29.21 (29.6)	129.86 (344.6)	254.41 (95.9)	489.37 (92.4)
	EFT/NEFT	0.82	2.55 (211.0)	3.07 (20.4)	4.78 (55.7)	13.32 (178.7)	171.25	546.01 (218.8)	612.88 (12.2)	774.46 (26.4)	1,403.26 (81.2)
	Credit Cards	100.18	129.47 (29.2)	156.09 (20.6)	169.54 (8.6)	228.2 (34.6)	176.63	256.86 (45.4)	338.86 (31.9)	413.61 (22.1)	579.85 (40.1)
	Debit Cards	37.76	41.53 (10.0)	45.69 (10.0)	60.18 (31.7)	88.31 (46.7)	48.74	53.61 (10.0)	58.97 (10.0)	81.72 (38.6)	125.21 (53.2)
Non-Electronic	Cheques	1023	1167 (14.1)	1287 (10.3)	1367 (6.2)	1461 (6.9)	115960	104589 (-9.8)	113291 (8.3)	120424 (6.3)	133961 (11.2)

Source: RBI Bulletin, various issues.

Notes: 1. Figures in brackets are percentage change over the previous year.

2. Debit card figures for 2003–04 and 2004–05 are estimated on the basis of 2005–06 figures.

3. Card payments figures pertain only to Point of Sale (POS) transactions.

Umbrella Organisation for Retail Payments

The DPSS issued a discussion paper ('Constituting an Umbrella Organisation for Operating All Retail Payment Systems in India') on 25 April 2005. The paper brought out the rationale for setting up an umbrella organisation for retail payments. The goal was to consider bringing all retail payment systems in India on to a robust technology platform and a single organisation. The retail payment system was fragmented and did not have sufficient electronic and national connectivity. There were other issues to consider. For example, the Bank, the regulator, was also the service provider for the cheque clearing system at the Bank centres. It was held by many that the regulator should not be the service provider. Second, the various clearing houses in the country tended to function in an autonomous manner, and the local practices varied from place to place. Third, skill development in the existing set-up was low. Fourth, despite MICR cheque processing centres being profitable, the profits were accruing to the managing banks instead of being utilised for product development and new service offerings. In these circumstances, there was a case for a single organisation that would achieve uniformity and connectivity and enable the Bank to withdraw from its role as a retail service provider. The retail payment system could be ideally operated by commercial banks. The note discussed two existing models of umbrella retail payment systems, one practised in Sweden and the other in France.

The discussion paper led the IBA to recommend setting up a company with twenty banks as shareholders, to take over the cheque processing centres with no bank holding more than 10 per cent of the shares.⁶⁵ The IBA asked the Bank for clearance to set up this umbrella organisation.⁶⁶ The Executive Director, R. B. Barman, advised (6 October 2005) that the IBA could go ahead with the proposed organisation, and made a few additional recommendations.⁶⁷

But now an industrial dispute broke out to oppose what was seen as an attempt to outsource the Bank's jobs to private parties. RBI Workers Union Kolkata was the first to file a dispute with the Regional Labour Commissioner, Kolkata, quoting a 'Notice', published in the *Free Press Journal* dated 2 March 2006, about the formation of a company (NPCI) to carry on the activities of banks' clearing houses. The notice said that it was a surreptitious move by the Bank and in contravention of the RBI Act. It feared that the transfer of clearing cells to a private limited company would threaten many jobs. The United Forum of Reserve Bank Officers and Employees wrote to the Bank's Governor on 10 March 2006 on similar lines. They added that the formation

of the NPCI was not in the interest of smooth functioning of the payment and settlement systems. Many letters were received from the All India State Bank Officers' Federation and other banks' employees' unions. There were also more than twenty letters received from the public, raising objections to the 'Notice' published in the *Free Press Journal*. There were Parliamentary questions on the issue and a reference was received from the Standing Committee on Finance by Deputy Governor Leeladhar dated 30 May 2006. Economists like Amiya Kumar Bagchi and Ratan Khasnabis criticised the plan.⁶⁸

The United Forum launched an agitation programme from 15 May 2006 to 7 August 2006 and decided that if no positive change in the approach of the Bank was seen, they would follow up with a day's token strike in the second half of August 2006. The All India Reserve Bank Employees Association and the All India Reserve Bank Workers' Federation representing class III and IV employees, respectively, had raised industrial disputes in connection with the setting up of the NPCI before the local Regional Labour Commissioner (Central) at four centres, Kolkata, New Delhi, Mumbai and Chennai, through their local units.

