VIII PAYMENT AND SETTLEMENT SYSTEMS AND INFORMATION TECHNOLOGY IN THE RESERVE BANK

VIII.1 Payment and settlement systems play a vital role in the efficient functioning of the financial system. The Reserve Bank, therefore, continued to strengthen the institutional framework for payment and settlement systems during 2005-06. The 'Payment and Settlement Systems Vision Document (2005-08)' was released in May 2005 laying down a road-map for the medium-term. The Reserve Bank focused on promoting electronic modes of funds transfer during the year with a view to bringing about efficiency in the retail and large value payment systems. The National Electronic Funds Transfer (NEFT) system for catering to retail payment requirements was operationalised in November 2005, a month ahead of the target. A noteworthy event in the payment and settlement systems is the growing popularity of the Real Time Gross Settlement (RTGS) system which enabled the discontinuation of the paper based inter-bank clearing during 2005-06.

VIII.2 The role played by information technology (IT) in the financial sector is considerable. The banking sector, in particular, has been an extensive user of IT for improving efficiency and customer service with the introduction of new technology oriented delivery channels. The Reserve Bank, therefore, published the 'Financial Sector Technology Vision Document' in July 2005 for facilitating smooth and orderly technological upgradation of the financial sector.

VIII.3 This Chapter profiles the initiatives taken by the Reserve Bank during 2005-06 in its endeavour to provide a safe, secure, efficient and sound payment and settlement systems. This Chapter also details the initiatives by the Reserve Bank on the use of IT within the Reserve Bank as well as in the banking sector.

Board for Regulation and Supervision of Payment and Settlement Systems

VIII.4 The Board for Regulation and Supervision of Payment and Settlement Systems (BPSS) has been constituted as a Committee of the Central Board of the Reserve Bank since March 2005. The Board lays down policies relating to the regulation and supervision of all types of payment and settlement systems, sets standards for existing and future systems, authorises the payment and settlement systems, determines criteria for membership to these systems, including continuation, termination and rejection of membership. The Department of Payment and Settlement Systems provides secretarial assistance to the BPSS. The BPSS, since its constitution on March 7, 2005, has met on five occasions till June 2006. The BPSS provided policy inputs and direction relating to:

- Vision document on payment and settlement system for the period 2005-08 which was released in May 2005.
- Draft bill relating to payment and settlement systems.
- Need for separate EFT Regulations to be framed under the Reserve Bank of India Act, 1934. The EFT Regulations drafted on approval of the BPSS and after the approval by the Central Board of the Reserve Bank were forwarded to the Government of India for approval for notification.
- Standards of operational efficiency for MICR Cheque Processing Centres.
- Best Practices in Payment Systems – a comparative study of India's position *vis-à-vis* a few developed countries.
- Conducting a comparative study of the Indian RTGS system with those of other countries to explore the feasibility of implementing the best features available in other RTGS systems in India.
- Leapfrogging from cash/paper based payment systems to electronic payment systems.
- Use of electronic modes for making payments.

VIII.5 The Reserve Bank plays a proactive role in facilitating the payment systems initiatives of banks in providing various services like internet banking, mobile banking as also other innovative services to their customers (Box VIII.1). While permitting such initiatives by banks, the Reserve Bank prescribes minimum safeguards which the banks should put in place before implementing such channels for payments.

Box VIII.1

Mobile Payments – Retail Small Value Payments

Growing usage of mobile phones has encouraged banks and non-banks to develop new payment services for their customers. Mobile payments are defined by the channel through which the payment instruction is entered into the payment system. Mobile payments cater largely to micro-payments segment and can be made through voice access, short messaging service (SMS) or wireless application protocol (WAP). WAP technology enables a mobile phone holder registered with this service to access his/her bank website for banking services. Some products use phones as an access channel to initiate and authenticate transactions from existing payment means such as bank accounts or payment cards. Another arrangement allows customers to pay using the prepaid value stored on the mobile phone or pay *ex post*, where payments for goods/ services are placed as additional items on the customer's phone bill. Authentication of payments is done by keying in a unique PIN (personal identification number).

The number of mobile phone users in India (over 100 million) exceeds the number of card holders and their network covers a very large area. Therefore, a payment mechanism using mobile phones has turned out to be a convenient mode for small value transactions. Accordingly, banks in India are tapping the potential of this mode of payment and promoting this as a delivery channel for small value retail payments. The facilities provided by banks through this mode include: enquires about bank account; alerts on debits / credit to the account above the limit set; alerts on cheque bounce; information on balance above / below limit; and reminders for payment due date for credit card.

