PAYMENT AND SETTLEMENT SYSTEMS AND INFORMATION TECHNOLOGY

The Reserve Bank continued its efforts in making the payment systems more secure and efficient. Efforts were also made to make the payment systems more affordable for users and to widen their reach beyond the existing levels to achieve the goal of financial inclusion. The focus has also been on reducing the use of cash in society. During the year, the Reserve Bank continued its endeavours to improve the IT infrastructure with a view to facilitating the Indian banking sector's alignment with the latest technological innovations.

IX.1   During 2012-13, the Reserve Bank continued to encourage innovations in payment systems as well as enhance accessibility and affordability to hitherto unbanked segments of population through suitable adoption of technological developments. These efforts are reflected in the growing volumes under electronic modes during the year (Table IX.1). Simultaneously, the volumes under paper-based clearing show a decline, as envisaged in the Vision Document 2012-15. The

Table IX.1: Payment System Indicators - Annual Turnover

Item	Volume (million)			Value (₹ billion)		
	2010-11	2011-12	2012-13	2010-11	2011-12	2012-13
1	2	3	4	5	6	7
Systemically Important Payment Systems (SIPS) through RTGS	**49.3**	**55.0**	**68.5**	**484872.3**	**539307.5**	**676841.0**
Total Financial Markets Clearing (1+2+3)	**1.7**	**1.9**	**2.26**	**383901.3**	**406071.2**	**501598.5**
1. CBLO	0.15	0.14	0.16	122597.4	111554.3	120480.4
2. Government Securities Clearing	0.36	0.44	0.70	69702.4	72520.8	119948.0
3. Forex Clearing.	1.20	1.30	1.40	191601.5	221996.1	261170.1
Others (4+5+6)	**1387.4**	**1341.9**	**1313.7**	**101341.3**	**99012.1**	**100181.8**
4. CTS	160.4	180.0	275.1	14391.2	15103.7	21779.5
5. MICR Clearing	994.6	934.9	823.3	68621.0	65093.2	57504.0
6. Non-MICR Clearing	232.3	227.0	215.3	18329.1	18815.1	20898.3
Total Retail Electronic Clearing (7+8+9)	**406.3**	**512.3**	**692.8**	**11944.9**	**20574.9**	**31876.8**
7. ECS DR	156.7	164.7	176.5	736.5	833.6	1083.1
8. ECS CR	117.3	121.5	122.2	1816.9	1837.8	1771.3
9. EFT/NEFT	132.3	226.1	394.1	9391.5	17903.5	29022.4
Total Cards (10+11)	**502.2**	**647.5**	**865.7**	**1142.1**	**1500.4**	**1972.9**
10. Credit Cards	265.1	320.0	396.6	755.2	966.1	1229.5
11. Debit Cards	237.1	327.5	469.1	386.9	534.3	743.4
Total Others (4 to 11)	**2295.9**	**2501.7**	**2872.2**	**114428.2**	**121087.4**	**134031.4**
Grand Total (1 to 11)	**2346.9**	**2558.6**	**2942.9**	**983201.8**	**1066466.1**	**1312470.9**

Note: 1. Settlement of government securities clearing and forex transactions is through Clearing Corporation of India Ltd.

2. Figures in the columns might not add up to the total due to rounding off of numbers.

3. At the end of April 2013, MICR clearing was available at 64 centres (66 centres during the previous year). At two centres, namely New Delhi and Chennai, Cheque Truncation System (CTS) has been implemented. Grid-based CTS has commenced operations since April 2012 in Chennai, in which banks from 82 locations are participating, encompassing the states of Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, West Bengal (Kolkata) and the Union Territories of Puducherry and Chandigarh.

4. The figures for cards are for transactions at POS terminals only.

5. Transactions for a value of ₹79 billion (representing 0.01 per cent of total non-cash transactions during the year 2012-13) were done using pre-paid instruments issued.

6. Transactions for a value of ₹4.3 billion (representing 0.0003 per cent of total non-cash transactions during the year 2012-13) were done using Instant Money Payment Services (IMPS).

Cheque Truncation System, introduced in the year 2008, has also shown substantial growth during the year, thus consolidating the paper-based clearing structure in the country. Overall, the payment and settlement systems registered healthy growth, with volumes and value growing at 15.0 per cent and 29.7 per cent, respectively, on y-o-y basis compared with the growth of 9.0 per cent and 23.2 per cent, respectively during the previous year.

TRENDS IN PAYMENT SYSTEMS

Paper Clearing

IX.2   The application package 'Express Cheque Clearing Systems' (ECCS) that was introduced in 2011 for non-MICR clearing houses is now available at 1,269 centres and offers a speed clearing facility. The grid-based Cheque Truncation System introduced in March 2012 in Chennai, has been extended to cover image-based clearing operations across the states of Tamil Nadu, Kerala, Karnataka and Andhra Pradesh, as well as cities such as Kolkata, Ludhiana, Puducherry and Chandigarh. Banks from 88 locations (24 MICR centres and 64 non-MICR centres) are participating in the Chennai Grid. As part of the national roll-out, CTS clearing operations in Mumbai commenced in April 27, 2013.

