Chapter 4

EVOLUTION OF PAYMENT SYSTEMS IN INDIA

4.1 Traditional Payment Systems

4.1.1. Payment Instruments and Mechanism

The Payment System of a country provides the channels essential for conducting trade, commerce and other economic activities smoothly and efficiently. An efficient payment system not only functions as a lubricant to speed up the flow of liquidity in the economy, but also stimulates economic growth of the country. Payment process is a vital aspect of financial intermediation; it enables the creation and transfer of liquidity among different economic agents. A smooth, well-functioning payment system not only ensures efficient utilization of scarce resources but also eliminates systemic risk” (RBI, 1998).

Payment instruments and mechanisms have a very long history in India. The payment instruments during the earliest period consisted of coins that were punch marked or cast in silver and copper, and the credit system, which included bills of exchange, were used for inter-regional transfers of cash.

Loan deed forms, which were used in ancient India, were called mapatra or malekhya. These contained details such as the name of the debtor and the creditor, the amount of loan, the rate of interest, conditions of payment as well as the time of repayment. The deed was to be witnessed by a respectable person and endorsed by the loan deed writer. During the Buddhist period, the loan deeds were known as inapanna. During the Mauryan period, the instrument in use was called as adesha, which was an order on a banker, to pay the sum mentioned in the note to a third person. Merchants in large towns used to exchange letters of credit with one another. Even promissory notes were in use. The loan deed, during the Mughal period was called as dastawez which were of two types: (i) dastawez-e-indultalab which was payable on demand, and (ii) dastawez-e-miadi that was payable after a stipulated time. The use of bills of exchange was common in busy commercial centers. Indian bankers also issued bills of exchange on foreign countries for financing sea-borne trade. These bills, which included the insurance premium covering risk, representing safe arrival of goods, were traded at
high discounts and were popular among the traders. During this period, Pay Orders were issued from the Royal Treasury on one of the provincial treasuries. They were known as *barattes*, which were similar to modern drafts or cheques.

During the 12th Century, the most important credit instrument evolved in India was called *hundis*, which is being used even at present. *Hundis* were used as remittance instruments (to transfer funds from one place to another); as credit instruments for borrowing money and also for trade transactions (similar to current bills of exchange).

The princely states in India minted their own coins, e.g. “Arcot Rupee Coin”. However, in 1835, the East India Company introduced the Company’s *Rupee* that led to the uniformity of coinage throughout the British India.

The origin of paper money in India can be traced back to the latter part of the 18th Century when semi-government and private banks started issuing notes. Later on, each Presidency Bank had the right to issue notes within certain limits. In 1861, The Paper Currency Act was passed, which conferred upon the Government of India, the monopoly of issuing currency notes, which ended the practice of note issue by private and Presidency Banks. Hence, the private banks and the presidency banks developed other instruments of payment in the money market. The Bank of Hindustan introduced cheques, and in 1827, the British introduced the Post Bills which were Inland Promissory Notes issued by a bank to a person at a distant place, and its holder was to be paid on acceptance after a specified number of days, usually 7 or 30 day’s sight. Usually the European businessmen used them for carrying out internal transactions.

In 1881, the Negotiable Instrument(NI) Act was enacted for formalizing the usage of instruments like the cheque, the bill of exchange and promissory note. This act provided the legal framework for non-cash paper payment instruments in India.

As business activities and volumes of trade and commerce increased, the use of the cheque became prevalent. But it served for limited volumes of instruments and there was danger of loss in transit; hence, the need for organized cheque clearing process emerged among the banks. The banks in the Presidency towns formed clearing associations and the final settlement was effected by means of cheques drawn upon the Presidency banks (RBI, 1998).
The Calcutta Clearing Bank’s Association, the largest association of bankers, adopted the Clearing House Rules in 1938. At that time the association had 25 large banks as its members and eight sub-members. There were two ordinary clearings on each business day, except Saturday when there was only one clearing. As the association did not cover many banks functioning in Calcutta, the cheques, drafts, etc., of non-clearing banks were collected by the clearing banks only on payment of charges. This practice adversely affected their business opportunities, as the public was not ready to maintain accounts with those banks whose cheques suffered serious handicap of market acceptability. To overcome the problem, in 1939 these banks formed the Metropolitan Banking Association with 50 members, to conduct the Metropolitan Clearing House, and entered into an understanding with the Calcutta Clearing House in 1940. There were two other clearings conducted in Calcutta, namely the Pioneer Clearing and Walks Clearing.

The Bombay Clearing House was the only association conducting clearings in Bombay. In the year 1941-42, it adopted the uniform procedures and charges for collection of non-clearing banks’ cheques, drafts, dividend warrants, etc.

The Reserve Bank of India Act was enacted in 1935, under which the RBI was set up and it took over the Clearing Houses in the presidency towns.

Currency continues to be an important means of payment in India accounting for about one fifth of M3, which is nearly three times higher as compared to other developed countries. In addition, there are cheques and drafts for payments in commercial transactions. Other paper instruments include bankers’ cheques, payment orders, payable “At Par” cheques which include interest or dividend warrants, refund orders, gift cheques, etc.; all these are in operation even today. These are the instruments, provided under the Negotiable Instrument Act, 1881, and are used to cater to the needs of specific payment requirements.

According this Act, a Negotiable Instrument means a Promissory Note, Bill of Exchange or Cheque. A Bill of Exchange is an instrument in writing containing an unconditional order, signed by the maker directing a certain person to pay a specified sum of money, only to or to the order of, a certain person or to the bearer of the instrument. Thus, *hundi* is a bill of exchange in the Indian context governed by custom and local usage; however, hundis are not covered by the NI Act.
A Cheque is a bill of exchange drawn on a specified banker and not expressed to be payable otherwise on demand. It is a negotiable instrument, which can be further negotiated by means of endorsement and is payable on demand. A cheque payable to a bearer is negotiable by its delivery. A cheque payment is a debit transaction. A cheque is not cash, nor does it assume the finality of payment. If funds are not available with the drawer, the cheque is dishonored on presentation. In case of outstation cheques, banks also charge for collection based on postal costs and the value of the cheque. There can also be a delay in crediting the amount of an outstation cheque. Hence, a cheque may not always be acceptable to the payee. As a result, many commercial transactions tend to be settled through the payment of a demand draft, which again is a prepaid negotiable instrument. Banker’s Cheque is a payment instrument used by banks to settle their payment obligations on behalf of their customers. The bank guarantees the payment of this instrument for its full value. These instruments are payable at the branch of issue and used for payment within the local clearing jurisdiction.

Banks also issue Payment Orders for payments made on behalf of the bank. These are signed by a banker and carry the guarantee of the bank on the availability of the funds and are payable at the branch of issue.

Travelers Cheques are secure and a convenient alternative to carrying cash. These are prepaid instruments, issued in fixed denominations. The holder of a traveler’s cheque has to sign it in the presence of the merchant/establishment in exchange for goods or services. Such cheques can be replaced if they are stolen or lost without additional cost, provided the issuing agency (bank) is intimated immediately. Such cheques are available in domestic as well as foreign currencies. These cheques can be readily encashed at all bank branches anywhere and in several commercial establishments with which the bank/s have tie-ups.

Interest Warrant is yet another instrument which is used for the payment of periodic interest on fixed deposits with companies and government securities. These are a special category of cheques which are “payable at par” in various branches of a bank throughout the country. Similarly, dividend warrants are usually payable at par to the shareholders of a company. Bankers also provide the facility to issue Current Account Cheques ‘at par’ to the corporate clients on selective basis, to facilitate payments to upcountry suppliers and others. So too, for payments from retailers and other upcountry
buyers of corporate products, banks offer collection account facilities for reputed companies. “The payments to the company are channeled through special accounts throughout the country and repatriated to the headquarters’ account” (RBI, 1998).

All the payment instruments described so far are paper based and are required to be presented at specific banks for payment personally or through another bank for collection. The main disadvantage with the cheque and demand draft is that these instruments have to be physically presented which may result in delay in payment. In order to overcome this, fund transfers through the medium of Telex was introduced. A Telegraphic Transfer (TT) represents payment instructions sent by telex to any branch of the same bank to credit the beneficiary’s account with the stated amount. “A cipher code is appended to the text of the message to ensure its integrity and authenticity during transit” (RBI, 1998).

The most popular payment instrument in India is the Money Order Service provided by the Department of Posts and Telegraph, Government of India. This instrument is useful and convenient for an individual to send money to a third party through a post office. The originating post office collects the full amount of the remittance along with the charges or commission from the remitter and sends the advice to the destination post office, which pays the specified amount to the beneficiary. As compared to a paper-based payment advice, a Telegraphic Money Order is faster, although a higher service charge is levied for providing such facility.

The postal department also provides another payment instrument called the Postal Order. It is issued denomination wise, which can be easily encashed by the beneficiary after due identification at the post office on which it is drawn. The postal orders and money orders are not dependent on the banking system; hence, they are GIRO payments and are in the nature of credit transactions as opposed to a cheque which is a debit payment mechanism.

4.1.2 Institutional Arrangements

In order to carry out the payment processes smoothly and efficiently, it is necessary to evolve and establish an appropriate institutional structure. The Reserve Bank of India by issuing bank notes facilitates cash payments by providing currency chests at the premises of commercial banks, and, government treasuries where the RBI does not have branch
offices. Other institutional arrangements include various agencies like the clearing house, settlement accounts with a major bank, usually the Central Bank. A set of related framework of rules, regulations and procedures accepted by all parties govern the payment process. The place where the exchange of instruments and the settlement of the claims take place is called the Clearinghouse. In India, the Clearing System is local, confined to a defined geographical jurisdiction covering all the banks and branches situated in the area under a particular zone.

**Clearinghouses in India**

A clearinghouse is a ‘voluntary association’ of banks that facilitates payments through cheques between different bank branches within a city or place. It acts as a central meeting place for bankers to exchange the cheques drawn on one another and claim funds for the same. This exchange is called clearing operations. In the four metros and a few other cities, the RBI looks after the operations of the clearinghouse. Each clearinghouse has uniform regulations and rules as prescribed by RBI for the conduct of its operations. At present, there are more than 1000 clearing houses operating all over India, which facilitate cheque payments. The RBI, State Bank of India and other public sector banks manage them. The cost of processing payment instructions is very high due to the decentralized mode of functioning of these cheque-clearing houses. Local cheques are paid within 1 to 3 days, while outstation cheques may take three to ten days. (http://www.rbi.org.in/scripts/print view.html.)

The memberships of the clearinghouse include both direct members and sub-members. All the branches of a member bank within the clearinghouse jurisdiction are eligible to present and receive cheques drawn on any other member bank/branch within the jurisdiction. The sub-members sponsored by a member bank participate in clearing in the same way as a branch of a member bank. The membership to the clearinghouse is through a joint decision of the general body of the clearinghouse.

**Clearing Structure**

An outstanding feature of the Indian banking system is its branch-centered banking. As a result of the vast network of branches, the logistics of collection and delivery of paper payment instruments become formidable. The clearing infrastructure is designed in such a way that it can facilitate the movement of instruments between the presenting and
drawee branches. Each member bank in a centre is represented in the clearinghouse by its service branch that collects all the instruments from various branches and consolidates them for presentation to all the banks affiliated to the clearinghouse. Similarly, it receives and distributes among its branches, all the instruments drawn upon its branches by other banks in the clearinghouse. Thus, the service branch of a bank performs the key intermediary role between the clearinghouse and the branch of a bank.