PAYMENT SYSTEMS

VIII.6 The overall turnover in the various payment and settlement systems rose by 35 per cent during 2005-06 on top of 67 per cent during 2004-05. The turnover in respect of RTGS transactions increased sharply. In terms of value, turnover in RTGS now constitutes the largest component, followed by foreign exchange clearing and high value clearing among the Systemically Important Payment Systems (SIPS) (Table 8.1).

Table 8.1: Payment System Indicators: Annual Turnover

	Volume (000s)			Value (Rupees crore)		
	2003-04	2004-05	2005-06	2003-04	2004-05	2005-06
1	2	3	4	5	6	7
Systemically Important Payment Systems (SIPS)						
1. Inter-bank Clearing	1,142	808	-	30,46,666	9,91,436	-
2. High Value Clearing	13,172	13,077	18,748	30,23,290	46,07,208	49,75,477
3. Negotiated Dealing System	265	185	151	25,18,323	26,92,126	25,59,260
4. Forex Clearing	331	466	490	23,18,530	40,42,435	52,39,674
5. RTGS	67	460	1,767	1,965	40,66,184	1,15,40,836
Total SIPS (1 to 5)	**14,977**	**14,996**	**21,156**	**1,09,08,774**	**1,63,99,389**	**2,43,15,247**
Others						
6. MICR Clearing	6,24,360	9,41,693	10,34,539	20,35,934	90,18,073	94,82,300
7. Non-MICR Clearing	3,34,039	2,25,392	2,52,911	30,05,139	11,02,643	18,54,763
8. Electronic Clearing	31,352	57,900	83,241	29,606	77,702	1,06,599
9. Cards	1,86,558	3,61,517	10,45,319	36,176	77,266	2,36,994
Total Others (6 to 9)	**11,76,309**	**15,86,502**	**24,16,010**	**51,06,855**	**1,02,75,684**	**1,16,80,656**
Grand Total (1 to 9)	**11,91,286**	**16,01,498**	**24,37,166**	**1,60,15,629**	**2,66,75,073**	**3,59,95,903**

Note : 1. Paper-based inter-bank clearing was closed at Mumbai with effect from November 1, 2004 and subsequently at other centres in phases. By June 2005 it was discontinued at all the centres. Inter-bank transactions are now settled through RTGS system. RTGS became operational on March 26, 2004.
2. High value clearing refers to cheques of Rs.1 lakh and above.
3. Settlement of NDS and forex clearing is through Clearing Corporation of India Limited (CCIL).
4. At end-March 2006, the MICR clearing was at 53 centres. Non-MICR clearing refers to all paper based clearings at the centres where MICR cheque processing centres have not been set up.
5. Electronic clearings comprise Electronic Clearing Service (ECS), Electronic Funds Transfer (EFT), Special Electronic Funds Transfer (SEFT) and National Electronic Funds Transfer (NEFT).
6. Cards include credit and debit cards.

Table 8.2: Retail Electronic Funds Transfer Systems

Type	Volume of transactions (000s)			Value of transactions (Rupees crore)		
	2003-04	2004-05	2005-06	2003-04	2004-05	2005-06
1	2	3	4	5	6	7
ECS-Credit	22,654	40,051	44,216	10,228	20,180	32,324
ECS-Debit	7,897	15,300	35,958	2,253	2,921	12,987
EFT	801	2,549	3,067	17,125	54,601	61,288
Total	**31,352**	**57,900**	**83,241**	**29,606**	**77,702**	**1,06,599**

Retail Payment Systems

VIII.7 The turnover in retail payment systems recorded an increase of 13.7 per cent in value during 2005-06. These systems include the conventional cheque clearing system – the predominant mode for retail payments (both the MICR and Non-MICR clearings). Retail payments system also include electronic systems, *i.e.*, the Electronic Clearing Service (ECS-Debit and Credit), EFT, NEFT and card-based systems (credit, debit and ATM cards) (Tables 8.2 and 8.3). ECS was available at 44 centres as at end-June 2006. In order to facilitate electronic modes of payment, banks are providing innovative products to their customers by developing new products and integrating them with ECS/EFT/NEFT/RTGS at the back-end for settlement.