Electronic Payments

IX.3   The Real Time Gross Settlement System (RTGS) processed transactions to a settlement value of around ₹8 trillion on March 28, 2013, which is the highest value settled through RTGS on a business day. To ensure interruption-free operations under all circumstances, disaster recovery drills for RTGS systems are conducted on a quarterly basis.

IX.4   The National Electronic Funds Transfer (NEFT) handled a record volume of 47 million transactions valued at around ₹3,602 billion in the month of March 2013. With the addition of 13,980 branches during the year, the number of bank branches participating in NEFT has grown to 100,429. There are around 650 sub-member banks participating in NEFT.

IX.5   With the addition of 18,257 branches during the year, the coverage of the National Electronic Clearing Service (NECS) has been increased to 75,659 locations as at the end of July 2013. The Regional Electronic Clearing Service (RECS) system introduced in various Reserve Bank centres has seen expansion in branch coverage during the year.

IX.6   As at end March 2013, 55 banks with a customer base of around 23 million were providing mobile banking service in India compared to 49 banks and a 13 million customer base at the end of March 2012. During 2012-13, 53 million transactions valued at around ₹60 billion were transacted, thus registering a growth of 108 per cent and 229 per cent, respectively, over the previous year. The removal of transaction limits on mobile banking and the raising of limits for transactions that can be sent without end-to-end encryption have contributed to this increase.

Authorisation under Payment Systems

IX.7   Any entity that wants to set up and operate a payment system in India needs authorisation from the Reserve Bank under the Payment and Settlement Systems Act, 2007 (PSS Act). As at end-May 2013, 44 entities are operating various payment systems in the country, which included a financial market infrastructure organisation – the Clearing Corporation of India Ltd. (CCIL), the National Payments Corporation of India (NPCI), card payment networks (VISA, MasterCard, RuPay, *etc.*), automated teller machine (ATM) networks, cross-border in-bound money transfer services and pre-paid payment instrument (PPI) issuers.

White Label ATMs

IX.8   To accelerate the growth and penetration of ATMs in the country, the Reserve Bank, in June 2012, issued guidelines on the entry of non-bank entities into the space of ATM operations, which have been christened White Label ATMs (WLAs). So far, 19 entities have approached the Reserve Bank seeking authorisation to set up and operate

WLAs. Of these, 12 entities have been granted in-principle approval and one entity has been issued a Certificate of Authorisation. The first WLA was operationalised at Chandrapada (tier-V town), Maharashtra on June 27, 2013.

POLICY INITIATIVES

Vision Document 2012-15

IX.9   The Reserve Bank published the Vision Document for payment systems, laying down the roadmap for payment systems in the country for the next three years, *i.e.*, 2012-15 (Box IX.1)

Transparency and efficiency in paper clearing

IX.10   To bring transparency to the charges levied by banks and to increase the efficiency of cheque clearing, the Reserve Bank took the following measures: i) Banks have been advised to reframe their Cheque Collection Policies (CCP) to include compensation payable for delay in the collection of local cheques. If no rate is specified in the CCP for delay, compensation at the savings bank interest rate should be paid for the period of delay; ii) All CBS-enabled banks were advised to issue only "payable at par"/ "multi-city" CTS 2010 Standard cheques to all eligible customers without extra charges with appropriate board-approved risk management procedures; and iii) Banks were advised not to charge their savings bank account customers for the issuance of CTS-2010 standard cheques for the first time. As a large number of non-CTS cheques continue to be in circulation, the banks have been advised that the existing arrangement for clearing of non-CTS 2010 cheques will continue up to December 31, 2013. Thereafter, such instruments will be cleared at less frequent intervals through separate clearing sessions in the CTS locations.

Box IX.1
Vision Document 2012-15

The Vision Document indicates the Reserve Bank's renewed commitment to providing safe, efficient, accessible, inclusive, interoperable and authorised payment and settlement systems for the country, with affordable alternatives to customers, especially those who are still deprived of such payment modes. The main challenges in achieving these goals are: (i) the continued use of cash as the predominant mode of payment; (ii) low per-capita non-cash transactions; (iii) concentration of modern electronic payment systems in Tier I and II centres; (iv) low penetration of acceptance infrastructure for electronic payments; and (v) government receipts done predominantly through cash/ cheque, *etc.*

The Vision Document focuses on promoting electronic modes of payment and reducing the use of cash by:

i)   Proactively promoting electronic payments through a 7-A's framework of enhancing accessibility, availability, awareness, acceptability, affordability, assurance and appropriateness of payment systems and products.