**Clearing Process**

When a cheque is deposited in a bank the clearing process begins. The cheque is delivered to the bank/branch on which it is drawn. The cheque is passed for payment only after confirmation of the availability of funds and the banker is satisfied about genuineness of the cheque. If the cheque is not paid, it is returned to the presenting bank through another clearing called the Return Clearing. “The realization of the funds occurs after the completion of return clearing and by the absence of an unpaid cheque.” (RBI, 1998)

**Settlement of Funds**

The settlement of funds in the clearing process takes place at several levels. The total amount or value of cheques presented by a bank on other banks represents the claim by that bank on other banks. All the banks make similar claims on every other bank in the clearing. Then a net settlement is arrived at the clearinghouse and the debit or credit position of the bank is determined. These are then booked in their current accounts maintained by the settling bank. This is called Interbank Settlement. The settlement of funds between the service branch and the branch concerned represents the transfer of funds at the branch level. When the funds are debited from the drawer’s account and credited to the payee’s account, the payment process is completed. This takes place only after completion of the return clearing.

**Return Clearing**

Realization of a cheque, i.e. payment, takes place after the cheque which is returned unpaid, is settled in this clearing. The total of all the items that are unpaid is debited to the original presenting bank and credited to the drawee bank. A similar process is followed in the case of inter-bank settlement at the service branch of a bank. Thus, the credit given to the payee on account of the cheque is reversed.
Inter-branch Clearing

When the customers draw cheques on different branches of the same bank, these need not be sent to the clearinghouse, because the transfer of funds is an internal matter restricted to the same bank. In such cases, the service branch of the bank acts as a settlement branch for all the branches of the bank and the cheques are sent to the drawee branches and the inter-branch accounts are credited or debited internally only.

Time Lag

The total clearing cycle including the return clearing leads to a time lag in the process of payment. As cheques have to be physically presented at the branch on which they are drawn, there is substantial movement of cheques from one place to another. Thus the recipient of the payment has to wait until the collecting banker is fully satisfied that the payment of a cheque has taken place. Thus, physical presentment continues to result in time lag, so long as physical movement of the cheque is necessary under the banking law.

Collection of Outstation Instruments

As the clearing jurisdiction is local, a separate procedure has been evolved for the collection of cheques drawn on the banks outside the area of a clearinghouse. In this case, the cheques have to be sent by post for collection to the representative branch or correspondent branch for presentation in the clearinghouse in the outstation centre. After realization of the cheque, the proceeds are sent to the original presenting bank for crediting to the account of the customer. This procedure results into delay in the payment of these cheques, and, there is also uncertainty about the time of actual realization. However, the setting up of the National Clearing System has helped in reducing the time lag at the designated centres.

Settlement of Funds for Outstation Instruments

In order to reduce the delay in the collection of outstation cheques, several alternative forms of payment instruments are used such as demand drafts, and “payable at par” warrants. In such cases the problem of settlement between the paying and the collecting banks still remains.

In the absence of formal rules and regulations governing the transaction of business in the clearinghouses, each clearinghouse had its own rules and regulations
according to local conventions and convenience, but resolving of disputes among members was a difficult exercise. In 1986 the RBI framed a set of guidelines known as the ‘Uniform Regulations and Rules (URR) for all the Bankers’ Clearing Houses’. These Regulations aimed at providing a uniform framework for conducting clearing throughout the country and have been adopted by the general bodies of all the clearinghouses in India. The Uniform Rules and Regulations was a step toward establishing a formal institutional framework for the payment settlement system in India. For strengthening the institutional framework, in 2005 the RBI constituted a Board for Regulation and Supervision of Payment and Settlement Systems (BPSS) as a Committee of its Central Board, chaired by the RBI Governor. The main functions of BPSS are: (a) to lay down policies for the regulation and supervision of all types of payment and settlement systems, (b) to set standards for the existing and future systems, (c) to approve criteria for authorization of payment and settlement systems, and (d) to determine the criteria for membership. Thus, the BPSS is the highest policy making body in respect of the payment and settlement system in India, which includes all types of payments and settlement systems.

4.1.3 Computerization of Clearing and Settlement Operations

Several Committees of the RBI have recommended the need for computerization of the clearing system on priority basis. The use of modern technology for clearing began with the establishment of the ‘Claim Based Settlement System’, at Mumbai, Chennai and Delhi in the early 1980’s. These systems generated settlement reports on the basis of input statements containing the aggregate value of (cheques presented) claim of one bank over the other banks in the clearinghouse. Thus, balancing and settlement of clearing could take place faster and it provided accuracy in the final statement.

As the volumes of check transactions started increasing rapidly in the 1980’s, banks found it difficult to handle the huge volumes, which delayed payment of credit to customers. Hence, the Magnetic Ink Character Recognition (MICR) based mechanized cheque processing technology was inducted. The RBI introduced two types of reader sorters for clearing of local instruments: (i) Medium Speed Reader Sorters having the capacity to process 300 instruments per minute, for inter-city instruments, and (ii) High Speed Reader Sorter System (HSRS) having the speed to process 2400 documents per
minute. By the middle of 1989, MICR clearing operations in the four metropolitan cities became fully operational and well stabilized.

**The Clearing Mechanism**

Clearing Mechanism process may be described as follows:

**Inter-city Clearing**: A two-way inter-city clearing takes place in the four metropolitan centers, viz. Mumbai, New Delhi, Kolkatta and Chennai, and, all the other offices of the RBI are connected to these centers under one-way inter-city clearing. Under this system, inter-city cheques drawn on any of the metropolitan centers are first processed at the MICR clearing and later sent to the drawee centre through postal courier, where they are integrated with the local clearing. Thus, the National Clearing System has contributed significantly towards reducing the time taken for realization of these cheques.

**Regional Grid Clearing Operations**: A regional grid clearing was introduced by which the major commercial centres and district headquarters in the region were connected for one-way clearing with the nearest MICR centre. This linking has substantially reduced the time for inter-city clearing and has proved to be very beneficial in speeding up the cheque clearing process.

The RBI manages the settlement operations in all non-MICR based clearing centres. The magnetic media based input settlement is an intermediate step towards the complete automation of cheque clearing through MICR processing. It enables banks as well as clearing houses to get familiar with the computerized atmosphere. The system has been performing well since the last few years. The process includes: presentation clearing, return clearing, high value/high value return clearings and inter bank clearing.

**High Value Clearing**: This is a value-added service. Under this clearing system, selected branches, located in central business areas or commercial areas and nearer to the clearinghouse/service branches of banks, present instruments of Rs 1,00,000 and above of their customers, within a specified time, to the clearing house. These are to be dropped into the respective receptacles of the drawee banks and the settlement takes place through floppy/(CD)-based input statement. The return clearing is held before the close of banking hours on the same day. Thus, high value clearing is effected much faster as compared to the regular MICR clearing.
**Inter-Bank Clearing**: Inter-bank payments are settled by way of issuing cheques drawn on their accounts with the RBI. However, this procedure resulted in a large number of cheques being presented to the Deposit Accounts Department (DAD) of the RBI, which resulted in heavy pressure on them. Hence, it was decided to start a separate inter-bank clearing. In the case of the inter-bank clearing, banks use their own bankers’ cheques for settling their claims mutually. This settlement is carried out with the use of (CD) floppy-based input statements submitted to the clearinghouse. The pay orders are dropped in the assigned receptacles so that banks’ representatives can collect them. In the absence of return for these instruments, the credit/debit tends to be instantaneous. For the purpose of four types of transactions – Call money transactions, Rupee payment of foreign currency transactions, Bank-to-Bank transfers for funding upcountry requirements, and Inward remittances – inter-bank clearing is necessary. Using software provided by the RBI, instead of using bankers’ cheques, banks generate credit advices, and, the settlement takes place at the clearinghouse on the basis of the consolidation of the credit data supplied by all the members.

Computerization of both the service branches and the large-volume business clearinghouse centres has created a base for the introduction of automated clearing operations at other centres. This has in effect opened up the avenue for the much desired introduction of e-payment services.

**Speed Clearing**: This is a new clearing arrangement which was introduced at 63 centres in June 2008 for collection of outstation cheques through local clearing, provided these cheques are drawn on core banking enabled branches of the paying banks. The cheques drawn on outstation CBS branches of a drawee bank can be processed in the local clearing. Thus, speed clearing tends to reduce the time taken for realization of outstation cheques and can be paid on T+1 or T+2. As a result of this, the volume of cheques processed in inter-city clearing, conducted at RBI’s locations, has significantly been reduced. Consequently, inter-city clearing function has been discontinued at eleven of the RBI locations. During 2008-09 it was available only at 4 centres (RBI, Annual Report 2008-09).
4.2 Electronic Payment Systems

In order to promote a safe, secure, reliable and efficient payment system, the RBI has taken the lead and developed and promoted the adoption of an effective electronic payment infrastructure. The need was felt to develop a system that would decrease the volumes of paper instruments in MICR clearing, and improve customer service by prompt and secure interest/dividend payments to the beneficiaries. For this e-clearing service was found to be the ideal method as it is considered to be cost effective and a better alternative method of effecting low value, high volume and recurring payment transactions. Hence, the following e-services have been initiated since the mid 80’s.

4.2.1 Communication Networks and Messaging System

In order to develop an efficient, reliable and cost effective payment and settlement system it is necessary to have well developed communication networks. The RBI considered the urgent need to adopt and adapt and also develop information technology for intra-bank and inter-bank communications in the 1980s, and, hence, set up a Committee on Communication Network for Bank and SWIFT under the Chairmanship of Shri T N A Iyer. The Committee recommended that BANKNET should be set up and banks in India should join the SWIFT Network. The RBI accepted the recommendation and the job of designing and implementing BANKNET was entrusted to M/s CMC.

**BANKNET**

The BANKNET was commissioned in 1991. It is a packet switched x.25 based network with nodes at Mumbai, Delhi, Chennai and Kolkata and switching centre at Nagpur with mesh topology. Bangalore and Hyderabad were connected to Chennai through remote PADs. The BANKNET uses the store-and-collect transmission logic, provided by the Message Transfer Utility (MTU) in the system. BANKNET usage turned out to be much lower than projected expectations mainly because of the fact that BANKNET was far ahead of its time, in the sense that, the critical mass in computerization was lacking, and also the changes required in work procedures, necessitating the use of communication technology had not been developed, at the user-end.
**RBI Net**

The RBI Net is communication software developed in ’C’ language and available for both DOS and UNIX platforms. It allows free format messaging and file transfer on the existing BANKNET infrastructure with the help of UNIX services installed at the 4 NCCs. RBI Net has also been used by the Department of Banking Operations and Development (DBOD) for various applications. For example transmission of data by commercial banks to the RBI regional offices and providing consolidated data by the Regional offices of DBOD to central DBOD (RBI, 1998).

**The Indian Financial Network (INFINET)**

INFINET is the communication backbone of the Indian banking and financial sector. All types of banks and premier financial institutions in India are eligible to become members of the INFINET.