VIII.8 In view of the increased popularity of the card-based payment systems, it is imperative to ensure that such systems continue to operate in a safe and efficient manner. Accordingly, the Reserve Bank has issued detailed operational guidelines for banks issuing credit cards based on the recommendations of the Working Group on the Regulatory Mechanism for Cards. The guidelines require that the banks/NBFCs issuing credit cards should have a well documented policy and a Fair Practices Code for credit card operations. The guidelines, *inter alia*, require that terms and conditions should be mentioned clearly; the most important terms and conditions should be highlighted; and interest rates and other charges should be indicated clearly. Guidelines also lay down the code of conduct for Direct Selling Agents (DSAs)/ Direct Marketing Agents (DMAs) and provide for protection of customer rights (right to privacy, customer confidentiality, fair practices in debt collection and redressal of grievances). Adherence to Know Your Customer (KYC) norms and adequate internal control and monitoring systems are also stressed in the guidelines.

Table 8.3: Card based Payments

Type	Volume of transactions (000s)			Value of transactions (Rupees crore)		
	2003-04	2004-05	2005-06	2003-04	2004-05	2005-06
1	2	3	4	5	6	7
Credit Cards	1,00,179	1,29,472	1,32,242	17,663	25,686	34,694
Debit Cards	86,379	2,32,045	9,13,077	18,513	51,580	2,02,300

VIII.9 In order to enhance the security features in the cards, a Working Group on Security Issues in Card Transactions (Chairman: Dr.R.B. Barman) has been set up to study the (i) status of migration of current magnetic strip based credit/debit cards to chip based credit/debit cards in India; (ii) status of migrating all points of sales (POS) and ATMs to accept chip based debit/credit cards as well; and (iii) issues involved in migration to chip based debit/credit cards.

SETTLEMENT SYSTEMS

Paper Based Clearing

VIII.10 Paper-based clearing remains the most important segment of the retail payment and settlement system. New MICR cheque processing centres (CPCs) started operations at 10 centres during 2005-06, increasing the total number of centres to 53. These centres account for about 83 per cent and 85 per cent of the total cheque volumes and value, respectively. MICR CPCs will be set up at six more centres by March 2007.

VIII.11 In view of the large volumes of paper-based instruments processed by the MICR clearing system, setting up of back up centres/arrangements gains importance. The Reserve Bank operates the MICR CPCs at the four metropolitan centres; at each of these four metropolitan centres, back up centres have been set up by the State Bank of India. Banks which have set up MICR CPCs at other centres have been advised to identify nearby CPCs to operate as back up centres. Besides, the banks managing the clearing houses have been advised to use magnetic media based clearing system (MMBCS) as back up for clearing and settlement. In order to ensure smooth operations of clearing and settlement in case of any eventuality, banks managing the clearing house have also been advised to work out arrangements with the second largest bank at the respective centres which should be in a position to take over the clearing and settlement operations. The presidentship of the Clearing House has been taken over by the bank managing the CPC at all non-RBI centres facilitating better coordination between the CPC and the branch where settlement accounts are located. As a step towards standardisation, the

Reserve Bank had advised banks/Governments that all paper payment instruments should be in MICR format by March 31, 2006. The date has been extended as some Government departments are still in the process of exhausting their existing non-MICR cheque stocks and printing new MICR cheques. Furthermore, as a step towards increasing the efficiency in the paper-based clearing system at the centres where the volumes are less and where it is not viable to setup a MICR CPC, banks managing the clearing houses have been asked to implement the MMBCS system. A plan has been worked out for computerisation of clearing operations at 40 non-MICR centres with more than 25 member banks. Finally, with a view to maintaining the operational efficiency of various CPCs as also to have a formal oversight over the MICR CPCs, the Reserve Bank framed a set of standards known as "The Standards of Operational Efficiency for MICR Cheque Processing Centres" (Box VIII.2).