The unions had two main concerns. First, there would be a retrenchment of about 2,000 employees and, second, foreign and private banks would share ownership of the NPCI. The Bank clarified during discussions that there were about twenty employees in five MICR clearing centres operated by the Bank. Second, clearing services would cover places with a minimum of five branches and there were not that many branches in a single village. The Bank also assured that the major part of the shareholding would be held by public sector banks and that there would be a cap on the ownership by foreign banks.

Explaining the facts behind this dispute, the Human Resources Development Department of the Bank said that the 'Bank's efforts were for consolidation, rationalization and streamlining the operation for enhancing the efficiency under one organization and not for reducing the jobs as has been perceived by the unions. There is no outsourcing or transfer of work....' The Bank held meetings with the four unions separately to explain its stand, which was that there would be no outsourcing or transfer of work, as the work in the National Clearing Cells will be carried on by the Bank's staff as before, who would be on deputation with the proposed NPCI. A meeting with the representatives of the United Forum was held in Mumbai on 2 June 2006. Following this, there were a series of reconciliation meetings with the Deputy Chief Labour Commissioner, Mumbai. During one of these (28 November

2007), the Bank insisted on the closure of the case, whereas the unions' representatives requested for adjournment, claiming that the matter had been taken up before the highest forum (Parliament) and was nearing finality.

In a letter issued to members on 10 December 2007, the United Forum claimed success in their endeavours:

Our joint efforts to protect RBI servicing and managing Metro Clearing Houses, continuing payment service in Regional Offices, operating RTGS system, etc. as hitherto have fully succeeded. Discussing Payment and Settlement Systems Bill 2006 Hon'ble Finance Minister Shri P. Chidambaram announced these categorically and repeatedly in Lok Sabha on 26 November 2007 and Rajya Sabha on 3 November 2007 which are also circulated in Public Domain. He further states that RBI is empowered to license and regulate all payment and settlement systems existing as well as prospective if any, proposed National Payment Corporation of India will manage other clearing houses run by PSBs which will be a public sector corporation owned by PSBs, to be licensed and regulated by RBI. For NPCI staff will continue to be drawn from PSBs for long. We are extremely grateful to MPs from left parties in particular and some other well-wishers for this splendid achievement.

Towards the end of our reference period, during the final conciliation meeting held on 26 March 2008, before the Deputy Chief Labour Commissioner (Central), Mumbai, the management of the Bank submitted a written statement stating:

The Hon'ble Finance Minister has during the course of consideration and passing of the Payment and Settlement Systems Bill 2006 (in November 2007), made the following statement: 'Sir, to-day, RBI operates the payment system in four metros. It also provides a number of payment services in the 14 cities or so, where it has regional offices.... That will continue in the foreseeable future. The Reserve Bank has accordingly noted to comply with this assurance given by the Hon'ble Finance Minister to the Parliament. The representatives of the All India Reserve Bank Employees Association and All India Reserve Bank Workers' Federation after going through above submissions stated that they agree with the same and requested to treat this issue as settled.'

In view of this submission, the industrial dispute was treated as closed by the Labour Commissioner. The United Forum of Reserve Bank Officers and Employees issued a circular to members dated 3 April 2008, titled 'NCC

Remains with RBI – Our Jobs Protected’, and it was treated as a unique achievement of their collective endeavours.

While our reference period ends with the Bank and the IBA’s joint efforts, it took several months more for the NPCI to become a reality.⁶⁹

Assessment of the Indian Payment and Settlement Systems with Reference to International Standards

The Standing Committee on International Financial Standards and Codes, set up by the Bank and the Government of India in 1999, constituted an advisory group⁷⁰ to assess the observance of standards and codes relevant to the payment and settlement systems.⁷¹ In respect of SIPS, the focus of the group was on the introduction of Lamfalussy standards⁷² as a minimum benchmark and to develop appropriate mechanisms for an RTGS system. Compliance with G30⁷³ recommendations on SSS was the focus for the equity and debt segments, while for the foreign exchange segment, the group made recommendations entailing actions that could facilitate the CCIL in conforming to international practices and principles.