“The setting up of the INFINET, a wide area based satellite communication and terrestrial lines network using VSAT technology in June 1999, was a landmark in the area of communication technology in so far as the Indian financial system is concerned. The INFINET is the forerunner of an efficient telecommunication backbone for the banking and financial sector” (RBI, Annual Report 1999-2000).

It is a Closed User Group Network for the banking sector. The hub and network management system are located at the Institute for Development and Research in Banking Technology (IDRBT), Hyderabad, and fully funded by the RBI. The INFINET connects 439 VSATs, but extension of the network was also planned in 2000 in order to achieve connectivity to 5000 VSATs in the long run. “The INFINET user Group set up several sub-groups for design and standardization of message formats, interbank applications and structured messaging backbone” (RBI, Annual Report 1999-2000).

A working group in 1999 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 were to be implemented at the first stage. Message formats for government transactions, currency chest transfers and some segments of government securities transactions were taken at the second stage.
Structured Financial Messaging Solution (SFMS)

SFMS was launched on December 14, 2001, at the IDRBT to meet the need to have a secure and common messaging solution to serve as the basic platform for intra-bank and inter-bank applications and to fulfill the requirements of domestic financial messaging.

The main advantage of SFMS is that it can be used for almost all the purposes of secure communication within the bank and also between banks. The most important aspect of the SFMS is that of intra-bank communication which can be used by the banks for taking full advantage of the secure messaging facility, which it provides satisfactorily.

Inter-bank messaging part is useful for applications, such as EFT, RTGS, Delivery versus Payment (DVP), Centralized Funds Management System (CFMS), etc. The SFMS also provides for easy to use Application Program Interfaces (APIs) that can be used for integrating all the existing and future applications with the SFMS. Banks can develop their own comprehensive and efficient tools and applications and integrate them effectively with SFMS for use on the Corporate Intranet. Banks also can link their major high volume branches through appropriate connectivity like PSTN/ISDN or leased line (www.idrbt.ac.in).

Indian Financial Systems Code (IFSC)

IFSC is a uniform coding structure, which was developed for Straight Through Processing (STP) and for uniquely identifying every bank branch in the country. This code helps in routing of payment messages to the particular branch. Its pattern is basically adopted from 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” (RBI, Annual Report 2002-03). The IFSC is an 11-digit alpha-numeric number. The first four characters represent ‘bank code’, the fifth character is currently ‘zero’ which is reserved for future use and the last six characters represent the branch code.
4.2.2 Retail Electronic Payment Systems

4.2.2.1 Electronic Clearing Service (ECS)

ECS is a retail payment system that can be used to make bulk payments/receipts of a similar nature, especially where each individual payment is of a repetitive nature and of relatively smaller amount. This facility is meant for companies and government departments to make or receive large volume of payments rather than for funds transfers by individuals. The ECS facility is available at 75 centres on T+1 settlement cycle, from the earlier T+3. It is implemented across all the centres operated by the RBI at places where it manages the clearinghouses, and, by SBI and its associates in other centres. The ECS is divided into two types: (i) ECS (Credit) to make bulk payments to individuals/vendors, and (ii) ECS (Debit) to receive bulk utility payments from individuals. Due to its decentralized mode of functioning in 75 locations, the cost of processing payment instructions is very high. Hence, a new system called National Electronic Clearing Service (NECS), having centralized processing capabilities, was introduced with effect from September 29, 2008, to bring about uniformity and efficiency in the system. It also ensures reduction in cost and achieves economies of scale. While NECS-credit facilitates multiple credits to beneficiary accounts at the destination branches across the country against a single debit in the account of a user with the sponsor bank from a single central location at Mumbai, the NECS-Debit facilitates multiple debits to destination account holders across the country against a single credit to the user account at Mumbai. The NECS is a nation-wide system leveraging on core banking solutions (CBS) of member banks. All CBS branches are participants in the system. As on March 31, 2009, 114 banks with a total of 26,275 branches participated in NECS (RBI, Annual Report 2008-09).

**Electronic Clearing Service (ECS) Credit Scheme**

Under the ECS scheme, 1995, a series of e-payment instructions are used to replace paper instruments. “The system works on the basis of one single debit transaction triggering a large number of credit entries. These credits or electronic payment instructions which possess details of the beneficiary’s account number, amount and bank branch, are then communicated to the bank branches through their respective service branches for crediting the accounts of the beneficiaries either through magnetic media duly encrypted or through hard copy” (RBI, 1998).
User organizations, mostly corporate bodies and government departments that have to effect payments to a large number of beneficiaries, submit through a sponsor bank the details of payments in magnetic media to the bank managing the clearinghouse. The user organizations have to obtain mandates from the beneficiaries for crediting their accounts under the ECS. The corporate bodies have also to advise their beneficiaries about the due date of credit under the ECS.

ECS credit operates on the principle of “single debit-multiple credits” and is used for making payment of salary, pension, interest, dividend, etc. The minimum number of transactions per user institution is 2,500, with maximum value of any single item being restricted to Rs. 1 lakh. Only a marginal service charge has been levied to promote the ECS-Credit scheme.

**Electronic Clearing Service - Debit Scheme**

ECS-Debit clearing has been functioning on the principle of “single credit multiple debits” since 1995. This has been useful for payment of charges by customers to utility services such as electricity boards, telephone companies, payment of insurance premia, loan installments and so on. The main advantages of the scheme are faster collection of bills by companies and better cash flow management, whereby customers need not physically go to bill collection centres or specific banks.

All the precautions about data validation and integrity, as followed under ECS-credit, are also followed under ECS-debit. The individual transaction limit under the scheme has been fixed at Rs.50,000.

**National Electronic Clearing Service (NECS)**

The RBI developed the NECS product to enable centralized processing of the ECS transactions, in contrast to the existing ECS system that has decentralized operations at 70 locations, spread all over India. Under the scheme of NECS, the processing of all the ECS transactions would be centralized at the National Clearing Cell at Nariman Point, Mumbai, and the sponsor banks would need only to upload the relevant files to a web server, with online data validation facility. Destination banks would receive their inward clearing data file at a central location through the web server.
“The NECS would leverage the Core Banking platform of the commercial banks, to enable around 50,000 core banking-enabled branches of the various banks, to avail of this service. The system would facilitate end-to-end seamless posting of the NECS transactions in a straight-through-processing (STP) environment” (Leeladhar, 2008).

This would help the users and member banks to send, receive and process the data files only at one centralized place, which will help in improving the efficiency of the payment system significantly.

4.2.2.2 Electronic Funds Transfer (EFT)

When the facility of electronic mode of transfer of funds did not exist, banks transferred funds of the customers through the medium of demand drafts (DDs), mail transfers (MTs) and telegraphic transfers (TTs). However, inordinate delays were experienced in executing the transactions. In order to facilitate speedy inter-city money transfer of funds and ensure effective customer service, the RBI introduced the EFT mechanism in 1995. The RBI is the service provider for EFT and it displays on its website the details of the banks and cities where EFT is available. The system was being operated by RBI in 16 centres.

Under the EFT system, anyone who wants to make payment to another person or company can approach his bank and give instructions or authorization to transfer funds directly from his own account to the bank account of the receiver. For this purpose, the customer has to provide to the bank all the details of the receiver (payee) such as: name, bank account number, account type, bank’s name, branch name, place, etc., at the time of placing the request for such transfer, so that the amount reaches the beneficiary’s account correctly and quickly. Funds transfer through EFT takes place on the same day or the next day. Banks generally charge some processing fees for the use of EFT facility.

National Electronic Funds Transfer (NEFT)

The NEFT is a message-based funds transfer system, which provides secure one-to-one funds transfer facility to bank customers. The EFT system provides settlement facility only at few centres, but, the NEFT facilitates national coverage along with centralized clearing and settlement facility. It thus ensures cost reduction and achieves economies of scale. In order to provide a sound legal basis to the system, it is provided with a Public Key Infrastructure (PKI) based authentication process. Under this system, there are six
settlements during a single day, which facilitates faster availability of funds to customers (RBI, 2006-07).

Since its inception in 2005, the coverage of NEFT is progressing as expected, and, banks have been advised to encourage their customers to use NEFT. At the end of March 2009, a total 55,225 branches of 89 banks were participating in the NEFT. “To encourage the retail electronic payment systems, various measures were initiated by the RBI, viz. (i) facilitating initiation of NEFT transactions by accepting cash from walk-in customers (from the earlier account to account transfer); (ii) offering option to make credit card payments; (iii) extending the settlement time window for NEFT by one and half hours” (RBI, Annual Report 2008-09). As a result, there has been substantial increase in both the volume and amount of transactions in NEFT.

The NEFT was strengthened by (i) enhancing Business Continuity Plans/Disaster Recovery arrangements; (ii) mandating creation of Customer Facilitation Centres (CFCs) for prompt resolution of customer complaints; (iii) increasing the number of settlements from six to eleven and making the system available from 0900 hours to 1900 hours on week days and 0900 hours to 1300 hours on Saturdays; and (iv) mandating positive confirmation to be sent to the originator, confirming successful credit to the beneficiary’s account. As of March 2010, NEFT was available across India, in over 69,000 branches.

At present, the NEFT payment system cannot be used for processing payments which are of urgent/critical nature on a 24x7 real time basis. Hence, customers of the banks are not able to remit funds from one bank to the other on a 24x7 basis. NEFT is also being used for the last leg of payments (inter-bank) in the case of cross-border remittances. Due to its limited 9.00 am to 7.00 pm processing window, cross-border payments cannot be processed in the night. Some steps need to be taken for making NEFT function continuously round the clock.

Thus, the hypothesis: “Improved efficiency in payment and settlement systems would result in improved operational efficiency of banks”, holds good.
4.2.2.3 Cheque Truncation System (CTS)

The use of cheque is here to stay as it is one of the widely used instruments of payment. The main reason for the use of cheque by bank customers is that it does not require a computer or debit card at the point of sale.

To enhance the efficiency of the paper-based clearing system, the CTS was implemented in February 2008, on a pilot basis in the National Capital Region of New Delhi, but limited to participation by only 10 banks. At present, all the banks are participating in the system through 53 direct member banks. “The main objective of the CTS is to improve the efficiency and substantially reduce the cheque processing time in the system” (Leeladhar, 2008).

As the traditional clearing system required the physical presentation of cheques for payment and settlement at the clearinghouse, it involved inefficiencies in terms of clearing time and infrastructure. “The enormity of logistics needed for physical cheque clearance can be gauged from the fact that, we cleared about 1.46 billion cheques during the financial year April 2007 - March 2008” (Leeladhar, 2008). The main advantage of CTS is that it does not need the physical presentation of the cheque at the clearinghouse, but only its electronic image is to be forwarded. Thus, the CTS would enable the realization of cheques on the same day and also provide a more cost-effective mode of settlement than manual and MICR clearing. Smaller banks that find it difficult to set up the required infrastructure can utilize ‘service bureaus’ set up for this purpose by a few larger banks.

Once the CTS becomes fully operational, it would be the largest in the world and would help India to shift from paper-based instruments to a fully electronic mode of payment and settlement. Necessary amendments have been made in the Negotiable Instruments Act, 1881, which provides legal recognition to the e-image of the truncated cheque. Thus, CTS may help in increasing public confidence in the system.
4.2.2.4 Cards-Based Payment Systems

Payment Card Schemes

(a) Authorization – Payment card transactions are on-line and are authorized directly by the card issuer. The card issuer authorizes a specific payment to be made from one of the cardholder’s accounts.