ii)   Developing policy guidelines that are equitable, uniform and risk-based and also products/channels to facilitate innovation and competition, simplification of documentation requirements, increasing the role of non-banks in payment systems, *etc.*

iii)   Increasing the efficiency of payments system through standardisation of message formats, uniform routing codes, uniform account numbers, interoperability in payment systems, capacity building in terms of systems and human resources, implementation of GIRO payments *etc.*

iv)   Setting up a standards setting body;

v)   Addressing the risks in payment systems, especially in electronic transactions and strengthening the risk management systems.

vi)   Promoting access and inclusion through payment system literacy initiatives under Electronic Banking Awareness and Training (e-BAAT).

vii)   Facilitating migration of government payments and receipts to the electronic mode from the existing cheque / cash modes.

viii)   Promoting the use of pre-paid payment instruments as a substitute for cash in general and specifically for financial inclusion through , Electronic Benefit Transfer (EBT), DTS transfers and e-commerce.

ix)   Promoting innovation to facilitate financial inclusion through further adoption of mobile banking and Near-Field Communication (NFC) in payment systems, mobile Point of Sale (PoS), *etc.*

x)   Ensuring compliance with the new international standards by central counterparties, CSDs, trade repository and other systemically important payment systems.

Disincentivising issuance and usage of cheques

IX.11   In order to further enhance the speed of decline in usage of cheques, a discussion paper on "Disincentivising Issuance and Usage of Cheques" was prepared and placed on the website for comments from the public.

Efficiency enhancement in NEFT

IX.12   Two efficiency enhancement features were introduced in the National Electronic Funds Transfer (NEFT) system. An additional batch at 8:00 AM was introduced, taking the total number of batches to 12 on weekdays and 6 on Saturdays. Further, the continuous release of credit messages was introduced which increases the time available to destination banks to process inward NEFT transactions and facilitate more efficient handling of the growing transaction volumes. To facilitate the migration of small-value transactions from cash or cheque to NEFT, customer charges for transactions up to ₹10,000 were reduced to ₹2.50.

Adoption of uniform routing code and uniform account number structure

IX.13   With the adoption of CBS by all major banks, there was a demand from banks to do away with the branch identifier in the IFSC for routing RTGS and NEFT transactions. Further, there were demands for a uniform account number across banks, which would help avoid wrong credits under the payment systems. A Technical Committee was constituted by the Reserve Bank to study the issues (Box IX.2)

Box IX.2
Technical Committee to Examine Uniform Routing Code and Account Number Structure

Various payment systems in the country use different codes to identify the bank/ branch for settlement and routing purposes. While the RTGS and NEFT systems use the Indian Financial System Code (IFSC), the ECS, cheque clearing systems use the Magnetic Ink Character Recognition (MICR) code and cross-border transactions use the SWIFT Branch Identifier Codes (BIC). The adoption of core banking solutions in almost all major banks and the consequent business process re-engineering led to a demand for reviewing the routing codes by doing away with the branch identifier in IFSC for RTGS and NEFT and to route all transactions only through the bank code in the IFSC. Another suggestion was to consolidate the multiple routing codes (MICR, IFSC, SWIFT, BIC) to enable interoperability among payment systems.

Similarly, the structure of customer account numbers varied across banks in terms of length, pattern, composition and presence of cheque digits. This hampered even basic validations on account numbers during origination of payment transactions.

To study these issues and provide recommendations, the Reserve Bank constituted a Technical Committee (Chairman: Shri Vijay Chugh) in August 2012 to examine:

a)   the feasibility of doing away with the branch identifier in the IFSC;

b)   the desirability of implementing IBAN to replace multiple identifiers for all financial transactions;

c)   the harmonisation of all existing bank/branch codes

The Committee comprised of representatives from banks, the IBA, IDRBT and regulatory departments of the Reserve Bank.

While analysing the issues, the Committee aimed to achieve the objective of standardisation while ensuring that the changes required in banks' systems and processes would be minimised and cause the least inconvenience to customers. The Committee submitted its report in December 2012.

The main recommendations of the Committee are:

i)   In view of validation checks built around branch identifier in IFSC by a large number of banks to prevent credits going to wrong accounts, the Committee recommended its continuation.

ii)   The IFSC is best suited for routing purposes in payment systems in the current scenario and as such it may continue to be used. Further, in order to limit the number to existing level, the Committee recommended that any new payment system should use only the IFSC for routing purposes.

iii)   The Committee recommended the implementation of IBAN in banks as it would bring in uniformity and also enhance the efficiency in systems that use account numbers as a critical input for successful processing of payment transactions. The Committee recommended 26-characters long IBAN with alpha bank-id as it will require minimum changes across banks. However, the Committee noted that IBAN will not bring in portability of accounts across banks.