The observance of Core Principles for Systemically Important Payment Systems was a part of the International Monetary Fund and the World Bank’s Pilot Financial Sector Assessment Programme of 2001. The assessment stated that, though the Bank played a pivotal role in the payment system, both as a participant and as a regulator, India’s compliance with the core principles was only partial, particularly with regard to the lack of legal and contractual framework relevant to the payment and settlement systems, multilateral netting arrangements used in clearing not being backed by legislation, and real-time finality not being assisted by bankruptcy legislation. The assessment highlighted that procedures in the event of a default – ‘partial unwind[ing]’ of transactions of defaulting institutions – could have serious systemic implications. Though the limits on the maximum amount of risk that could be taken by the participants in the payment system were clearly defined, it said that they did not meet the required standards. The report also stated that the security of SIPS in India was low. It concluded that the introduction of RTGS, which would handle all large-value payments, would greatly enhance compliance, boost efficiency and lower the risks in the payment system.

In 2004, the Bank undertook a review of the recommendations of the advisory group. It noted that significant progress had been made in the

implementation of the recommendations. Enactment of the legislation covering payment and settlement systems could help strengthen the legal framework and help make further advances towards meeting the best practices advocated as part of the international financial standards and codes. The committee noted that the operationalisation of RTGS marked significant progress in respect of some important recommendations made by the advisory group.⁷⁴ The BPSS carried out a study in 2006 to examine the compliance of the Indian payment systems with the core principles of systemically important payment systems. The study revealed that eight out of ten principles were broadly or fully complied with. The principles partially complied with related to legal basis (the system should have a well-founded legal basis under all relevant jurisdiction) and settlement of multilateral netting systems (the multilateral netting system to complete daily settlement in time even in event of the failure to settle by participation with the largest settlement obligation).⁷⁵

In most countries, the general trend had been to reduce the use of cheques as a payment instrument and introduce the cheque truncation system to reduce the settlement cycle. The cheque clearing system in India ranked above all countries in terms of the settlement cycle. However, the HVC in India was unique. No country provided a system that enabled same-day settlement of high-value cheques as India did. There were, however, deficiencies, mainly in the outstation cheque collection process. While a centralised ECS had been provided, this was available only for the Reserve Bank centres. To address this deficiency, a National Electronic Clearing Platform was implemented in September 2008. The other deficiency in the system was that the benefits of facilities like ECS and RTGS were not shared by the lower end of the customer segment, who still used expensive informal channels. There was a need to develop solutions using newer technologies that allowed all segments of society to gain access to the benefits offered by these facilities. The utilisation of the electronic payments infrastructure could be increased by using technology to make the facilities more accessible to customers.

Conclusion

The Bank played a large and pivotal role in the development of India's payment and settlement systems for both large-value and retail payments during the reference period, specifically in the areas of electronic funds transfer and electronic clearing service. The RTGS system was introduced in March 2004

and the NEFT system in November 2005. The former replaced the paper-based interbank clearing system and settled a sizeable volume of large-value transactions. The Bank mandated the use of electronic payments for transactions between the Bank-regulated entities and markets in March 2008. The Bank also managed the clearing houses (for paper-based and electronic clearing) in seventeen large cities, while operating the clearing houses at four major locations. It was the settlement banker in these cities.

In the paper-based clearing system, cheque truncation aimed to achieve efficiency. The market microstructure for settlement of money, government securities and foreign exchange transactions was also strengthened with the operationalisation of the CCIL as a central counter-party in February 2002. IT played a particularly important role behind many of these steps to strengthen the infrastructure, but this chapter has shown that technology was not by itself sufficient. A great deal of the initiative involved institutions for the protection of consumer interest and security of transactions while achieving greater speed and more volume. This was made possible also by addressing various legal issues and, more importantly, by passing the Payment and Settlement Systems Act, 2007.

Notes

1. The use of information technology in the financial sector took roots in the reports of the Rangarajan Committee on Mechanisation in Banks (1984). Further developments among the public sector banks had been based on the recommendations of the Rangarajan Committee (1989), the Saraf Committee (1994) and the Vasudevan Committee (1998).
2. In India, cash continued to be the most widely used medium of exchange even at the end of the reference period. This chapter does not deal with cash as a mode of payment in detail (see Chapter 9 on this subject).
3. VSAT is an acronym for very small aperture terminal, but more simply put, it describes a small satellite terminal that can be used for one-way and/or interactive communications via satellite.
4. The clearing house settlements were carried out as per the Uniform Regulations and Rules of Bankers' Clearing Houses, 1986, framed by the Bank and adopted by the general bodies across the country. The practices in vogue were of long-standing and conventional usage and hence enjoyed a great measure of public acceptance.
5. The global conference on 'Managing Change in Payment Systems' was co-hosted by the BIS and CPSS on 10–11 December 1997. The compendium

of presentations made at the conference is available at <https://www.bis.org/publ/plcy04.pdf>.