- Each merchant or retailer in the MasterCard and Visa-Card Schemes has one or more floor limits for transactions at their stores, and the details about these floor limits are held either by the merchant or their acquiring bank.

- In the case of magnetic stripe cards, the merchant swipes the card and asks the cardholder to sign a slip. Then the terminal sends an authorization request containing the card number, transaction amount and currency, transaction time and date, merchant ID, name, location and merchant type, acquirer and issuer IDs and card security information to the merchant’s bank which transmits this to MasterCard or Visa, which then sends it on to the card holder’s bank requesting authorization. Thereupon, the cardholder’s bank approves the purchase and sends the approval to MasterCard or Visa who then pass it on to the merchant’s bank to transmit to the merchant. Thus, the complete authorization process takes only one to three seconds. The banks involved in the process can be anywhere in the world. Master Card and Visa complete their role just within milliseconds, but the time taken by the cardholder’s bank and merchant’s bank tends to vary.

(b) Clearing

After completion of the authorization of the purchase, the cardholder receives a MasterCard or Visa slip and the merchant’s receipt. The merchant’s bank collects all the details of the full payment transaction which are made out of the basic authorization data already sent to the issuer bank and the authorization code, EMV data and with commercial T&E cards and purchase cards, additional data on transaction such as local tax, car rental data, etc. MasterCard and Visa collect the data from member banks on the morning of the next day, and prepare files for delivery to the acquirer and issuer banks for the purpose of consolidating debit transactions from different acquirers into one file for each issuer bank and files of
charge backs for the acquirer banks and to calculate the overall net balance due or received by each member bank. Finally, a fully reconciled daily clearing data file is prepared for each member bank. This clearing file is transmitted to each of the member banks, 3-6 hours after the initial data collection. Each member then decides in which currency it prefers to settle, though local currency is used.

(c) Settlement

In order to participate in the MasterCard and Visa’s settlement systems, member banks have to open an account at a specified bank. At a specified time and date the member banks are debited/credited at the settlement banks for the net balance outstanding in each of their currencies. Usually the Euro / US dollar account is settled on the next day, i.e. the same day the reconciled data files are received by the member banks. When the cardholder’s account is debited and the merchant’s account is credited depend upon the policy decisions taken by the member banks.

MasterCard and Visa provide the two largest global multi-currency clearing and settlement systems in the world. At present they are generally used for consumer to business transactions but soon they will be used for business to business transactions also on account of their several advantages as compared to other payment systems (Large, 2005).

In the absence of a domestic price setter, today Indian banks incur significant cost for affiliation to international card associations like VISA/MASTERCARD. Moreover, in the process, domestic card transactions, which account for more than 90 per cent of the total are routed to switches located outside the country which apart from posing security concerns or customer privacy also result in outgo of valuable foreign exchange of the country.

Shared ATM Networks in India

Before the year 2001, banks in India created proprietary ATM networks to promote brand differentiation and facilitate customer acquisition. New private sector banks like Axis Bank, ICICI Bank, HDFC Bank, and foreign banks like Standard Chartered Bank of India and Citibank led this initiative. However, these banks were initially reluctant to share their ATM networks. The first shared ATM network ‘SWADHAN’ was launched in

Multi-lateral and branded networks were more convenient to customers than bi-lateral ATM sharing arrangements. The largest multi-lateral network is Cashnet, which is managed by Euronet India. It started with just three member banks, i.e. Citibank, Axis Bank and IDBI Bank. Canara Bank is the settlement bank for ‘Cash Online’, which is another shared ATM network. Most of these networks were started during the year 2003. Euronet India was selected by IDRBT to implement a National Financial Switch (NFS) in the country. It comprises both an integrated inter-ATM switch provided by Euronet India and an internet and e-commerce payment gateway from Opus Software, which acts as an e-commerce facilitator to authenticate and route payment details between banks and various parties (Express Computer, 2007). But it is currently being used only as an integrated inter-ATM switch. This national switch started its operations from August 2004. The settlement on NFS takes place through the RTGS system. On October 15, 2009, the RBI authorized the NPCI to take over operations of NFS from IDRBT. NFS covers 41 member banks with about 60,200 ATMs as of June 30, 2010. The daily average volume of transactions is around 2.75 million with a peak volume of 3.1 million in June 2010 (http://www.npci.org.in/nfsbackground.aspx).

**Credit Cards and Debit Cards**

Credit/Debit cards are widely used in India because they provide a convenient form of making payments for goods and services without the use of actual cash or cheques. Banks issue credit cards to their customers, and, merchants who accept credit/debit card payments claim the amount from the customer’s bank through their own banks.

Debit Card is a direct account access card as the amount transacted gets debited immediately. The amount permitted to be transacted in debit card is limited to the extent of the amount standing to the credit of the cardholder’s account. A credit card involves provisions of credit to the card user and paid by the end user on receipt of the bill either in full or in installments.

**Credit Card Operations**

The Working Group on Regulatory Mechanism for Cards, constituted by the RBI, had suggested several regulatory measures which aimed at encouraging the growth of credit
cards use in a safe, secure and efficient manner as well as to ensure that the rules, regulations, standards and practices of the card issuing banks are in alignment with the best customer practices. Based on these recommendations and feedback obtained from the public, card issuing banks and others, the RBI framed guidelines for credit card operations to be followed by all the credit card issuing banks/non-banking financial companies (NBFCs). Each bank and NBFC should have well a documented policy and a Fair Practices Code for entering into credit card operations. They had to widely publish its contents using the media and through their websites latest by November 30, 2005.

**Pre-paid Payment Instruments**

These are the payment instruments wherein the value for use is stored in advance, such as smart cards, magnetic stripe cards, internet accounts, internet wallets, mobile accounts, mobile wallets, paper vouchers, etc. Prepaid payment instrument, as a mode of payment instead of cash, enhances convenience. This also facilitates e-payment for goods or services, purchased or availed through internet/mobile. The maximum loss on account of fraudulent use of the card would be limited to the balance available on the card.

For the development of any new payment product or mode, the developer/supplier should convince the public of the efficiency and safety of the technology and systems offered. In addition, to bring about efficiency and competitive pricing, a level playing field has to be ensured. Taking into consideration the various issues related to the development of a new payment system, the RBI had issued policy guidelines for issuance and operation of prepaid payment instruments on April 27, 2009 (RBI, Annual Report 2008-09).

4.2.3 **Large Value Electronic Payment Systems**

**Real Time Gross Settlement (RTGS)**

RTGS is a funds transfer mechanism where transfer of money takes place from one bank to another on real time and on gross basis. This is a faster money transfer system through the banking channel. Real time settlement means payment transaction is not subjected to any waiting period. The transactions are settled as soon as they are processed. Gross settlement means the transaction is settled on one-to-one basis, without bunching it with other transactions. As money transfer takes place in the books of the RBI, the payment is considered as final and irrevocable.
The RTGS system is primarily for large value transactions. The minimum amount to be remitted through the RTGS is Rs. one lakh, and there is no upper limit. Under RTGS the beneficiary branches are expected to receive the funds in real time / as soon as funds are transferred, by the remitting bank. The beneficiary bank has to credit the beneficiary’s account within two hours of receiving the funds’ transfer message. When the remitting bank receives a message from the RBI that money has been credited to the receiving bank, then the remitting bank can advise the remitting customer that money has been delivered to the receiving bank. If money is not credited, for any reason, the receiving bank would have to return the money to the remitting bank within two hours. Once the money is received by the remitting bank, the original debit entry in the customer’s account is reversed. The RBI has waived its processing charges for all e-payments products; however, banks have the discretion to levy a service charge for services provided by them.

The remitting customer has to furnish the necessary information to a bank for effecting RTGS remittance, which includes the amount to be remitted, account number to be debited, name of beneficiary bank, and name and account number of beneficiary customer, the IFSC code of the receiving branch.

In case of non-credit or delay in crediting the beneficiary’s account, the beneficiary has to contact the bank/branch. If the issues are not resolved, then the Chief General Manager, Customer Service Department of the RBI may be contacted.

On a typical day, the RTGS routes about 60,000 transactions worth about Rs. 2,700 billion and covers over 52,000 branches in more than 10,000 scattered locations (www.rbi.org.in/scripts/FAQView.aspx?Id=65).

**Types of RTGS Membership**

Banking and financial organizations in the country are given membership of RTGS according to their types. The type of membership of each RTGS member determines the type of transactions for which it will be eligible under the RTGS system. The type of membership is determined at the discretion of the RBI. The RTGS members are classified according to the following types:
- **Type ‘A’ Membership**

All scheduled, including scheduled cooperative banks are eligible for A Type Membership. All the members have access to all types, *including* customer-based RTGS transactions. All these members have an individual PI (Participant Interface) each and are eligible for intra-day liquidity support from the RBI. The “A” type members are required to have the infrastructural facilities, as specified by the RBI from time to time, so that they continue to be eligible for the RTGS system.

- **Type ‘B’ Membership**

All the primary dealers are eligible for Type B Membership and have access to all types, *excluding* customer-based, RTGS transactions. These members have an individual PI each and are eligible for intra-day liquidity support from the RBI. These members are required to have all infrastructural facilities, as specified by the RBI.

- **Type ‘C’ Membership**

A bank or a primary dealer operating in Call Money Market and maintaining one or more current account/s in the Deposit Accounts Department of the RBI are eligible for ‘C’ Type membership. They neither have a PI nor are eligible for intra-day liquidity but can have RTGS facility only through a sponsor bank. These members need to have sufficient funds in their respective current accounts or fully collateralized credit lines as arranged with their respective sponsor banks. Each ‘C’ Type member needs to have at least one sponsor bank at a time.

- **Type ‘D’ Membership**

All clearing entities looking after Net Settlement Clearings are eligible for this type of membership. Each “D” Type member should have a Net Settlement interface software acquired from the RBI. Each member is eligible to submit Multilateral Net Settlement Batches (MNSBs) to the Central System, for settlement and can receive notifications regarding them including broadcast (RTGS Guidelines, 2004, [www.rbi.org.in](http://www.rbi.org.in)).
RBI may define new membership types, and it may disable any existing membership type/member at any time, at its discretion, change or restrict the facilities/transaction types, available to a member/type at any point of time. The RBI also provides service by participating in RTGS system as Type A member.

**Types of RTGS Transaction**

The processing for settlement of the following base transaction types will involve the respective settlement accounts/current accounts of the RTGS members:

- Inter-Institutional transactions
- Customer transactions
- Delivery *versus* Payment transactions
- Own-Account Transfer transactions
- Multilateral Net Settlement Batches (MNSB) transactions (RTGS Guidelines, 2004, [www.rbi.org.in](http://www.rbi.org.in)).

The RTGS membership type governs the eligibility of an RTGS member to undertake all or any one or more of the above transactions.