The recommendations of the Committee are under consideration of the Reserve Bank of India.

Security in Card Payments

IX.14   The Reserve Bank has been seeking to enhance the safety and security of card payment transactions – both Card Present (CP) and Card Not Present (CNP) transactions. Besides mandating introduction of SMS alerts, use of additional factors of authentication in case of CNP transactions have also been mandated. In addition, the Reserve Bank has also issued necessary instructions for securing CP transactions based on the recommendations of a Working Group which submitted its report in May 2011. The Working Group *inter-alia* suggested evaluation of the usefulness of Aadhaar as additional factor of authentication (AFA) for card present transactions. Accordingly, based on the results of the Pilot conducted at New Delhi in December 2012-January 2013, a Working Group has been formed to study the feasibility of Aadhaar as an AFA for CP transactions and other related issues.

IX.15   Further, the growing popularity of alternate channels of payments brings added responsibility on banks to ensure that transactions effected through such channels are safe, secure and not easily amenable to fraudulent usage. The Reserve Bank has advised banks and other stakeholders to put in place certain security measures in a time bound manner to strengthen the security aspects of the eco-system. Some of these measures relate to introduction of AFA for online payments and implementation of digital signatures for customer-based large value payments in RTGS, securing PoS terminals to prevent data compromise as well as putting in place techniques for fraud prevention; placing restrictions on addition of beneficiaries in internet banking accounts and number of online transfers; issuance of international card only on demand by customers and limiting the usage threshold on magstripe cards for international transactions; issuance of EMV card to people who use cards internationally *etc.*

Rationalisation of MDR in Debit Cards

IX.16   In order to encourage all categories and types of merchants to deploy the card acceptance infrastructure and facilitate acceptance of even small value transactions using debit cards, the Merchant Discount Rate (MDR) structure for debit card transactions was rationalised. The maximum rate that can be charged by banks was specified as not exceeding 0.75 per cent of the transaction amount for value up to ₹2000 and not exceeding 1 per cent for transactions above ₹2000.

Rationalisation in Issuance of Prepaid Instruments

IX.17   As on end-May 2013, 41banks and 22 non-banks have been authorised to issue prepaid instrument (PPI). In view of the potential of prepaid instruments to enhance the objectives of financial inclusion and also facilitate reduction in cash-based transactions, the Reserve Bank has rationalised the guidelines for issuance of semi-closed PPIs in terms of categories and KYC requirements.

i)   PPIs up to ₹10,000 by accepting minimum details of the customer, amount outstanding at any point of time and total value of reloads in month not to exceed ₹10,000, can be issued only in electronic form;

ii)   PPIs from ₹10,001 to ₹50,000 by accepting any 'officially valid document' defined under rule 2(d) of the Prevention of Money Laundering Act, non-reloadable in nature, can be issued only in an electronic form;

iii)   PPIs up to ₹50,000/- with full KYC, can be reloadable.

IX.18   Further, in order to enhance the utility of PPIs, the facility of funds transfer from a PPI to another PPI issued by same entity and/or to any bank account, was enabled for all categories of PPIs.

GIRO-based Payments

IX.19   In earlier days, a payment was made by sending a cheque to the payee and payee deposited the cheque in his/her bank for credit to his/her account. Later on, there came a facility by which the payer himself could deposit the cheque in his/her bank for credit to payee's account. These were termed as "payer" initiated payment and were known as GIRO.

IX.20   In India, although a wide range of payment instruments and payment channels are currently available in the country, there is no dedicated system for facilitating bill payment where cheque and cash still occupy a major place. To overcome this problem and provide a common infrastructure for all bill payment needs of the public, a Committee for Implementation of GIRO based Payment System was constituted with the following broad terms of reference (a) finalise the contours of the GIRO product (electronic and cheque) for the country; (b) design the operational and procedural guidelines of the GIRO payment system; (c) draw up a roadmap for implementation of GIRO in India and (d) lay down the transitional path for switch over from cheque to electronic GIRO over a period of time. The Committee has since submitted its report which is under consideration (Box IX.3).

Automated Teller Machines (ATM)

IX.21   To improve the delivery of customer services, banks were advised to place a quarterly review of ATM transactions to their Board of Directors, indicating, *inter alia*, the denial of services to the customers at ATM sites, reasons thereof and the action taken to avoid recurrence of such instances. Banks were also advised to report the developments in this regard to the Reserve Bank.

National Payments Corporation of India (NPCI)

IX.22   During the year, NPCI was permitted to admit WLA operators as direct members of National Financial Switch, if approached. As regards mobile payments, NPCI was permitted to enhance the array of services provided through mobile banking and also to widen the channels available for customers to initiate IMPS transactions (*viz.*, ATMs, internet, mobile *etc.*). NPCI is also working on bringing more mobile network operators on-board to provide mobile banking services through a common dedicated platform.