6. With A. Vasudevan as the Chairman. The heads of the departments of Banking Operations and Development, Banking Supervision, Government and Bank Accounts, Legal Department and Information Technology were the members.
7. The note also redefined the role of the DIT. It would continue to monitor the operations of the MICR cheque processing centres and the clearing house operations, work on standardisation of formats and software and Bank-wide networking, interconnectivity among the departments and extension of EFT throughout the country within the next two years. The DIT would be actively associated with the RTGS work that could be carried out at the technical level, by the IDRBT, and constantly monitor the risks involved in the payment systems as well as in the technology applications related to settlement procedures.
8. Consisting of a team drawn from within the Bank, from the areas of law, banking operations and supervision, economics and foreign exchange operations.
9. Chairman A. Vasudevan, with representation from the government (Ministry of Finance and Department of Electronics), the Bank, the Indian Banks' Association (IBA), the National Institute of Bank Management and IDRBT. The Chief General Manager, DIT, was the member-secretary.
10. The detailed report can be accessed at <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?FromDate=07/17/99&SECID=1&SUB-SECID=0>.
11. The membership at the time of constitution were: S. P. Talwar, Deputy Governor, Chairman; other members were M. Damodaran, Joint Secretary, Ministry of Finance, V. Janakiraman, Managing Director, SBI, A.T. Pannir Selvam, Chairman, IBA, Rashid Jilani, Chairman and Managing Director, Punjab National Bank, R. H. Patil, Managing Director, National Stock Exchange, O. P. Gahrotra, Senior Executive Director, SEBI, David P. Connor, Chief Executive Officer, Citibank, H. N. Sinor, Managing Director and Chief Executive Officer, ICICI Banking Corporation, D. S. Pendse, Managing Director, Tata Finance Ltd.; S. R. Mittal was the member secretary.
12. Of the thirty-seven major tasks listed for the department, action had been completed to a large extent in the case of thirty-three items. Only two aspects – introduction of variants of e-money (electronic money) and linkage of the Bank managed clearing houses – had not been completed. The latter would be completed while the introduction of e-money products would have to interface with other areas. The European Central Bank defines e-money as the 'amount of money value represented by a claim issued on a prepaid basis, stored in an electronic medium (card or computer) and accepted as a means of

payment by undertakings other than the issuer'. Three major issues of concern for the Bank were related to issuance of e-money, status of the issuers of e-money (that is, the participants to be allowed) and the norms to be followed for preserving the effectiveness and integrity of this methodology. For this, the Bank appointed a working group on e-money under the chairmanship of Zarir J. Cama, Chairman, HSBC, which submitted its report in July 2002.

13. INFINET, an acronym for the Indian Financial Network, uses a blend of communication technologies such as VSATs and terrestrial leased lines. The hub of the VSAT network is situated at the IDRBT. The INFINET was a wide-area satellite-based network using VSAT technology, which could serve funds and management information service applications for the banking and financial sectors. The INFINET project was conceived in October 1996. The task of setting up the INFINET was entrusted to the IDRBT.
14. SWIFT is a cooperative society under Belgian law owned by its member financial institutions with offices around the world. It also provided a network that enabled financial institutions worldwide to send and receive information about financial transactions in a secure, standardised and reliable environment. SWIFT was founded in Brussels in 1973 and was supported by 239 banks in fifteen countries. It started to establish common standards for financial transactions and a shared data processing system and worldwide communications network.
15. Reported in *Business Standard*, 5 September 1997.
16. As on 31 March 2002, there were ninety members of INFINET, including banks and other financial institutions such as term lending institutions, PDs and mutual funds. The VSATs stood at 890 at the end of March 2002, compared with 700 at the end of March 2001.
17. Vepa Kamesam, 'Changing Faces of Banking: Banking with Technology', Inaugural address at the conference of Chairmen and Managing Directors of Public Sector Banks at IDRBT, Hyderabad, 2 November 2001.
18. BIS, 'Core Principles for Systemically Important Payment Systems', 19 January 2001.
19. Headed by K. S. Shere, Principal Legal Adviser of the Bank.
20. Such as membership criteria, suspension from or termination of membership, and the procedures related to clearing and settling claims among members. Individual clearing systems, such as the cheque clearing system, ECS and EFT system, operated under the governing covenants of these regulations and rules as adopted by each clearing house.
21. Netting is an arrangement among parties that transactions be aggregated, rather than settled individually.
22. BIS, January 2001.
23. M. G. Bhide Advisory Group, 1999.
24. K. D. Singh, Additional Secretary, Ministry of Law and Justice, asked whether