Box VIII.2

Minimum Standards of Operational Efficiency for MICR Cheque Processing Centres

MICR clearing is an important constituent of retail payment system and thus the efficient operation of MICR clearing is very critical to the system. The Reserve Bank has, therefore, developed "The Standards of Operational Efficiency for MICR Cheque Processing Centres" with the following objectives: (i) uninterrupted availability of clearing service; (ii) completion of clearing operations within the available time window; (iii) minimising clearing differences; (iv) risk mitigation; (v) minimum transaction costs; and (vi) fully meeting the customers' expectations. In terms of these standards, general guidelines to be followed by MICR Cheque Processing Centres (CPCs) include:

- Each CPC should adopt the Uniform Regulations and Rules for Bankers' Clearing House (URRBCH) as the legal/contractual basis for its functioning. Well-documented operational and procedural guidelines should also be in place and the staff members should be made familiar with the document.
- Daily clearing schedules (cheque receipt timing, processing timing, delivery timing, timing for posting the settlement of presentation clearing, time of holding the return clearing) should be adhered to as a matter of routine.
- CPCs should have working hours during the night to accommodate all the cheques received to be taken up for processing on the same day. The inward cheques for the drawee banks should be available for delivery in the early morning of the following day.
- Presentation of cheques by the member banks at the CPC should be as per requirements of the cheque processing system. Instruments should be as per MICR specifications.
- CPC should have a reliable computer system with high degree of security and contingency arrangement for timely completion of daily processing.
- Levels of access to the system, application programmes and clearing database should be strictly controlled with appropriate security set-up. The system should create necessary logs and audit trails.
- There should be a system of reporting clearing differences as well as a mechanism to resolve such differences within a fixed time-frame.
- Credit arising out of clearing settlement to member banks should not be allowed to be withdrawn/availed of before the return clearing process is completed. Accounting of presentation clearing and return clearing should be organised on the same day.
- A system of monitoring returns against presentations and returns against drawing should also be put in place. Banks showing unusually high percentage of returns may be cautioned about the likelihood of some irregular practices. In no case, fresh presentation should be permitted in return clearing.
- The recommendations of the Working Group on Monitoring of Clearing Operations should be fully complied with.
- There should be a system of ensuring timely completion of daily settlement in the event of inability on the part of a member to meet its liability by resorting to partial unwinding under Rule 11 of the URRBCH.
- Instrument-wise clearing data should be made available to the member banks electronically immediately after the settlement is over, preferably by populating the same in the CPC's web-server. This will facilitate Straight-Through-Processing (STP) at member banks end and quicken the process of coming back for return clearing.
- The CPC should lay down a comprehensive back-up policy and procedure as well as identify storage sites to ensure business continuity and uninterrupted access to critical data.
- A self assessment on the above guidelines should be done every quarter and a report should be submitted to the Reserve Bank.
- The CPC should subject itself to periodical internal audit and inspection by the bank managing the CPC.

The Reserve Bank would conduct oversight visit to the CPC at least once a year. The Reserve Bank may also organise audit/ inspection either through its own officers or through auditing firms, if required.

National Settlement System

VIII.12 At present, there are about 1,030 clearing houses spread all over the country. The settlement of the net pay/receive obligations is done in the books of accounts of the settlement bank separately at each clearing centre. Banks participating in clearing who have net pay obligations and do not have adequate funds with the settlement bank are often required to get funds from other places by telegraphic transfer. Similarly, banks who have large surplus funds have to send out funds to places where there are shortages. This casts a liquidity burden on the banks as they do not get benefit of excess funds at one clearing centre to offset the deficit at another. Moreover, moving funds from one place to another is expensive, cumbersome and results in poor liquidity management. There was, therefore, an imperative need to settle the positions of banks in the various clearing houses centrally in the accounts maintained at Mumbai. Accordingly, a National Settlement System (NSS) is proposed to be set-up. The NSS would primarily cover 20 large commercially important centres and the Reserve Bank centres which do not fall under the category of such "Top 20" centres. The implementation of the NSS would be taken up after the full fledged RTGS-IAS is implemented.

Cheque Truncation

VIII.13 With a view to further enhancing the efficiency in the existing paper-based clearing systems, the Cheque Truncation System (CTS) project has been undertaken in the National Capital Region of Delhi on a pilot basis. The CTS would enable the realisation of cheques on the same day, thereby improving the operational efficiency of the clearing process. It would also be a more cost effective mode of settlement than manual and MICR clearing. The vendor for the project has been identified. The project is expected to go live in the second half of 2006.