IX.23   The National Automated Clearing House (NACH) system was made operational during the year, which will provide one more alternative to users of bulk payment systems for effecting their payments. After launch of Rupay cards, India's first domestic card scheme, NPCI was also permitted to launch Rupay affiliated prepaid cards. To enhance the acceptance and usage of Rupay cards, its use on PoS and for e-commerce transactions was also permitted.

Oversight of Payment Systems

IX.24   An oversight framework commensurate with the international standards prescribed by the Committee on Payment and Settlement Systems (CPSS), the global standards setting body on payment and settlement systems, has been put in place to monitor the activities of the 44 (both bank and non-bank) authorised entities, operating payment systems in the country.

IX.25   The onsite inspection of National Payments Corporation of India (NPCI) and Clearing Corporation of India Limited (CCIL) showed that the entities have sound governance structure and the risk management systems are in place. The CCIL being a critical financial infrastructure in the country is being monitored closely to avoid any systemic impact. The concentration risk in payment systems is being evaluated to initiate appropriate action in accordance with the international practice.

IX.26   The off-site monitoring of authorised entities is done on the basis of the data received from banks, through online and offline mode, using the Online Return Filing System (ORFS). Periodical analysis of the data is carried out to discern patterns and trends for further policy actions.

Box IX. 3
Committee to Recommend Implementation of GIRO-based Payment Systems in India

In line with the objective set out in the Payment Systems Vision (2012-15), a Committee (Chairman Shri G. Padmanabhan) was set up to finalise the modalities of implementing the GIRO payment system – both electronic and cheque based, in India. The Committee released the report in April 2013.

Bill payments, including utility bills and other payments related to school fees, examination fees, government payments, pre-paid payment instruments top-ups, mobile phone recharge/top-up, insurance premia, taxes *etc.* form a major component of retail payment transactions space. Despite the availability of a wide range of payments instruments and channels, there are significant operational and cost inefficiencies in the bill collection processes. It is estimated that over 30,800 million bills are generated each year in just the top 20 cities in the country and almost 90 per cent of these are estimated to be collected through cash/cheque with a very small share of electronic payments through ECS *etc.*

The Committee also noted the following gaps in the present bill payments eco-system – (i) lack of interoperability, (ii) high cost of cash collection, (iii) poor accessibility in semi-urban and rural areas, and (iv) lack of coordinated initiative by the billers to put in place a interoperable country-wide standard system.

While recommending an interoperable, integrated bill payment system in the country, the Committee noted that it would entail several benefits like:

- Widen the availability of bill payment points for consumers by bringing in any bank branch, post offices, business correspondents, retail agents of aggregators, ATMs, *etc.* within its ambit;

- allow consumers to make payment by cash, cheque, credit/debit cards, prepaid payment instruments;

- facilitate payment of bills through internet banking, mobile banking and Interactive Voice Response System;

- provide instant confirmation by SMS or otherwise of payments made;

- provide cost efficient collection and reconciliation services to billers

The major recommendations of the Committee are:

i) A GIRO based payment system christened "India Bill Payment System" (IBPS) may be designed and implemented in the country.

ii) The participants in the IBPS would include billers, intermediaries/aggregators, banks, collection agencies operating the IBPS touch-points in addition to the IBPS' own touch-points. For easy identification, and acceptance of the IBPS, a service mark/logo should be designed and displayed on the bills as well as the IBPS touch points.

iii) Initially, only intermediaries/aggregators may be permitted direct connectivity to the IBPS which may be considered for billers at a later date, based on appropriate access criteria.

iv) The payment made by a consumer would be irrefutable and payer should be provided with a receipt by the IBPS acknowledging the receipt of the payment carrying a unique reference number generated by the IBPS with the IBPS service mark/logo.

Other suggestions given in the Report are:

a) *Bill Presentment***:** IDRBT could develop an appropriate algorithm for capturing bill data to bring in standardisation of bills. IBPS should support the prevalent paper mode of bill presentment but should encourage electronic presentment.

b) *Bill Information flow***:** Under IBPS, payment information should flow online to minimise reconciliation issues and customer grievances.

c) *Payment instruments/channels***:** The IBPS should facilitate acceptance of payments through IVRS, net banking, mobile banking and enable acceptance of all payment modes including cash at the IBPS points.

d) *Customer Support***:** IBPS will provide for online registration of complaints from customers and the first point of contact (bank branches/customer service point receiving the payment) would provide customer support. Grievances related to bill payment will have to be attended to by the biller while IBPS/aggregator would provide the necessary support to the billers in this regard.

The Committee recommended that a separate organisation needs to be set up to operate and manage the IBPS in a professional manner and run on commercial lines which may be authorised by the Reserve Bank under the Payment and Settlement Systems Act, 2007.