the existing Indian Contract Act was not adequate for dealing with payment and settlement systems, and why the Bank was seeking to regulate these systems. He also observed that in case any amendment was required, it could be made in the RBI Act instead of passing a new law. The Bank explained the background, including the R. H. Patil Committee's recommendations and the core principles of the BIS. It was pointed out that similar separate legislations were prevalent in countries such as Australia, Canada and South Africa. The discussion was followed up by a detailed note to the government. On 28 November 2005, the government wrote to the Bank that the Ministry of Law and Justice suggested that 'it will be appropriate if disputes are redressed by arbitration through the International Centre for Alternative Disputes Resolution, which is an institution established by the Central Government'. The Bank replied that the disputes that might arise between the system participants and the system providers would be of a technical nature, calling for early settlement. Therefore, it was appropriate that such disputes were heard and settled by persons with specialised knowledge in the area of payment and settlement. The Bank also pointed out the limitations of engaging International Centre for this purpose. While the Bank's view prevailed on this issue, on another point, that the Bank should not decide a dispute where it was a party, the draft was amended to make the government the final authority.

25. This move was a step towards complying with the recommendations of the Joint Parliamentary Committee (JPC) on Stock Market Scam and Matters Relating Thereto (2002).
26. The Board comprised the Governor (Chairman), Deputy Governor in charge of the payment and settlement systems as Vice-Chairman, other Deputy Governors as members, and two members from the Central Board of Directors to be nominated by the Governor. The Executive Director in charge of payment and settlement systems, the Executive Director in charge of Financial Markets Committee and the Principal Legal Advisor of the Bank were permanent invitees to the meetings, and persons with experience in the field could be inducted as either permanent or temporary invitees.
27. With the following members with tenure of two years: Governor Reddy, Deputy Governors V. Leeladhar, K. J. Udeshi and Shyamala Gopinath, and Central Board Members H. P. Ranina and N. R. Narayana Murthy. In addition, P. S. Shenoy, who had recently demitted office as the Chairman and Managing Director of Bank of Baroda and had experience in the field of payment systems, was a permanent invitee. As mentioned earlier, the report of the JPC on stock market scam was a trigger in pushing reforms in payment and settlement systems. Prominent among the measures recommended by the Committee on Technology Upgradation (1999) were introduction of the EFT, RTGS, CSMS, NDS and SFMS, which will provide the backbone for all message-based communication over INFINET. The committee felt that

the Bank had a long way to go in this area. This comment of the JPC was cited in a background note prepared during the formation of the BPSS, indicating that the setting up of the BPSS was a part of the action taken on the report of the JPC.

28. The Board discussed issues such as preparation of a framework for payments through mobile phones, extension of jurisdiction of the MICR clearing houses, computerisation of non-MICR clearing houses, surveys to ascertain whether extension of RTGS business hours met the customers' needs, and expansion of NEFT system to make all RTGS branches NEFT-enabled, among other specific issues.
29. The first annual report of the BPSS for 2005–06 noted that the Bank had identified RTGS, the interbank government securities clearing system, the interbank foreign exchange clearing system and the high-value clearing (HVC) system as SIPS. The term applies to systems the failure of which can endanger the financial system. The DPSS carried out a study to examine the compliance of the Indian payment systems, including the RTGS, with the core principles of SIPS internationally. The study revealed that eight out of ten principles were broadly or fully complied with. The partially complied principles related to legal basis (the system should have a well-founded legal basis under all relevant jurisdiction) and settlement of multilateral netting systems (the multilateral netting system to complete daily settlement in time, even in event of the failure to settle by participation with the largest settlement obligation).
30. To gauge the status of the Indian payment systems, an assessment was made against the core principles for systemically important payments systems. The findings were published in the first report on oversight of payment systems in India in November 2007.
31. MICR cheque processing centres were submitting quarterly self-assessment reports on compliance to these standards. Minimum Standards at the Magnetic Media-Based Clearing System were also prepared and issued in October 2007. A self-assessment report indicating compliance with the guidelines had to be carried out every half year by the clearing houses.
32. BIS (Committee on Payment and Settlement Systems), *Red Book* (Basel: BIS, 2011).
33. The NPC would have a Deputy Governor as the Chairman and included a Regional Director, IBA Chairman, Joint Secretary of the Banking Division, Chairmen and Managing Directors of two public sector banks, one private bank, and one foreign bank, and one large NBFC. The National Stock Exchange Managing Director and the SEBI Executive Director were the other members.
34. To facilitate the introduction of RTGS, a working group was chaired by Executive Director A. Vasudevan. Two vendors, TCS and