Each RTGS member will communicate only through his or her PI with the IFTP system of the Central System, and all the interactions between the two would be through pre-defined messages only. The Indian Financial Network (INFINET) or any other communication network, as may be specified by the Bank for the purpose from time to time, will be the communication medium of all such interactions. It is the only network in place to route payment transactions from one bank to another, but this may be an area of concern ‘when’ and ‘if’ this primary network fails due to some reason. The Committee on Financial Sector Assessment (CFSA), constituted by the Government of India in consultation with the RBI in September 2006, concluded in its 2009 Report that RTGS system in India broadly observes Core Principle No. 7 for Systemically Important Payment Systems which states: “The system should ensure a high degree of security and operational reliability and should have contingency arrangements for timely completion of daily processing.” Even the 2008 World Bank publication on payment systems...
worldwide confirms this requirement. Additional measures to achieve a better compliant mode are urgently needed.

Settlement of Transactions

(a) A payment transaction is considered as settled when the settlement account or the current account (which is to be debited through the transaction) of the RTGS member has been debited and the settlement account of the RTGS member (who is to be credited through the transaction) has been credited.

(b) A transaction will be settled only if there is adequate balance in the settlement account that is to be debited. Otherwise the transaction will be rejected or placed in the RTGS member’s logical payment queue in the RTGS system, depending on the properties of the type of transaction of the payment message.

(c) After settlement of transactions, all the RTGS members whose settlement accounts have been credited or debited will be notified by the central system, provided that the RTGS members have their individual PI.

Once the settlement takes place, the payment transaction will not only be final but also irrevocable except for unclear credits of MNSB transactions.

Multilateral Net Settlement Batches

(a) All MNSB transactions arising out of net settlement clearings of Type D members are settled through the RTGS system. These include: (i) net settlement batches arising from cheque clearing operations; (ii) foreign exchange clearings; (iii) e-funds transfer; (iv) e-credit and debit clearings; (v) government securities clearing; and, (vi) any other MNSBs as decided by the RBI from time to time.

(b) Each MNSB transaction is settled only through a defined window in a batch mode, which begins when the batch is received for settlement in the RTGS system. During the settlement window, the batch is periodically re-tried for settlement as defined by the RBI. Any MNSB transaction which cannot be settled during the window is cancelled and the batch is returned to the original
clearing entity, which then takes action according to the rules and regulations dealing with the clearing entity.

(c) The RTGS members, who have to meet a net debit obligation under a particular MNSB transaction, must ensure that sufficient funds are available in their respective settlement accounts, and, in the case of ‘C’ Type members in their current accounts, when the MNSB transaction is received for settlement and when the batch is applied or retried for settlement. If an RTGS member does not have sufficient balance available in its settlement account/current account to meet its debit obligation during the settlement window, at the point of submission for settlement or retry, a shortfall intimation notification is sent to the RTGS member. The RBI views seriously any delay, especially due to the failure by an RTGS member to provide adequate liquidity to meet their debit obligations in the settlement of an MNSB transaction.

(d) The RTGS members including the clearing entity who submitted the MNSB transaction for settlement, are notified by the IFTP system on settlement/failure of each settlement attempt of the MNSB transaction. In case of failure of an MNSB transaction, the clearing entity is notified of the reasons for failure, including details of the clearing participants, who failed to meet their debit obligations, along with the actual amount of shortfall. If the MNSB transaction is settled by the invocation of sponsorship arrangements/lines of credit, the clearing entity is notified of the clearing participants in whose accounts there was a shortfall, the amount of the shortfall in each such clearing participant’s account, the sponsors from whom funds were invoked to settle the MNSB transaction and the amount invoked from each of the sponsor(s).

**Intra Day Liquidity (IDL) Facility**

The Bank at its discretion, may grant access to intra-day liquidity facility to Types A and B members for settlement of their RTGS transaction. The Bank sets down terms and conditions for granting IDL facility and notifies the members from time to time. The decision of the Bank is final. The IDL facility is provided by the Bank to help in overcoming short-term requirements of funds during RTGS business day for settlement of
the transactions. The IDL facility used by the members must be reversed before the close of the IDL shutdown phase.

If the RTGS member fails to repay any IDL used by it before the end of the RTGS day, the securities against which such IDL has been used and to the non-reversal of IDL, will get transferred to the Bank’s Investment Account. The member has to repurchase on the next working day, within 1 1/2 hours before RTGS start for the day, and till the repurchase is complete, the member will not have access to IDL facility. If a member fails to repurchase the above securities within the stipulated time, the Bank will take this lapse seriously and penalties will be imposed. The bank-member may even be liable for suspension from the RTGS membership.

RTGS system in India adopts a pure gross settlement mechanism for funds settlement. In this mechanism, as the banks are unaware of the incoming credits, it creates strain to manage liquidity requirements to meet the debit obligations on real time basis, resulting in high liquidity costs for the banks. This might result into settlement risk in case any bank fails to meet its obligation. This finding can also be corroborated by the CFSA 2009 Report. The Committee on Financial Sector Assessment (CFSA), constituted by the Government of India in consultation with the RBI in September 2006, in its Report concluded that RTGS system in India broadly observes Core Principle No. 3, for Systemically Important Payment Systems, which states: “The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and which provide appropriate incentives to manage and contain those risks.” According to the report, the participants are individually responsible for their liquidity requirements, though there are built-in mechanisms in the system to manage liquidity risk. Thus, the liquidity pressure to a great extent remains with the system’s participants.

Hence, the hypothesis: “The systemic risk shall be observed as the size of payment systems grows in size and becomes varied in nature” holds good.

Customer Transactions

Type A customers can send or receive customer transactions on behalf of their customers through the RTGS system. Credit under customer transactions, received by the RTGS
member in its settlement account through the system is ultimately credited to the account of the beneficiary customer at his/her bank.

Funds received by an RTGS member for credit to the beneficiary customer’s account will be returned to the originating RTGS member within two hours of the receipt of the payment at the PI of the recipient bank, or before the end of the RTGS business day, whichever is earlier. In case of any delay in providing credit to the beneficiary’s account and in returning the payment to the originating member, the recipient bank will be liable to pay compensation at 2 per cent above the current repo rate respectively to the originating member. The recipient will return payment as a fresh inter-bank payment.

Centralized Funds Management System (CFMS)

CFMS consists of two components: (i) the Centralized Funds Enquiry System (CFES), and (ii) the Centralized Funds Transfer System (CFTS). The CFTS, which is the funds transfer facility of CFMS, which has been in operation since 2005-06, enables banks to better manage their current account balances with the Reserve Bank by electronically moving funds from one office of the RBI to another office, i.e. from a surplus centre to a deficit centre.

4.2.4 Financial Markets Clearing

Clearing Corporation of India Ltd (CCIL)

The CCIL was set up at the initiative of the RBI to provide the institutional structure for the clearing and settlement of transactions undertaken in government securities, money market instruments and foreign exchange products. The objective was to bring in efficiency to the transaction settlement process, to insulate the financial system from shocks arising from the operation-related issues, and to undertake activities that would help in broadening and deepening the money, debt and forex markets in India.

The CCIL started its business operations in the securities market in February 2002 when the Negotiated Dealing System (NDS) of the RBI was activated with the settlement of Gilts and Repo deals. Later on, it started to cover also the settlements of forex and other money market operations. The CCIL also supports, through its own subsidiary Clearcorp Dealing Systems (India) Ltd., the three trading platforms in the forex and money market segments.
The CCIL has adopted the core principles set down by the BIS and International Organization of Securities Commission (IOSCO) that prescribe the design and operation of payment systems for the world. The business model of the CCIL has been based on strong information technology infrastructure, supported by business logic and ethics.

A. Government Securities Segment

Securities Lending and Borrowing (SLB) scheme for government securities was made operational in October 2004. This scheme enables the CCIL to borrow government securities from a member approved by the RBI for the purpose of meeting shortages in the settlement transactions.

*Negotiated Dealing System – Order Matching (NDS-OM)* is an electronic process which is screen based, anonymous and order-driven trading system. This has been introduced by the RBI, as a part of the existing NDS system to facilitate electronic dealing in government securities. It is accessible to members through the RBI’s INFINET Network. The system facilitates better price discovery, liquidity, higher operational efficiency and transparency. NDS-OM also provides facility for straight through processing, with all the trades on the system automatically sent to CCIL for settlement. NDS-OM is available for all NDS existing members who are regulated by the RBI.

B. Money-Market Segment

*Collateralized Borrowing and Lending Obligation (CBLO)*

The CBLO, a money market instrument approved by the RBI, is a product developed by the CCIL for the benefit of the entities which have been phased out from inter-bank call money market or is given restricted participation in terms of ceiling on call borrowing and lending transactions, and, those which do not have access to the call money market. The CBLO is a discounted instrument issued in electronic book entry form for maturity periods covering one day to one year period.

*Trading in the CBLO Market:* The CBLO members access CBLO trading platform through INFINET connectivity or even through the internet platform. Large corporations, mutual funds, NBFCs, insurance companies, etc., can become members. This trading activity has been increasing since August 2005. Clearing and settlement activities for CBLO include novation, netting, generation of obligations and final settlement in the
accounts of the concerned members either with the RBI or their designated settlement banks. Shortages are met out of Funds Lines of Credit established for the purpose. Appropriate funds/CBLOs are not delivered to the defaulting member to protect against final default. Penalties are levied for such shortages along with disciplinary actions (CCIL, Fact Book, 2008).

**National Financial Switch (NFS)**

The Institute for Development and Research in Banking Technology (IDRBT) of the RBI has initiated the NFS to facilitate interconnectivity between banks’ switches that provide a user access to a large number of ATMs of different banks. The IDRBT has appointed the CCIL as the Settlement Agency for interbank settlement of ATM transactions among the members of NFS.

**Derivatives**

The CCIL has started a trade reporting platform for Rupee Interest Rate Swaps (IRS) and forward Rate Agreements in August 2007. This deal reporting facility is to be used by members to report their deals in a convenient manner. The reported deals are processed by the CCIL through a specially developed software which offers certain post-trade processing services like resetting interest rates, providing settlement values, etc., to the reporting members.

**C. Forex Settlement**

In November 2002 the CCIL started the guaranteed settlement of interbank US$/INR spot and forward trades, and, in February 2004 cash and tom trades were included in its scope for guaranteed settlement. The multilateral netting system provides a netting advantage to more than 90 per cent of the market participants. The CCIL guarantees settlement of such trades, which leads to the banks’ settlement efficiency, reduction in settlement and operational risks, reduction in intra-day liquidity requirements and settlement cost savings (CCIL, Fact Book, 2008).

During the process of settlement, trade confirmations received from members are validated and matched, and then subjected to an exposure check. Only the trades that pass the exposure check are accepted for settlement. The CCIL is the central counterparty to every accepted trade of all the member banks through the process of novation. Various
reports are prepared to update members on the status of deals reported by it to CCIL and the net settlement obligations that become due to and from them. The members can access these reports over a Report Browser on their INFINET network.

The rupee leg is settled through the members’ current accounts with the RBI and the US$ leg through the CCIL’s account with the Settlement Bank at New York.

**Continuous Linked Settlement (CLS)**

The CLS provides a means of settling foreign exchange transactions finally and irrevocably. Both sides of a trade are settled simultaneously on Payment *Versus* Payment (PVP) basis, so as to make it final. The CLS, thus provides “real time gross settlement” through a specially created special purpose bank, i.e. the CLS Bank International, which has links to the RTGS Systems of the relevant currencies. The CLS Bank maintains an account at each central bank and has access to the payment system of each currency.