Clearing Corporation of India Limited (CCIL)

IX.27   The Reserve Bank is committed to the adoption and implementation of the international standards and best practices in payment systems including, the new CPSS-IOSCO standards 'Principles for Financial Market Infrastructures (FMIs)'. The oversight framework for CCIL would now be drawn up based upon the PFMIs. Towards this end, CCIL was subjected to an onsite inspection during which it was assessed using the assessment methodology of the PFMIs to ascertain the compliance to each of the 24 standards.

IX.28   During the year, CCIL has implemented several measures to strengthen its risk management framework which includes complete revamp of the margining system in securities segment, implementation of changes to forex forwards regulations pertaining to exit option for members, resignation by members, limited liability for members and computation of default fund *etc.* CCIL during the year conducted two rounds of trade compression in IRS/FRA which resulted in early termination of trades.

Committee on Payment and Settlement Systems (CPSS)

IX.29   The CPSS and the International Organisation of Securities Commissions (IOSCO) published the new set of standards for financial market infrastructures "Principles for Financial Market Infrastructures" (PFMIs) which unified and harmonised three previous international standards for FMIs[1]. Additionally, CPSS-IOSCO has published the disclosure framework for promoting consistent and comprehensive public disclosure by FMIs and an assessment methodology that would provide guidance for monitoring and assessing observance with the PFMIs.

PFMI implementation monitoring

IX.30   CPSS-IOSCO have since started the process of monitoring implementation of the PFMIs in jurisdictions that are members of the FSB and/or the CPSS-IOSCO Steering Group that carried out the review of PFMIs.

IX.31   CPSS has also published a report on "Innovations in retail payments" which provides an overview of innovative retail payment activities in the CPSS and several other countries and identifies a number of exogenous and endogenous factors that could serve as drivers for retail payment innovations or as barriers to them. The report also identifies a number of issues for central banks including the increasing role played by non-banks in retail payments for which a separate CPSS Working Group (Chairman Shri G. Padmanabhan) has been setup.

Technical Support to SAARC Countries

IX.32   The Reserve Bank, as part of the SAARC initiatives has been providing technical support to the member countries. Based on their request, during the year, the Bank arranged custom-made training programmes to the officials of Royal Monetary Authority (RMA) of Bhutan and the Maldives Monetary Authority in the areas of electronic payments and image-based cheque clearing systems, respectively.

INFORMATION TECHNOLOGY INITIATIVES FOR THE BANKING SYSTEM

Automated Data Flow

IX.33   Under the directions of the Reserve Bank, banks have undertaken to bring returns to be submitted to the Reserve Bank under Automated Data Flow (ADF). By implementing this, banks would be able to automate the flow of data from their CBS or other IT systems to the Reserve Bank

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[1] Core principles for systematically important payment systems (CPSS, 2001); the Recommendations for securities settlement systems (CPSS-IOSCO, 2001); and the Recommendations for central counterparties (CPSS-IOSCO, 2004).

in a straight through manner without any manual intervention. Banks have adopted different strategies for putting in place systems and processes to achieve the above. By March 2013, most of the banks have implemented suitable solutions to generate all the returns to be submitted to the Reserve Bank. The ADF project has been considerably successful in sensitising the banks on the need for ensuring data quality and consistency in regulatory reporting. The Reserve Bank is closely monitoring the progress in this regard.

IX.34   The pace of change in technology is enabling banks to innovate rapidly to overcome the challenges of increasing volumes and growing competition from new entrants, but also poses challenges relating to sophisticated financial crime. In this context, it is imperative that the regulator has sufficient information in the form of dashboards, score-cards and reports on almost real time basis to make timely policy decisions and act proactively.

The initiative of ADF is a first step in this direction. The next focus would be on analytics.

Cloud Computing

IX.35   With increased use of information technology (IT) infrastructure by banks, there is a need to examine the issue of shared IT resources in order to optimise costs while maintaining the desired levels of efficiency and security. The feasibility of such shared resources by the banking sector needs to be explored wherever possible, taking into account security issues, data integrity and confidentiality. One such avenue is cloud computing. Cloud computing is a large-scale parallel and distributed computing system. It consists of a collection of interconnected and virtualised computing resources that are managed to be one or more unified computing resources. The cloud opens up the world of computing to a broader range of uses and increases the ease of use by giving access through any internet connection. (Box IX.4).

Box IX.4
Cloud Computing - Trends, Issues and Concerns

The National Institute of Standards and Technology (NIST) characterises cloud computing as '...a pay-per-use model for enabling available, convenient, on-demand network access to a shared pool of configurable computing resources (*e.g.* networks, servers, storage, applications, services) that can be rapidly provisioned and released with minimal management effort or service provider interaction'.