PricewaterhouseCoopers (PwC), were shortlisted and PwC was appointed as consultant for the RTGS project.

35. Vepa Kamesam, 'Roll Out Strategy for RTGS Implementation', Inaugural address at a meeting with CMDs of banks, July 21 2003.
36. The IAS is the accounting system of the Bank (members' current accounts are in IAS).
37. Between May and October 2003, the DIT prepared a comprehensive draft of the RTGS (Membership) Regulations and Rules and circulated it among banks and other stakeholders, such as the Fixed Income Money Market and the Derivatives Association of India, and invited feedback before finalising it. Implementation of RTGS commenced live operations with a soft launch on 26 March 2004 in four banks, SBI, Standard Chartered Bank, HDFC Bank and Saraswat Co-operative Bank, for interbank transactions. Customer transactions started on 29 April 2004.
38. The integrated system, when fully implemented in late 2005, provided significant additional advantages, including automated start-of-day funding of the RTGS settlement account (transfer of funds based on standing instruction from the current account to the settlement account); automated end-of-day flushing of the RTGS settlement account (transfer of funds from the settlement account to the current account to make the settlement account zero); message-based own account transfer between the RTGS settlement account and the current account in IAS or two current accounts in IAS in the Deposit Account Department of the Bank; multilateral settlement; automated intra-day liquidity facility; and gridlock resolution mechanism.
39. It reported that the IAS had also stabilised well and was ready to be used as the primary accounting system at Mumbai. The annual closing of accounts for 2007-08 was performed using the IAS.
40. These were previously contractual in nature but were later notified under the Payment and Settlement Systems Regulations. The regulations provided for the oversight of the RTGS system, a standing committee for the management of the system, and an admission procedure for members. The RTGS guidelines detailed business operations, including the use of settlement accounts and funding accounts, transaction types, communication, message formats, settlement of transactions, intra-day liquidity facility, queue management and gridlock resolution.
41. The Bank and commercial banks belonged to category A, and PDs to category B. Members of categories A and B were direct members of the system. Banks and PDs that were in neither category were eligible to belong to category C, though there were no such members. Clearing houses and clearing agencies (including CCIL) formed category D membership. Members of categories A and B could submit their own interbank transactions, but only category A

- members could submit transactions on behalf of their customers. Category D members could submit only net settlement batches to the RTGS system.
42. For this purpose, there was an interface between the RTGS system and the IAS of the Bank. The banks used the option available in their participant interface (PI) to transfer funds from one account to another in Mumbai, or use the CFMS if the transfer was between accounts from one office of the Bank to another.
 43. BIS, *Red Book*.
 44. An internal group constituted by the Bank in 2006–07 examined various aspects of payment systems, particularly relating to switching over to electronic modes. Based on the recommendations of the group, the minimum value for customer-based RTGS transactions was enhanced to ₹0.1 million from 1 January 2007. Other measures implemented during 2007–08 included mandating all interbank transactions for settlement only through the RTGS mode; review of the norms relating to membership of INFINET to facilitate larger participation in electronic payment-based message transfers; effecting the settlements arrived at by the CCIL and the National Stock Exchange and the Bombay Stock Exchange as RTGS batch settlements; implementation of the national settlement system (NSS) for processing the clearing settlements of the major clearing houses as RTGS batch settlement; implementation of NEFT for greater coverage and reach for the common man; gradual upward revision of the per-transaction limit for customer-based transactions to a level of ₹100 million; and migration of government-based payment and receipt transactions to electronic means. The multilateral net settlement batch mode to facilitate settlement of various CCIL-operated clearings (interbank government securities, interbank foreign exchange, CBLO and national financial switch) was operationalised through RTGS in Mumbai in 2006–07.
 45. For example, between March 2005 and March 2008, the value of transactions increased from ₹5,826 billion to ₹47,118 billion. Of the total value in March 2008, customer transactions accounted for ₹17,988 billion, interbank transactions for ₹9,784 billion and interbank clearing for ₹19,346 billion (*Source*: RBI, Database on Indian Economy).
 46. In the proposed NDS, all trades between members of the NDS would have to be reported on the NDS, which would be directly linked to the settlement system. So that market participants prepare themselves for the NDS, it was proposed that with effect from 2 June 2001, all transactions settled through the DvP system of the Bank would be on T+1 basis. As this would provide certainty to market participants in respect of demand for settlement funds for securities transactions on the day of settlement, it was expected to improve cash and liquidity management among money market participants.
 47. The implementation of the project resulted in the integration of markets, automation, inter-connectivity and electronic maintenance of record. It helped