The CCIL has also commenced settlement of cross-currency deals through the CLS Bank by availing third-party services of ABN AMRO Bank as the settlement bank since April 2005.

**D. Funds Settlement**

As the CCIL provides guaranteed settlement for trades accepted by its systems, in securities, forex and CBLO segments, it needs to have adequate liquidity arrangements for taking care of defaults by members both in rupee and dollar amounts. Hence, the CCIL has made arrangements for credit facility with banks in India for the rupee component, and, with the Settlement Bank in New York for dollar funds. In order to facilitate settlement of cross-currency trades of its member banks through CLS, CCIL has adequate liquidity limits in the different currencies from the Settlement Bank and ABN-AMRO Bank.

**4.3 Payment Channels**

Most of the economies, at present, are in the process of getting “electronized” as more and more transactions are taking place online and volume of electronic payments are surpassing the paper-based payment instruments. In India electronic delivery of banking activities are also progressing rapidly. Even internet facility is being used to provide services to the rural population as it is relatively economical, faster and can cover
extensive areas. While facilitating increasing volumes, security and efficiency become critical and essential, hence necessary infrastructure needs to be developed. “An internet E-commerce Payment Gateway is a critical infrastructural component to ensure that such transactions occur without any hitch and in total security over electronic networks.” (Gulati & Srivastava, http://www.csi-sigegov.org/2/10_342_2.pdf)

4.3.1 Internet E-Commerce Payment Gateway

A Payment Gateway is the access point to the national banking network. All online transactions have to pass through a Payment Gateway for the purpose of processing. Thus, a Payment Gateway acts as a bridge between the merchant’s and the financial institution’s website which processes the transactions. A Payment Gateway not only authenticates but also routes the details of payment in the most secure environment, between the party and the related banks involved in the transaction process. “The Payment Gateway functions in essence as an “encrypted” channel, which securely passes the transaction details from the buyer’s Personal Computer (PC) to bank’s for authorization and approval. On receiving the approval, the Payment Gateway sends bank the information to the merchant thereby completing the “order” and providing verification.” (Gulati & Srivastava, http://www.csi-sigegov.org/2/10_342_2.pdf)

The concept of Payment Gateway is not new to India, because a few banks and some service providers are offering Payment Gateway services especially for credit card transactions. If the full potential of e-commerce in India is to be exploited, then customers will have to be provided with a complete range of payment options, such as E-cheque, EFT, ATM cards, etc. Secondly, the existing Payment Gateways enable Business-to-Customer (B2C) or Business-to-Business (B2B) transactions only. They do not cover lucrative government business activities. There is also the absence of a single service for all types of transactions covering all the banks. There are certain obstacles hampering proliferation of payment gateway. Firstly, payments may not take place at all, because the customers may not have accounts with the banks supporting the Payment Gateway. Secondly, the Payment Gateway covers only a limited number of banks. Besides, there are problems relating to reliability, delivery and limited payment avenues and the general lack of trust among customers and doubts about the service partner. In India at present the Payment Gateways in operation are: (i) Transecute Pvt. Ltd. (ii) Pay
Seal (ICICI), (iii) Eliteral Payment Gateway, (iv) Payment-Gateway-India.com, (v) Team VII Payment Gateway, (vi) Citi Bank, and (vii) HDFC.

Role of the Government

The government has to play the key role as a facilitator. It should lay down appropriate rules, regulations and procedures for the development of e-commerce, so that the Payment Gateway can function smoothly and effectively as it can take the lead role in the development of the national economy. The government should take steps to encourage all government transactions and payments through the Payment Gateway. The tax structure on online transactions needs to be worked out, so that it can promote the use of Payment Gateway. The rules and regulations should be defined to encourage genuine players as well as ensure security. At the same time, internet accessibility and affordability needs to be developed through promoting appropriate networking infrastructure. Other government initiatives could include:

(a) Promoting e-commerce and internet culture among the people and government employees.

(b) Organizing seminars and workshops to educate persons about Payment Gateway.

(c) Encouraging government departments to utilize Payment Gateway facility.

(d) Creating an environment of security and trust by passing stringent laws.

(e) Encouraging merchants through incentives, like tax concessions, for the use of Payment Gateway.

(f) Developing the necessary infrastructure through initiatives for computerization, development of human resources.

(g) Adopting measures to bring non-conventional sectors like agriculture, animal husbandry and so on, under the Payment Gateway umbrella.

(h) Promoting workable private-public partnership, if necessary, for developing and popularizing Payment Gateway, as effectively done by several countries.

Advantages of Payment Gateway

Payment Gateway is beneficial not only for banks but also for the public as well as the economy as a whole.
(a) Benefits for the Public

- Customers can make payments with ease from their homes.
- Customers can access multiple counters from one location.
- Reduction in time for making transactions.
- Assurance of maximum security of transactions.
- Reduction of prices of goods and services due to elimination of merchants as the need for maintenance of shop and infrastructure does not arise.
- Reduction in prices will attract the public to take advantage of the Payment Gateway.
- Greater coverage enables better reach to rural and remote areas of India.
- Service providers will be motivated to use it as it will be highly cost effective.

(b) Advantages to the Economy

- Payment Gateway will help in releasing scarce resources like human and non-human capital, which can be invested in other sectors of the economy.
- It provides efficient and homogenous payment mechanism for banks and customers in India.
- It reduces potential security lapses and frauds.
- It stimulates the development of new payment instruments.
- It provides a single platform for a variety of payment needs, infrastructure and instruments
- It has ability to track transactions and maintain their record, which will help in checking financial irregularities.
- It provides instant information flow leading to quick decision taking.
- It helps to keep pace with international payment systems and undertake transactions at a global level within a very short time.
• It tends to reduce the number of intermediaries, which reduces cost of payment.

• It provides authorization and settlement instantaneously; hence there will not be any risk of defaults and bounced cheques.

• It provides a better-streamlined approach for government-related payments.

• It generates savings for the government and businesses by eliminating the need for maintaining expensive office infrastructure and establishment.

• It will result in the emergence of new line of service providers for developing websites, integration services, maintenance, etc.

• Processing exports will be easier

(Gulati & Srivastava, http://www.csi-sigegov.org/2/10_342_2.pdf)

4.3.2 Bank’s B2C Payment Gateway

The B2C services are developed and used as an extension to the banks’ e-banking business and also as a means to differentiate them from their competitors, by offering online payment gateway services which enable merchants to accept payments from the accounts of their consumers’ banks.

In order to accept payments, the merchant has to present an application to establish the communication with the issuer’s gateway and identify himself to the issuer. The consumer pressing the “check out” button of an order on the merchant’s website will be redirected to a webpage hosted on the gateway server of the issuer. The related order, information, such as, the purchase amount and the buyer’s name, will be submitted to the gateway through hidden fields. The consumer will be asked to present a bank account number and a password to initiate payment. Once the buyer is authenticated, the issuer’s gateway will send a positive message to the merchant and redirect the consumer to a URL pre-designed by the merchant. This whole process can be carried out within a minute.

In order to receive payments, the merchant has to open a settlement account with the issuing bank. After the buyer initiates a payment, the issuer will debit the buyer’s saving account or debit card account. Although the seller receives the funds immediately,
the issuer credits the merchant’s settlement account with a short delay, depending on the agreement between the merchant and the bank.

The payment process results into an intra-bank credit transfer from the consumer to the merchant. The main advantage of this payment system is that the merchant can never collect the consumer’s bank account information. Secondly, after successfully authenticating the buyer, the issuing bank will guarantee the payment. Thus, the merchant is able to ship the goods immediately and digital goods will be delivered in real time, as soon as it receives a “YES” message on an order from the issuer.

The webpage, generated by the issuer’s gateway, is encrypted by a secure socket layer (SSL) to ensure security. Some banks may provide local wallet applications, known as the PRO vision of personal banking systems, to enhance the authenticating procedure by digital certificates or Universal Serial Bus (USB) devices. Such systems usually embody more personal financing features and unlock money transfer limit (Lei, 2006).

4.3.3 Third-Party B2C Payment Gateway

“In order to process multiple brand bank cards, a merchant has to install various applications from the respective issuers which will increase the complexity and the cost of the merchant’s system” (Lei, 2006). The third-party payment service providers integrate several issuers’ payment gateways into one single interface to online merchants, which emerge as the resellers.

The third-party service provider’s payment gateway helps in routing a request from the merchant to the corresponding issuer’s payment gateway and passes the issuer’s response to the merchant. The consumer has to select any one in the several card brands in a webpage that is generated by the service provider to proceed with the payment, and has to submit an account number along with password in the issuer’s webpage. This procedure needs to be followed for initiating a payment.

A third-party service provider has to open multiple accounts with the correlated banks, but the merchant does not have to open such accounts. The settlement process consists of two steps: (i) an intra-bank credit transfer from the consumer’s account to the service provider’s account, and (ii) an inter-bank credit transfer from the service provider’s account to the merchant’s account. Thus, this may be called as a two-step-
settlement model. In practice, the third-party service provider settles the payments with the merchants periodically instead of trade by trade.

For example a third party B2C Payment Gateway service provider solution is as shown in diagram 4.1:

**Diagram 4.1: Online Payment (TechProcess Solutions Limited)**

Presentation at the Programme in Payment and Settlement Systems, NIBM, March 4, 2008

4.3.4 Electronic Bill Presentment and Payment

“Electronic Bill Presentment and Payment (EBPP) means the electronic bill presentment to the customer and the electronic initiation of payment by the customer” (Andreeff *et al.*, 2003).

The traditional customer bill presentment and payment is a paper-based process, which involves presenting a paper bill for goods or services rendered earlier, to the customer who pays by cheque. The bill presentment process involves billing operations, such as generating, printing, mailing and delivery of bills to customers. Thus, this process tends to be costly and time-consuming.

The bill payment process involves at least five main participants: (i) the customer, (ii) the customer’s bank, (iii) the biller and (iv) his bank and (v) a payment network

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*TPSL (TechProcess Solutions Limited) is India’s leading player in electronic payments and transaction processing (Third Party Service Provider). It handles 60%+ of all electronic clearing house transactions. Key capabilities are: Receivables and payables processing (primary business); Back office processing and Software solutions. It has 140+ customers, including the leading Institutional customers, across key verticals – commercial banks, mutual funds, insurance, utilities, telecom companies.*
The customer uses funds deposited at his bank to settle the monetary transaction. The biller’s bank presents the customer’s payment obligation through a payment network that processes a cheque or card. The customer’s bank sends funds through a network to the biller’s bank, if sufficient funds are available in the payee’s account.

In contrast to the traditional model, EBPP does not require the mail system for the delivery mechanism for bill presentment and payment, because it uses the internet as a fast and cheaper delivery mode for presenting bills electronically.

**Advantages of EBPP**

- It provides convenience to the customers
- It saves time and cost significantly
- It provides control to customers over timing and amount of payments
- It is a universal payment mechanism favored by the customers
- It gives confidence to the customers that any bill payment process will protect their privacy and funds by securely transferring only billing information and payments.
- It is a reliable payment mechanism for customers and merchants
- It provides also a dispute resolution mechanism
- It reduces cost of billing and payment
- It enhances ability to up-sell and cross-sell
- It ensures control over customer data
- It also provides for broad delivery and payment medium to billers, to gain maximum customer use.