National Electronic Funds Transfer System

VIII.14 The National Electronic Funds Transfer (NEFT) system which uses Structured Financial Messaging Solution (SFMS) of the Indian Financial Network (INFINET) was operationalised in November 2005, ahead of the target date of December 2005. The NEFT, a deferred net settlement funds transfer system, addresses the lacunae which are faced in the EFT and SEFT system. The use of digital signatures under NEFT provides a legal basis for EFT under the Information Technology Act, 2000. With the implementation of the NEFT, the Special EFT system in operation has been discontinued from January 2006. The existing EFT system in operation at the 15 Reserve Bank centres is also scheduled to be discontinued once NEFT system stabilises. The number of settlements of NEFT has been gradually increased from 2 settlements a day to 4 settlements (9:30 am, 10:30 am, 12 noon and 4:00 pm). This has enabled customers to get funds on a near to real time basis and mitigate risk in a deferred net settlement system.

Real Time Gross Settlement System

VIII.15 The implementation of Real Time Gross Settlement (RTGS) system has revolutionised the large value payment system in the country by facilitating faster movement of funds across accounts. With the stabilisation of the RTGS, the paper based inter-bank clearing at all the Reserve Bank managed centres was discontinued from June 2005. The RTGS facility was being provided by 96 banks as at end-June 2006, including the Reserve Bank, at over 21,916 branches in 2,793 centres in 469 districts. The value of transactions through RTGS system nearly trebled during 2005-06 (Table 8.4).

VIII.16 The Integrated Accounting System (IAS) of the Reserve Bank is being integrated with the RTGS system. The full fledged operation of the RTGS-IAS system would begin shortly. The benefits of implementation of RTGS-IAS are:

- Automated Start-of-Day funding of the RTGS Settlement Account (*i.e.*, transfer of funds on the basis of standing instruction from the current account to the settlement account);
- Automated End-of-Day flushing of the RTGS Settlement Account (*i.e.*, transfer of funds from the settlement account to the current account to make the settlement account zero);
- Message-based Own Account Transfer (OAT) between the RTGS Settlement Account and the current account in IAS or two current accounts in IAS in Deposit Accounts Department (DAD) of the Reserve Bank at Mumbai;
- Multilateral Net Settlement Batch-Settlement of the Net Clearing Batches such as MICR, EFT, ECS from NCC, Government securities, foreign exchange, CBLO and NFS-ATM from CCIL and the net clearing batches originating from BSE and NSE;
- Automated Intra-day Liquidity (IDL) facility including automated request for grant of IDL, automated reversal of outstanding IDL with

Table 8.4: Month-wise RTGS Transactions

(Value in Rupees crore)

Months	No. of Participants	Inter-bank		Customer		Total	
		Volume	Value	Volume	Value	Volume (3+5)	Value (4+6)
1	2	3	4	5	6	7	8
2004-05		**3,91,931**	**38,16,522**	**68,492**	**2,49,662**	**4,60,423**	**40,66,184**
2005-06		**10,53,940**	**89,70,624**	**7,13,058**	**25,70,212**	**17,66,998**	**1,15,40,836**
2005-06							
April	109	53,165	5,27,315	15,901	57,415	69,066	5,84,730
May	109	71,622	5,71,514	22,925	59,043	94,547	6,30,557
June	109	79,503	7,40,482	28,678	90,338	1,08,181	8,30,820
July	109	82,422	7,16,966	31,479	95,696	1,13,901	8,12,662
August	109	86,989	6,72,654	45,967	1,98,733	1,32,956	8,71,387
September	109	85,087	7,29,196	52,232	2,51,968	1,37,319	9,81,164
October	108	95,711	7,96,742	61,060	2,50,214	1,56,771	10,46,956
November	110	89,486	8,17,065	58,742	2,09,524	1,48,228	10,26,589
December	110	1,04,117	9,97,337	77,917	3,11,481	1,82,034	13,08,818
January	110	97,189	8,12,150	83,697	2,75,305	1,80,886	10,87,455
February	110	94,754	6,46,547	96,238	3,03,202	1,90,992	9,49,749
March	110	1,13,895	9,42,656	1,38,222	4,67,294	2,52,117	14,09,949
2006-07							
April	110	91,558	8,00,906	1,35,856	4,14,833	2,27,414	12,15,739
May	110	1,10,385	9,83,348	1,71,731	5,22,422	2,82,116	15,05,770
June	110	1,12,529	9,46,691	1,81,519	4,90,717	2,94,048	14,37,408
July	110	11,10,728	8,91,473	1,86,750	4,54,992	2,97,478	13,46,466

incoming credits, and intra-day addition/ withdrawal of un-encumbered securities offered for IDL availment; and

- Gridlock Resolution Mechanism.