- in increased geographical participation in primary issuance of government securities from terminals located at regional Public Debt Offices and member terminals connected with the system. The total volume of the CCIL-operated systems increased from 0.06 million to 0.09 million between 2004–05 and 2007–08, and the corresponding value from ₹7,291 billion to ₹26,783 billion.
48. The CFMS project was discussed in the 11th meeting of the Payments Systems Advisory Committee held on 26 March 1999, and in the subsequent meeting of the advisory committee held on 5 May 1999.
 49. Shyamala Gopinath, 'Retail Payment Systems – Select Issues', Inaugural address at the Regional Seminar on Payment Systems, jointly organised by RBI and BIS at Mamallapuram, Chennai, 17 March 2009.
 50. See the section on Legal Issues.
 51. Working Group on Cheque Truncation and E-cheques (Chairman: R. B. Barman, Executive Director) was constituted on 10 January 2003 to recommend a suitable model of cheque truncation for India. The group submitted its report in July 2003. The recommendations were the following: The physical cheque would be truncated within the presenting bank. Within the presenting bank, the point of truncation could be decided by each individual member bank providing for service bureau models where banks can approach or set up service bureaus for capturing images and MICR data. Settlement would be generated on the basis of current MICR code line structure. Electronic images would be used for payment processing. Grey scale technology would be deployed for imaging. Images would be preserved for eight years. A centralised agency for a clearing location would act as an image warehouse for the banks. The group recommended norms for agencies to provide the service. Public key infrastructure would be deployed to protect images and data flow over the network.
 52. SBI, Bank of India, Punjab National Bank, Syndicate Bank, Dena Bank, ICICI Bank, HDFC Bank, Standard Chartered Bank, Bank of America and Karur Vysya Bank Ltd.
 53. The committee in its meeting held on 13 April 2005 took the following decisions: (a) while the Reserve Bank and banks should take action in regard to ensuring security checks, the National Informatics Centre (NIC) should study security aspects of the proposed system and on behalf of the government, satisfy themselves and certify that it had sufficient checks built therein, (b) a meeting of various non-civil departments/ministries would be held to ascertain their level of comfort and, additionally, they would identify various changes in manuals/procedures and (c) a cheque truncation system would be introduced on pilot basis in Delhi in those departments and ministries which were well prepared, and extended to other departments in a phased manner.
 54. Working Group on Risk Mitigation Mechanism (Chairman: R. Gandhi) was set up during 2004–05. The group recommended limiting the number

of banks participating in the clearing system to a few low-risk ones. In the short to medium term, risk mitigation measures were to be introduced. The group felt that all high-value cheques should be presented in HVC twice or more a day or expand the geographical jurisdiction of HVC to make it co-terminus with the full or substantial part of the clearing house. The group also felt that on an immediate basis, HVC needed to be made more secure, and that a guarantee fund be introduced at a centralised location for the HVC systems. The contribution to the guarantee fund would be based on the risk profile of the member bank. In the case of a settlement failure in the HVC system, recourse to the guarantee fund would be made on the principle of 'defaulter pays'.