**EBPP Presentment Models**

There are two basic EBPP models: (a) the biller-direct model, and the (ii) consolidation or aggregation model. However, there are many variations of the consolidation/
aggregation model which include e-mail-based EBPP, the use of financial management software, screen scrapping and scan and pay methods.

(a) **Biller-direct Model** – As the customer enrolls for EBPP services, the biller generates an electronic version of the customer’s billing information. The biller may outsource this responsibility to a bill service provider (BSP), who acts as an agent for the biller and provides services like electronic bill translation, formatting, data parsing and even hosting the biller’s website. The biller notifies the customer of a pending bill via e-mail and the customer is directed to log onto either a biller’s website or to a BSP’s website, where the biller presents the customer with an electronic version of the billing statement. When the customer views the bill online, he can initiate payment directly from the website. Thus, in this process no other party is involved. The biller is responsible for interfacing with the customer to enroll and access electronic billing information and make payments.

(b) **Consolidation/ Aggregation Model** was developed to address customers’ desire to have one destination to access and pay their bills, while reducing the cost to the billers of implementing EBPP. In this model, the biller sends the customer’s billing information to a third party called “a bill consolidator”, who operates on behalf of the biller or the aggregator operating on behalf of the customer, and combines the data from multiple billers and consolidates the information at a single destination.

There are two variations: ‘thick’ and ‘thin’ consolidation models. Under the *thick* consolidation, the consolidator maintains both the summary and details of the information of the customer billing. Hence, the customer is not required to contact the original biller to get the full details of the due bills. Under the *thin* consolidation model, the biller maintains the details of the customer’s billing information, and, a summary is forwarded to the consolidator. Thus, customers can view the summary of their bills on the site of the consolidator, and for getting details, these can be linked to the original biller’s website.
The main limitations to EBPP are:

- Lack of incentives to the participants
- Absence of standards for data exchange
- Concerns over security and privacy of financial information
- Legal issues related to industry regulations, liability, dispute settlement, and customer protection.

In spite of these barriers, it may be expected that the EBPP models will become popular on account of the several advantages mentioned above.

**EBPP Payment Options**

*Credit Card* payment is an electronic payment option available to customers. However, from biller’s point of view, credit card transactions are generally more costly, as compared to other electronic payment alternatives. They are not accepted by all billers; this may limit their use in the electronic payments area.

Some credit cards are now available in the form of embedded microchips that store information, which is useful for authenticating the identity of the customer. If these cards can increase the reliability of authentication of the customers, billers will tend to be more receptive on account of the reduced fraudulency risk, although it is not still clear whether the fraud related to customer bill payment can be a significant issue for billers.

The use of credit cards is common among customers in an-on-line environment. As EBPP applications are available *via* the Internet, customers may pressurize more and more billers to accept credit card payments. Some billers who allow their customers to pay their bills *via* credit card are now charging a special fee for their use. If this becomes a common practice, more billers may be encouraged to accept credit cards for bill payments (Andreeff et al, 2003).

For example an EBPP service provider solution is given in diagram 4.2.
Diagram 4.2: Biller Aggregation (EBPP)
TechProcess Solutions Limited
A Presentation at the
Programme in Payment and Settlement Systems,
NIBM, March 4, 2008

Process Flow – Registration

For offline mode, customer fills physical registration forms and sends to TPSL

Process Flow – Bill Presentment and Payment

For offline mode, auto debit is done to customer bank account as per the mandate instruction.

TPSL - TechProcess Solutions Limited, India’s leading player in electronic payments and transaction processing (Third Party Service Provider). Handles 60%+ of all electronic clearing house transactions. Key capabilities are: Receivables and payables processing (primary business); Back office processing and software solutions. It has 140+ customers, including leading institutional customers across key verticals - commercial banks, mutual funds, insurance, utilities, telecom companies.

BJ/ASP website – TechProcess Solutions Ltd. (formerly known as Billjunction Payments Ltd.) is India’s foremost electronic bill presentment and payment company. TechProcess offers online bill payment through its service product BillJunction. It is dedicated to providing hassle-free bill payment service and is a single point contact for customer’s bill payment needs. BillJunction promises customers’ freedom from queues in the collection centres, missing bills and due dates, lost bills to keeping record of all bill payments.
4.3.5 Mobile Payment Systems

“Mobile” commerce is a natural successor to “electronic” commerce. The capability to pay electronically, with a website is the engine behind electronic commerce. Electronic commerce has been facilitated by Automatic Teller Machines (ATMs), debit and credit card systems, electronic money, electronic bill presentment and payment systems, etc.

Mobile payment is a natural evolution of e-payment schemes that facilitate mobile commerce. A mobile payment or m-payment may be defined “as any payment where a mobile device is used to initiate, authorize and confirm an exchange of financial value in return for goods and services” (Au & Kaufman, 2006). The mobile payments include transactions between consumers and merchants or other consumers. The mobile payments are beneficial for both the parties involved in the transaction; the consumer gains in the form of increased convenience, transaction speed, targeted offers and customized loyalty programs; and the merchant gains profit from new opportunities to increase sales, retain customers, reduction in cash handling cost and improve checkout productivity (Andractas, 2009). Mobile devices include mobile phones, PDAs, wireless tablets and other devices that are connected to mobile telecommunication network which makes it possible for payments to be made.

Mobile Payment Solutions

Mobile payment solutions may be classified according to the type of payments effected, and based on the technology adopted to implement the solution. There are many combinations of these technology adopted and modes of payment. At present, there are three different models available for m-payment solutions, on the basis of payment:

(a) Bank account based

(b) Credit card based

(c) Telecommunication company billing based (Lim, 2007).

(a) Bank Account Based M-payment In this model, the bank account is linked to the mobile phone number of the customer. Thus, when the customer makes m-payment transaction with a merchant, the bank account of the customer is debited and the amount is credited to the merchant account. Since banks have several customers, and,
telecommunication operators also have many customers, if they both collaborate to provide an m-payment solution, both will benefit.

(b) Credit card based M-payment In this model, the credit card number is linked to the mobile phone number of the customer. When the customer makes m-payment transaction with a merchant, the credit card is charged and the amount/value is credited to the merchant’s account. Credit card based solutions have a limitation in that it is heavily dependent on the level of penetration in the country. Hence, only a small segment of credit card holders will benefit in this process. However, there is an increasing demand for a payment solution by this segment, and, it can be used for high volumes of transactions in the immediate future. Thus, there is a better scope for this type of payment.

(c) Telecommunication Company Billing of M-Payments Customers may prefer to make payment to merchants using their mobile phones and this may be charged to the mobile phone bills of the customer. The customer then settles the bill with the telecommunication company. This may be classified into pre-paid airtime (debit) and post-paid subscription (credit).

Technologies for Mobile Payments

The facility of mobile technology provides various possibilities for implementing M-payments. A GSM mobile phone may be used to send or receive information (mobile data service) through three possible channels: SMS, USSD or WAP/GPRS. The choice of the channel influences the scheme of implementation of M-payment.

(a) Short Message Service (SMS) enables brief texts (140-160 characters) that can be transmitted from a mobile phone. Short messages are stored and forwarded by SMS centers. SMS messages have a channel of access to phone that is different from the voice channel (Court et al., 2005). SMS can be used to provide information about the status of one’s account with the bank (informational) or can be used to transmit payment instructions from the phone (transactional).

(b) Unstructured Supplementary Service Delivery (USSD) is a technology unique to GSM. It is a capability built into the GSM standard for support of transmission of information over the signaling channels of the GSM network. USSD provides
session-based communication, which enables a variety of applications. Thus, USSD is session-oriented and transaction-oriented technology, while SMS is a store-and-forward technology. Turn-around response time for interactive applications is shorter for USSD than SMS.

(c) **General Packet Radio Service /Wireless Application Protocol (GPRS)** is a mobile data service available to GSM users. It provides packet-switched data for GSM networks. GPRS enables services such as Wireless Application Protocol (WAP) access, Multimedia Messaging Service (MMS) and for internet communication services such as e-mail and world-wide web access in mobile phones.

(d) **Near Field Communication (NFC)** is the fusion of contactless smartcard (RFID) and mobile phone. The mobile phone can be used as a contactless card. NFC enabled phones can act as RFID tags or readers. This helps in creating opportunity to make innovative applications especially in ticketing and couponing (Ondrus & Pigneur, 2007). The “Pay-Buy-Mobile” project launched by the GSM Association targets 900 million mobile users with a common global approach using NFC (Card Technology Today, 2007).

**Challenges for M-Payment**

The main challenges for M-payment are as stated below:

(a) **Standards** – M-payments lack cohesive technology standards which can provide a universal mode of payment. Consolidation of standards in the mobile commerce is necessary, so that it will enable both producers and consumers to make investments that obtain value. In the absence of standards, different local and fragmented versions of M-payments being offered by different stakeholders may arise, e.g. network operator-centric models and bank-centric models. Standards should address security and privacy concerns of consumers and inter-operability between various implementations. Standards’ setting is a process of negotiation between various stakeholders. Thus it is more in the nature of political negotiations rather than technical discussions. The first movers benefit from this situation by creating *de facto* standards and major market share. There is no consensus among the players for setting Mihy-payments standards. Some companies have proposed standards and
they hope to put it into practice. The conflict over standards takes place at the firm level and at the inter-consortia level (Lim, 2007).

(b) **Business Models** – As there are many stakeholders in the system, a viable and sound business model needs to be developed that will produce a framework for sharing revenues.

(c) **Regulatory Issues** – As M-payments are economical, parties may be prepared to use it; but it is not a legal tender as it lacks the status of other payment instruments, such as cash, which is an authorized medium of exchange, adopted and guaranteed by the government. Hence, M-payments have to be backed by the issuer’s promise to pay. In order to achieve this, legislation needs to be enacted so as to make M-payment a legal tender. As Lim has pointed out: “The regulations for players in the financial industry are different from those governing the telecommunications industry, which means that each industry has its own particular standards body” (Lim, 2007).

The Mobile Payment Forum of India (MPFI) has been formed with the Institute for Development and Research in Banking Technology (IDRBT) and Rural Technology Business Incubator (RTBI), IIT, Chennai, taking the lead. Three sub-committees have been formed to go into the details and suggest measures to implement M-payment system efficiently and effectively.

**Examples of Mobile Payment Solutions**

(a) **Interbank Mobile Payment Service (IMPS)** is a real time, 24x7 functioning inter-bank payment system where fund transfer instructions can be originated only through mobile phones. NPCI provides this service through its existing NFS switch. In order to participate in this service, banks should be members of NFS and should have the approval from the RBI for mobile banking service. To send money, the remitter needs to log into the application and select IMPS menu or use the SMS facility in his mobile. Thereafter, the beneficiary’s mobile number, MMID (mobile money identifier), amount and MPIN (mobile PIN) need to be entered into the mobile, and, immediately these details are to be sent to the beneficiary. If the transaction is successfully processed, a confirmation via SMS is sent stating debit in remitter’s account and credit to beneficiary’s account (http://www.npci.org.in/aboutimps.aspx).
(b) Mobile Application Service Provider – Paymate developed a secure online payment system based on Interactive Voice Response (IVR) system. It has partnered with some Indian banks (e.g. Standard Chartered Bank of India, State Bank of India) to provide an M-payment service using SMS. The transaction platform links the user’s phone to a bank account, a credit card or a prepaid account. By entering a PIN code, transactions like retail payments, online payments and bill payments can be done very easily. For performing the transactions, money can be withdrawn from different bank accounts, which are registered by the user. “Paymate” has an ecosystem of over 15,000 merchants offering mobile payments to their customers. It also allows workers in cities to send remittances to their homes in the villages (Capgemini, 2009). The payment process flow of Paymate is as shown in diagram 4.3.