Centralised Funds Management System

VIII.17 The funds transfer facility among DADs of the Reserve Bank in four metropolitan cities, *viz*., Mumbai, Delhi, Chennai, and Kolkata was operationalised using CFMS during the year. At present, 27 banks are making use of this facility for own account transfer of funds across these four DADs. The system was extended to other Reserve Bank centres, *viz.,* Hyderabad and Bangalore, during July 2006.

INFORMATION TECHNOLOGY IN THE RESERVE BANK

VIII.18 Information technology (IT) has brought substantial changes in the functioning of organisations the world over in the last decade. In the Reserve Bank too, the use of IT has become vital and an integral part of the day to day operations and functions. With IT becoming an important facilitator, efforts have been made to ensure the smooth implementation of IT while meeting all user requirements with relative ease.

Technology Implementation in the Reserve Bank

VIII.19 The Reserve Bank has made concerted efforts in exploiting the potential of IT based on a set of guiding principles: (i) providing for latest, state-of-the-art systems; (ii) migration towards centralisation to the maximum extent possible; (iii) conforming to the generic architecture for the Reserve Bank and ensuring standardisation of systems; and (iv) providing holistic solutions rather than attempting to provide for individual, stand alone requirements. These guidelines have been followed with due importance to safety and security. Furthermore, the implementation of systems has been pursued using a project based approach with close coordination with the business owners, and by involving external expertise, wherever required.

VIII.20 Various efforts were made in 2005-06 towards consolidation of IT within the Reserve Bank. The year saw the completion of many projects which followed the generic architecture of 'Centralised Data Processing with Decentralised Access'. One of the major activities which got a fillip during the year was the integration of related processing functions. The year witnessed commencement of parallel runs using the new IAS for the DAD at Mumbai. This system is tightly coupled with the RTGS system, thus enabling

Box VIII.3
Data Centres of the Reserve Bank

The critical processing requirements of the Reserve Bank are now being increasingly performed using IT based systems. As a result, the need for consolidation of the critical systems has gained significance. Therefore, a state-of-the-art Data Centre housing critical computer systems with adequate back up Data Centres has been envisaged as under:

- A primary data centre conforming to the Tier IV Standard of the Uptime Institute (which is recognised internationally) and having multiple active power and cooling distribution paths, fault tolerant redundant components and providing very high availability in an exclusive area;
- An on-city back up data centre to be located in the same city; and
- An off-city back up data centre located in a different city.

The Data Centre will house all the critical systems of the Reserve Bank and shall provide for centralised databases with a decentralised access facility.

Straight-Through-Processing (STP) operations between these components. The system is also being provided with interfaces to operate with the Centralised PDO system. A new Centralised PAD system is currently being tested along with the existing system, and will be made fully operational soon; and the consolidation of this with the IAS would make the systems used for operations of the Banking Department of the Reserve Bank function in an integrated way.

VIII.21 The Integrated Establishment System (IES) which was tested comprehensively at all offices has been put to parallel operations at two centres; it will be made fully operational during the second half of 2006. A new Human Resources Management System (HRMS) incorporating latest systems will be ready for implementation during the second half of 2006-07. This system will be integrated with the IES.

VIII.22 In order to bridge the gap in communication across various offices of the Reserve Bank, video conferencing facility was implemented during the year. The facility was inaugurated by the Governor by using it for his New Year Address on January 2, 2006. The system has been initially installed at 14 locations and has been well received. The system has facilitated regional media to interact with the Governor and the Deputy Governors on the day of the release of the Annual Policy Statement/reviews every quarter.

VIII.23 In the recent period, the focus has been on rationalising the existing approach of distributed processing capabilities (which necessitated the existence of multiple facilities to house such systems as also additional manpower for regular updating and maintenance at high levels) through setting up of the Reserve Bank's Data Centres (Box VIII.3).

Status of IT in the Reserve Bank

VIII.24 Reflecting the ongoing efforts to increase the use of IT as well as to improve its efficient use, the usage of IT increased significantly during 2005-06 (Table 8.5).