55. The Bank decided ultimately to withdraw HVC from November 2009.
56. Exploring connection of major cities with the nearest metro to achieve faster clearing and settlement. This is the concept of extending the jurisdiction of MICR cheque processing centres across cities (cluster approach to clearing) and leveraging the CBS infrastructure available across banks (speed clearing). DPSS, *Cheque Clearing Newsletter*, vol. 2, January 2008.
57. The scheme, primarily meant to cater to small-value funds transfers, had an initial cap of ₹25,000 per transaction. This was increased to ₹0.1 million in 1997, ₹0.5 million in 1999 and ₹20 million from 1 October 2001.
58. Customers could choose to make payments through either RTGS (if they were above the threshold limit of ₹0.2 million at the end of the reference period) or NEFT.
59. A Working Group on Regulatory Mechanism for Cards explored the issue in March 2005, and concluded that the existing eligibility criteria for the issue of credit cards were appropriate and did not warrant allowing access to non-banking entities in this business. On issues relating to customer services, the group made detailed recommendations relating to transparency and disclosure, customer rights protection and code of conduct.
60. The Multi-Application Smart Card Project was in the nature of a commercial pilot conducted jointly by the Indian Institute of Technology, Mumbai, and the IDRBT, Hyderabad. It had participation from banks and industry stakeholders, such as card manufacturers, terminal providers and network service providers.
61. To study the recommendations for SMART Card based Payment System Standards (Chairman: A. Vasudevan, Executive Director) in September 1999. The group submitted its report on 30 January 2000 and the recommendations were accepted by the Bank.
62. Explaining the Bank's position on making ATM withdrawals free, Deputy Governor Leeladhar mentioned: 'The commercial banks are racing against each other to post hundreds of crores of rupees (billions) as profits and therefore they must not be fussy about meagre costs involved in cash withdrawal from

their ATM by customers of other banks', adding that even the cost involved in installing an ATM had come down from ₹3 million to ₹0.6 million. Some element of cross-subsidisation, therefore, was justified.

63. Chairman: R. B. Barman, Executive Director.
64. A discussion paper on this scheme was placed on the Bank's website in June 2008 for public comments. The satellite communication link was also disaster-proof. It was, therefore, considered suitable for use as a back-up communication link for the major centres in the country.
65. A working group (Chairman: S. Natarajan, SBI) discussed the legal status of such a body, options regarding technology and roadmap, and implementation issues. The IBA working group report was discussed in its meeting on 19 August 2005.
66. Letter to Deputy Governor Leeladhar, 19 September 2005.
67. That the company should necessarily be a Section 25 company, that is, such a corporation would not be driven by the profit motive to ensure larger dividends; registration of the company could be completed by 31 December 2005; the appointment of the non-executive chairman and the chief executive officer should be in consultation with the Bank; expansion of the ECS and EFT systems should be a priority; and the organisation would be supervised by the Bank.
68. *Economic Times*, 22 June 2006.
69. The NPCI was incorporated in December 2008 and the Certificate of Commencement of Business was issued in April 2009. Incorporated as a company, its aim was to create infrastructure of large dimensions and operate on high volumes, resulting in payment services at a fraction of the present cost.
70. Chairman: M. G. Bhidé.
71. The advisory group submitted its report in three parts in September 2000, December 2000, and July 2001, covering clearing house operations, settlement in equity and debt markets and foreign exchange transactions.
72. An approach and guidelines on regulation of financial services adopted by the European Union in 2001 to make the regulatory process quicker and more effective.
73. The Group of Thirty is an international consultative group of financiers and academics.
74. The introduction of same-day and intra-day settlement helped in significantly complying with the international standards. The Bank had identified RTGS, the interbank government securities clearing system, the interbank foreign exchange clearing system and the HVC system as SIPS.
75. A Committee on Financial Sector Assessment (Chairman: Rakesh Mohan, Deputy Governor, Reserve Bank, and Secretary, Government of India, 2009), through the Advisory Panel set up on Institutions and Market Structure, looked into the adherence to the standards and codes in payment and

settlement systems prescribed by the Committee on Payment and Settlement Systems for SIPS and CPSS-International Organisation of Securities Commission Recommendations for the Securities Settlement Systems and Central Counter-parties. Its findings were favourable. The assessment showed that the standards were observed by participants with some departures. No significant weakness was identified with respect to either high-value payment systems or SSS, while the shortcomings in the functioning of the central counter-parties were relatively minor. Greg Johnston, Head of Banking, Reserve Bank of Australia, peer reviewed the Panel's report on payment and settlement systems. He agreed that significant progress was made in the development of India's payment and settlement infrastructure and suggested that the RTGS and HVC systems be treated as SIPS. He stated that the legislation supporting the legal certainty of settlement finality in SIPS and netting in financial markets was a very important step. The overall findings of the CPSS Core Principles assessment were that the existing payment system operated cheaply and efficiently, with minimal systemic risk.