A cloud broadly has three segments in its structure: application, storage and connectivity. This cloud model is composed of three service models, five essential characteristics**,** and four deployment models. With certain variation among these three, the cloud computing providers offer their services according to three fundamental models:

Service Models

Software as a Service (SaaS): In this model, users access the software from cloud clients and cloud provider has to install and operate application software in the cloud. The cloud users are not responsible for managing the cloud infrastructure and platform on which the application is running. This eradicates the need to install and run the application on the cloud user's own computers. Hence the maintenance and support becomes much simpler.

Platform as a Service (PaaS): In the PaaS model, cloud providers deliver a computing platform that includes operating system, programming language execution environment, database, and web server. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers.

Infrastructure as a Service (IaaS): This is the most basic cloud service model. Here, the cloud providers offer computers, either as physical or as virtual machines, and provide storage, firewalls, networks and load balancers. IaaS providers supply these resources on demand from their large pools installed in data centres. This can be done in local area networks or in wide area networks, where the internet can be used for connectivity.

Essential Characteristics of the Cloud:

On-demand self-service. A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

(Contd....)

Broad network access. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (*e.g.,* mobile phones, tablets, laptops, and workstations).

Resource pooling. The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. Examples of resources include storage, processing, memory, and network bandwidth.

Rapid elasticity. Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand.

Measured service. Cloud systems automatically control and optimise resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (*e.g.,* storage, processing, bandwidth, and active user accounts).

Deployment Models:

Private cloud: The cloud infrastructure is provisioned for exclusive use by a single organisation comprising multiple consumers (*e.g.,* business units).

Community cloud: The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organisations that have shared concerns (*e.g.,* mission, security requirements, policy, and compliance considerations).

Public cloud: The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organisation, or some combination of them. It exists on the premises of the cloud provider.

Hybrid cloud: The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardised or proprietary technology that enables data and application portability (*e.g.,* cloud bursting for load balancing between clouds).

Some of the advantages of cloud computing are

i)   Maximising cost efficiency – cloud computing enables optimal utilisation of resources and overall cost efficiency

ii)   Accessibility – with cloud computing, access of all required information can take place from anywhere, anytime and from any device.

iii) Agility – cloud computing enables organisations to create new products and provide services faster.

iv)   Scalability – with cloud computing, it is no longer necessary to wait long for the required equipment and the integration process in cloud will be easy.

v)   High availability– cloud computing provides for high availability of servers.

The major concerns raised for the cloud computing model are:

i)   Cloud computing poses privacy concerns primarily because the service provider at any point in time, may access the data that is on the cloud. They could accidentally or deliberately alter or even delete some information.

ii)   In order to obtain compliance with regulations the users may have to adopt private cloud deployment modes that are typically more expensive.

References

National Institute of Standards and Technology, September 2011, "The NIST Definition of Cloud Computing". (http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf)

Voorsluys, William; Broberg, James; Buyya, Rajkumar (February 2011). "Introduction to Cloud Computing". New York, USA: Wiley Press.

RTGS and NG-RTGS System

IX.36 RTGS volume crossed 0.43 million transactions during March 2013. In view of the increasing volumes, as also other business requirements, the Reserve Bank is replacing the existing RTGS with NG-RTGS, which provides for improved functions and features. Some of the new features to be implemented in the NG-RTGS system are advanced liquidity management facility; extensible mark up language (XML) based messaging system conforming to ISO 20022; and real time information and transaction monitoring and control systems. Necessary hardware for the operationalisation of the application has already been procured. The necessary training to all RTGS members and internal departments is underway. The NG-RTGS system is expected to be operational by August 2013.

INFORMATION TECHNOLOGY WITHIN RESERVE BANK

IT Sub-Committee to the Central Board

IX.37   As part of good corporate governance and as recommended in the IT Vision Document 2011-17, an Information Technology Sub-Committee (ITSC) to the Central Board was constituted during the year. The mandate of the ITSC is to advise the Reserve Bank on overall IT strategy, infrastructure, applications, review of the security of the IT Systems, recommend measures for implementation of appropriate IT systems and monitor the progress of implementation of various IT initiatives undertaken. This Committee is headed by a Central Board member and has reputed representations from the Central Board, academia and industry.

IX.38   As part of its mandate, the ITSC has met two times during the year. The deliberations, *inter alia,* focussed on issues relating to the review of the IS Policy, DR drills conducted by the Reserve Bank, strengthening the IT infrastructure (Network), crystallising the responsibilities of the Chief Information Security Officer (CISO) for the Bank and also new IT initiatives undertaken by the Bank.

Information Security Policy for the Reserve Bank

IX.39   As the IS Policy is to be reviewed periodically, the existing Information Security (IS) Policy for the Reserve Bank and related sub-policies and operational guidelines were taken up for review during the year. For this, inputs were obtained from ISACA certified officers and officers handling system administration and other support functions of the Bank. The revised Policy and sub-policies have been approved by the ITSC. The operational guidelines relevant to administer the policy are being finalised.