Table 8.5: Critical IT Implementation Factors in 2005-06

Critical Requirement Factor	Performance Yardstick	Position as at end-March 2005	Position as at end-March 2006
Standardisation	Across all departments	40% completed 40% under progress 20% being started	85 % completed 15% under progress
Integrated Application Systems	For all functional units	50% completed 38% under progress 12% being started	65% completed 35% under progress
Server Consolidation	At all locations	25% completed 50% under progress 25% being started	70% completed 30% under progress
Connectivity	Across all offices and all locations	100% completed	100% completed
Productivity Tools	For all critical mainframe applications	95% completed	100% completed
Corporate e-mail	For all users at all locations	100% demand met	100% completed
IS Security	For all information systems	75-80% completed	90+% under progress

VIII.25 The smooth functioning of the Centralised PDO (CPDO) system in the light of migration towards the usage of centralised IT systems was an important event during the year. The Reserve Bank's corporate e-mail system has been functioning smoothly but has been following the distributed architecture. The migration to a single forest to ensure efficiency has already commenced. Enhancements to the system to make it easily accessible through the internet have been provided. The secured website of the Reserve Bank which facilitates registered users, including Government departments, to obtain data/information relevant to them has been extended to cover the Central Database Management System (CDBMSi). Member banks of the clearing houses have also been allowed to download clearing data through the Reserve Bank website.

VIII.26 In order to track the movement of cases, letters and notings, within and across departments, an in-house developed Document Management and Inward-Outward System was made operational during the year. This software has been implemented by all offices/departments of the Reserve Bank and has been well received. A multi-application smart card-based access control system for the Reserve Bank staff was also introduced during the year at the Central Office.

VIII.27 In view of the growing use of technology within the Reserve Bank, necessary steps have been put in place for a Business Continuity Plan (BCP) and a disaster recovery mechanism through technological upgradation. All critical payment systems are operated using mainframe computer systems, as elsewhere in the world; the potential of such systems is indicated in Box VIII.4.

Reserve Bank and the IDRBT

VIII.28 Continuing research, development and training is critical to ensure that the implementation of IT for the financial sector is in line with the developments in the IT industry. These aspects are being addressed by the Institute for Development and Research in Banking Technology (IDRBT), an institution funded by the Reserve Bank. The Institute is a Certifying Authority under the Information Technology Act, 2000 and is engaged in pioneering research and networking service functions. During the year, IDRBT commenced operations relating to the National Financial Switch (NFS). NFS facilitates apex level connectivity among ATM networks of banks and funds settlement at a central point. The NFS enables customers of banks connected to it to withdraw cash and information from ATMs of any of those banks. The NFS has the potential to provide large scale

Box VIII.4
Mainframe Computer Systems

Mainframe computers are large computer systems used mainly by government institutions and large companies for mission critical applications. Modern mainframe computer abilities are not measured by their performance capabilities; instead, their high-quality internal engineering and proven reliability, high-quality technical support, top-notch security, and strict backward compatibility for older softwares make them a class apart from other systems. These machines can be used for non-stop processing operations for many years without interruption and even facilitate repairs to take place whilst they continue to be in operation. The robustness and dependability of these systems are amongst the main reasons for the longevity of this class of computers and use in applications where down-time would be catastrophic. Terms such as Reliability, Availability and Serviceability (RAS) have become synonymous with mainframe computer systems.

Nearly all mainframes have the ability to run (or "host") multiple operating systems and thereby operate not as a single computer but as a number of virtual machines. In this role, a single mainframe can replace dozens or even hundreds of smaller servers, reducing management and administrative costs while providing greatly improved scalability and reliability. The reliability is improved because of the hardware redundancy noted above, and the scalability is achieved because hardware resources can be reallocated among the virtual machines as needed out of total system capacity. Mainframes can add system capacity in a non-disruptive, instant, and granular manner which is the need of most businesses of today. In contrast, most of the relatively smaller processing systems do not offer levels of security available in mainframe systems. Their total cost of ownership may be relatively lower, but their total cost per user tends to be far more than those of the mainframe systems.

Reflecting these factors, mainframe computer systems are also preferred by most of the central banks for BCP. The European Central Bank uses four such systems in tandem to take care of business continuity and disaster recovery; the Federal Reserve System has many such systems. In India too, the critical payment and settlement system processes are carried out using mainframe computer systems. These have not only stood the test of time but have also reinforced the dependability of these systems.

Box VIII.5
Pre-Implementation Audit of Critical Systems

Software development and implementation follows a structured approach in most organisations. In the Reserve Bank too, software implementation follows a well-defined method. With outsourcing emerging as the common method of procuring software, pre-implementation audit of critical systems assumes importance. This is generally done after the systems are tested internally by following a pre-determined plan relating to various situations and followed by an acceptance test. The major thrust areas of such a pre-implementation audit are : (i) gaining awareness of the scope of release management and control; (ii) planning and initiating key activities in the release and control process; (iii) learning how to integrate activities with change and configuration management; (iv) defining the release and control quality, policy and procedures; (v) defining and maintaining procedures, work instructions and guidelines for the release and control process; (vi) understanding the role of the release and control manager; (vii) learning about definitive software libraries and the definitive hardware store; (viii) learning to plan, manage and implement all releases from request to successful closure; (ix) learning to design, build and configure all releases; (x) learning to select the best release and control strategies; (xi) creating key performance indicators (KPIs) for release and control; (xii) learning how and what to audit through best practice; and (xiii) discovering service improvement plans for release and control. Such an audit provides more comfort for users of the systems.

services to meet the 'ANY-WHERE-MONEY' through 'ANY-BANK-ATM'.

Networks and Network-based IT Usage

VIII.29 In order to provide for increased availability of telecommunication capabilities, the bandwidth of the inter-city telecommunication links, which are part of the INFINET, was upgraded during the year. This has resulted in the existence of 2 mbps links across all the offices of the Reserve Bank, with the major offices being upgraded to 8 mbps.

VIII.30 The INFINET continues to perform satisfactorily as a safe and secure network for transmission of financial messages for member banks, especially for processing the common inter-bank payment system applications implemented by the Reserve Bank for the use by all member banks.

Information Security Policy

VIII.31 With increased dependence on IT in the Reserve Bank, an information security policy has been put in place. This policy will form the basis for detailed procedural indicators. IS Audit of critical systems – such as the PDO-NDS and the Reserve Bank's website – was conducted during the year. As a part of effective corporate governance, the IS audit function is performed not by the Department which implements the technological system. Thus, for IT systems implemented by Department of Information Technology (DIT) of the Reserve Bank, IS audit is undertaken by Inspection Department. Based on the findings, compliance is ensured by the DIT in conjunction with the business owner department for the respective system. Plans are on to conduct a pre-implementation IS Audit of the full scale RTGS-IAS as well (Box VIII.5).

IT for the Financial Sector

VIII.32 The Reserve Bank has been functioning as a catalyst in ensuring that latest developments in IT which are beneficial to banks are implemented by them. This process has witnessed substantial benefits. In order to provide the financial sector a roadmap, the Reserve Bank brought out the Vision Document outlining the IT plans for the financial sector for the medium term. The Vision Document elucidates Technology Vision for the financial sector and covers areas such as: IT regulation and supervision; IT and IDRBT; IT for the financial sector; and IT for Government related functions. With its Vision Statement of 'IT for efficiency and excellence', the objective is to 'enable banks to leverage on IT for better customer service, improved housekeeping and overall system efficiency'. This document provided a useful backdrop for discussions held by the Reserve Bank in January 2006 with the chiefs of the Computer Planning and Policy Departments of banks.

Outlook

VIII.33 The Reserve Bank would continue to focus on oversight of the various payment and settlement systems for ensuring safety and improving efficiency. As a step in this direction, the Reserve Bank has framed minimum operational standards for MICR cheque processing centres. These centres will be assessed through quarterly returns against the

standards. The Reserve Bank is in the process of bringing out the first Report on Payment Systems Oversight. The Report would help in highlighting the areas which require further improvements. The Reserve Bank would also endeavour to put in place a more formal structure for conducting oversight over existing payment systems. In order to provide a statutory basis for its oversight function over the payment and settlement systems within the country, the Reserve Bank is pursuing with the Government of India for enactment of a separate legislation *viz*., the Payment and Settlement Systems Act. The Bill was introduced in the Parliament on July 25, 2006. The Reserve Bank has also framed the Electronic Funds Transfer Regulations which are awaiting the approval of the Government of India.

VIII.34 The Reserve Bank would continue to harness the full potential of IT to improve operational efficiency. The amalgamation of IT with business requirements would pave the way for capabilities to process increased volume of transactions and provide good and efficient management information system inputs. It would also provide for better risk management and more effective ways of monitoring performance of banks.