Foreign Exchange Transaction Electronic Reporting System (FETERS)

IX.40   Banks report details of sale / purchase of foreign exchange by AD branches under the Foreign Exchange Transaction Electronic Reporting System (FETERS) which are used as input in the compilation and dissemination of the country's balance of payments (BoP) statistics. While the format of presentation of India's BoP was revised during 2011-12, to comply with the IMF's Balance of Payments and International Investment Position Manual – Sixth Edition (BPM6) as per the recommendations of the RBI Working Group (Chairman: Shri Deepak Mohanty), the FETERS system was modified by revising the purposes codes and other parameters suitably for capturing data on all the new items. The modified reporting system was implemented with effect from April 1, 2012. The resultant transition was smooth and India is among the pioneer countries implementing BPM6 standards.

Upgrading the Enterprise Knowledge Portal

IX.41   The Reserve Bank has taken up the up-gradation of EKP under the guidance of external experts. The revamped portal with enriched features and utilities is being developed. The EKP is expected to be upgraded on a robust platform with enhanced features such as a powerful search engine, rich content management, effective personalisation & collaboration tools, easy navigation and overall improved performance. The upgraded EKP is likely to be hosted by September 2013.

Upgrading of the Video Conferencing (VC) System

IX.42   During the year, work for VC up-gradation has commenced which would, *inter alia,* provide for executive VC rooms at select locations, classroom VC facility in training colleges, High Definition technology for better quality, video streaming facility, Video-on-demand facility. The project is expected to be completed by September 2013.

Perimeter Security Solution

IX.43   Perimeter Security Solution (PSS) provides a mechanism to protect information systems in the Reserve Bank from attacks through inflow of

harmful content, executables and leakage of confidential information through networks. PSS aims to build adequate security in the perimeter of the network to avoid attacks from network packet sniffers, IP spoofing, denial of service, password attack, application layer attack, BOT attack *etc.* PSS safeguards all IT infrastructure and high value assets including data in the Reserve Bank. It ultimately aims to protect the organisation from all external threats and attacks from outside cyber world.

IX.44   Revamping of the existing PSS has been taken up. The Project is being implemented in two phases. The first phase covered the procurement of networking component such as switches and routers and second phase would include operationalisation of firewalls, Intrusion Prevention System (IPS) *etc.* The project is expected to be operational by December 2013.

Information Security Operations Centre (iSOC)

IX.45   To handle enterprise-wide IT security, it has been decided to set up an Information Security Operations Centre (iSOC) in the Reserve Bank to proactively detect security related incidents impacting the Reserve Bank, other banks and the financial sector. The major objectives of iSOC shall be, *inter alia*, to classify all systems in the Reserve Bank based on criticality, carry out incident management and root cause analysis, monitor security systems of the Reserve Bank and plug deficiencies, coordinate the activity of monitoring the internet with external agencies such as CERT-IN and ensure compliance with Reserve Bank's IS policy.

XBRL Phase II – Initiative to modernise the data acquisition from Banks

IX.46   The Report of the High Level Committee for IT Vision Document (Chairman: Dr. K. C. Chakrabarty) has noted that there are consistent efforts to set standards for data reporting in the form of eXtensible Business Reporting Language (XBRL). Accordingly, the Reserve Bank has

undertaken a project to develop XBRL taxonomies for the various returns in the area of banking supervision and foreign exchange transaction reporting. In this process, an unduplicated list of data elements, which are covered in these returns, is being prepared along with the business rules. These taxonomies will help the banks to generate the necessary data at their end and validate the same using the business rules.

Information Management Initiatives

IX.47   Data Warehouse of the Reserve Bank is emerging as a centralised information management platform for data processing and information dissemination. In line with the information management vision of the Reserve Bank, the information collected through various returns and processed in disparate systems at different departments will be progressively routed through the eXtensible Business Reporting Language (XBRL) platform.

IX.48   Consequent to the restructuring of the Reserve Bank's Monthly Bulletin, a project was taken up by the Reserve Bank, with the objective of automating information flow, generation of reports and dissemination of all tables pertaining to Weekly Statistical Supplement (WSS) and current statistics of Monthly Bulletin, directly from the data warehouse. From January 2013 onwards, all data tables pertaining to these two publications have been brought out from the data warehouse.

IX.49   The payment system initiatives taken by the Reserve Bank have enabled to the financial system to transform itself in terms of efficiency, safety and speed of delivery. It has led to deeper acceptance and penetration of non-cash payment modes. The Reserve Bank is actively engaged towards ensuring that the payment and settlement systems in the country are safe, efficient, interoperable, authorised, accessible, inclusive and compliant with international standards. It will continue to proactively encourage electronic payment systems for increasing the cash-less transactions in the financial system.