**Diagram 4.3: Paymate Transaction Process**

Source: (Bellens, Fuldner & Yip, 2009)
4.4 Other Payment Systems and Utilities

4.4.1 Financial Inclusion

“Financial inclusion may be defined as the process of ensuring access to financial services and timely and adequate credit, where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost” (Economic Times, 2010).

According to the Committee on Financial Inclusion, the recent developments in banking technology have transformed banking from traditional “staffed”-infrastructure to a system supplemented also by other electronic tools like ATMs, credit/debit cards, internet banking, on-line money transfers, etc. However, the access to the technology at present is still restricted only to a certain segment of the society (IBA-IDRBT, 2010).

Technology Solution for Financial Inclusion

In order to promote financial inclusion, information and communication technology is an absolute necessity today. Many banks in India have introduced smart-card solutions with biometric authentication. In such mechanisms, transaction data and account details are stored on the account holder’s smart card. Point of Sale (POS) terminals are given to agents of Business Correspondents (BCs). Customers approach them for carrying out transactions. In many cases, in such a solution, a high-end mobile phone replaces the POS terminal. In this arrangement all transaction data are stored on the mobile phone and customers are only given receipts of their transactions. The second type of solution is mobile based. Here the customers can perform transactions using their mobile phones independent of agents of BCs. The agents in this case would be required only for cash withdrawal, cash deposit and enrollments. The smart card-based solution is relatively more advantageous than the mobile-based solution as it can provide biometric authentication, which would help in ensuring the identity of customers, and reduce frauds. It is also easily implementable. Mobile-based solutions are still at the nascent stage (Chakrabarty, 2009).

The third type of solution named ‘Aadhaar-enabled payment system’ is still in its experimental stage. It is a bank-led model that allows on-line financial inclusion transaction at POS (Micro ATM) through the business correspondent of a bank using the Aadhaar authentication (diagram 4.4). The objectives of this payment system are:
To empower a bank customer to use Aadhaar as his/her identity and access the respective Aadhaar-enabled bank account and perform basic transactions like balance enquiry, cash deposit and withdrawal, intra-bank or inter-bank remittances through a BC.

To enable the banks to route the Aadhaar-initiated inter-bank transactions through a central switching and clearing agency.

To facilitate disbursements of government entitlements like NREGA, Social Security Pension, etc., of any central or state government bodies. For performing a transaction in this system, the customer need to input his bank identification code, Aadhaar number and fingerprint captured during enrollment. (http://www.npci.org.in/AEPSOverview.aspx).

Diagram 4.4 : Aadhaar enabled Payment System- System Architecture

Source : (http://www.npci.org.in/AEPSOverview.aspx)
The main challenges faced by the banks are:

(a) Making large-scale procurement and implementation of end-to-end solution difficult.

(b) Rendering intra-bank and inter-bank interoperability difficult due to proprietary solutions.

(c) Problems in interfacing with CBS platforms.

(d) Lack of standard technology components of smart-card based solution across the industry.

(e) Lack of an authority for testing and certifying that the specified standard for smartcards and bank terminals has been complied with and adhered to.

(f) Ensuring data security of cards and terminals during manufacture, storage and transit.

(g) Designing and implementing a common key management system that works across different vendor implementations.

(h) Evolving a model that makes the business correspondent model viable, as costs are high due to the small size and multiple technology solutions.

To address these issues, the IBA and IDRBT organized a Workshop on Open Standards for Financial Inclusion. After lengthy deliberations, a “Technical Committee on Open Standards for Financial Inclusion” was constituted in February 2009 comprising a few select banks and institutions. The committee prepared a draft report, which has been placed in the public domain for suggestions and comments by all the stakeholders. When these open standards are finalized and bank terminals made interoperable, it will facilitate an efficient rollout of the financial inclusion projects that will be user-friendly and non-proprietary (IBA-IDRBT, 2010).
4.4.2 Cross-Border Payments and Remittances

There has been significant increase in labor mobility throughout the world. In the year 2008, world-wide remittance market was observed to be increasing at 16.6 per cent per year. The share of Asia Pacific was 38.7 per cent. According to a World Bank estimate, the recorded flows have been a global phenomenon, which stood at $ 414 billion in 2009, of which the share of developing countries was $ 316 billion, although there was a reversal of trend of 6.7 per cent from $ 443 billion to $ 414 billion in 2008. It is expected to increase by 6.5 per cent in the year 2010. The estimates covered 170 countries and the top 10 countries that were recipients accounted for 48 per cent of the total, and India’s share was the highest at $ 49,256 million (Times of Money, 2010).

Salient Features

Millions of non-resident Indians having trust in the Indian banking industry remit funds through banks for maintenance of their families back home and also for investment purpose. Currently, a shifting pattern is being observed. Emigration destination has been shifting from Gulf countries to the USA, Canada and Australia and even South America. There is also a marked shift from hawala to regulated channels and from captive-customers to “Value-Shoppers”.

The main issues facing traditional money transfers relating to customers include higher cost structure, lack of transparency of exchange rates, inability to track the status of the transaction and inconvenience of physical follow ups.

Dissatisfaction relating to channels includes: restrictions imposed by the regulatory framework, threats from weak AML/KYC norms, risk of repudiation, lack of centralized database and challenge from the un-banked sector.

Society for Worldwide Inter-bank Financial Telecommunication (SWIFT)

SWIFT was established in 1973, which was supported by 239 banks in 15 Countries. It is a Cooperative Society under Belgium law and is owned and controlled by its member banks and financial institutions. The mission of the Society is to create a shared worldwide data-processing and communications network, along with a common language for exchange of financial transactions. A physical telecommunications network connects all members of the SWIFT with each other. The physical network used in SWIFT is the
same as the one that is used for telephony and fax communication. The telecom network of each member country provides the infrastructure. SWIFT in Brussels provides the required software for communication, which is installed on computers in the location of each member. SWIFT works in the same way as the Internet, and it helps the members to send messages to each other. The message structure, format and contents are common for all the banks though the method of viewing the messages may differ. Each country has a SWIFT Gateway called SWIFT Access Point (SAP) to which each individual user’s terminal is connected. The users are connected to the SAP through leased lines with PSTN as backup. All the SAPs are connected to the Regional Processors, and these in turn are connected on-line to the Mother Operating Centres in the USA and the Netherlands from where the messages are distributed to the final destination addresses, which are indicated in each message.

SWIFT has nine types of Standard Message Categories. Each broad Message Category has various types of messages for specific uses. The majority of forex-related messages are sent to correspondent banks abroad through SWIFT. The SWIFT system uses an advanced data processing and telecommunications technology, and, it is based on the following features:

- It is available worldwide, 24 hours a day and 7 days a week.
- Standard message formats used for transactions enable the members to avoid problems of language and interpretation and also permits the automated handling of messages.
- Delivery of message is very “swift”.
- It also ensures a high level of security while transmitting all messages.
- It assumes the financial liability for the accuracy, completeness and timely delivery of all validated messages.

The majority of international inter-bank messages use the SWIFT network. By the end of September 2010, SWIFT was linked to more than 9,000 financial institutions in 209 countries. Although, SWIFT transports financial messages in a most secure way, it does not hold accounts for its members and also does not perform any form of clearing or settlement functions.
SWIFT does not facilitate funds transfers; it only sends payment orders, which must be settled via correspondent accounts that the institutes have with each other. Each financial institution, in order to exchange banking transactions, must have a banking relationship by either being a bank or affiliating itself with one or more banks, so as to have the benefits of those particular business features. “There are four key areas that SWIFT services fall under within the financial market place and these are Securities, Treasury and Derivatives, Trade Services and Payments and Cash Management. (http://en.wikipedia.org/wiki/Society_for_Worldwide_Interbank_Financial_Telecommunication)

SWIFT also offers a secure person-to-person messaging service, called SWIFTNet Mail, which came into existence on May 16, 2007. SWIFTNet Mail is intended for the secure transfer of sensitive business documents and is designed to replace the existing telex and courier services and the transmission of security-sensitive data over the open internet.

India joined the SWIFT Network on December 02, 1991, and the users of the network are the RBI and all the major banks including newly established private sector banks, branches of foreign banks and the major financial institutions.

Mechanism

A remittance transfer consists of three phases:

- The first phase takes place in the migrant worker’s country of work, where the transaction actually originates. A remittance transaction originates when the migrant visits a bank, money transfer company or any other originating point (such as grocery store, post office, gas station, etc.) in order to send funds to his friends or relatives in his home country.

- The second phase occurs when funds are transferred from the originating country to another foreign country.

- The third phase takes place when funds reach the destination country and are paid to the beneficiary at a commercial bank, money transfer company or any other distribution point (such as ATMs, grocery store, post office, etc.) (Martinez, 2005)
As mentioned in the earlier chapter, in the USA, clearing system for remittances are Automated Clearing Houses (ACHs); in the UK, they are Banker’s Automated Clearing Services (BACS) and Faster Payment Services (FPSs); in India they are retail payment systems like paper-based as well as electronic systems. Paper-based systems include: cheques; and Electronic systems include: ECS credits and debits, RTGS and EFT/NEFT.

The cash management process for facilitating cross-border payments into India using Times of Money* solution is as follows:

- **Step 1:** A correspondent bank, using payment instruments like wire and check, credit cards, internet transfers and virtual account, performs the domestic clearing.
- **Step 2:** Credit is given to *nisto* account with the correspondent bank. The other alternative is to perform FX conversion and give credit to *vosto* account in India.
- **Step 3:** Payouts are then made to beneficiaries in India (*Times of Money*, 2010).

The payment messages in this process/mechanism are transported from the remitting country to the receiving country through SWIFT messaging platform.

### 4.4.3 Cash Management Service

A corporate treasurer should have the exact picture of the funds available in his/her organization and the overall market scenario. This will enable him to understand clearly the exact working capital requirement of the firm, minimize float loss and discover better investment areas. Liquidity management thus occupies top priority for a corporate treasurer. Hence, the bank’s cash management team is also under constant pressure from its customers to release liquidity promptly for their needs. In addition, this team needs to look into other parameters like processing high volumes, making payments to correspondent banks, reconciling of payments, etc. Emerging cash management practices in India would thus enable banks to meet their customers’ current requirements without hampering quality standards (Mantri, 2008). Cash Management Service (CMS) in India

*‘Times of Money’ serves both individual as well as institutional clients through its businesses of global money transfer, e-commerce for NRIs, e-Payment and co-branded card service. A flagship brand of *Times of Money*, ‘Remit2India’ facilitates money transfers to India by NRIs around the world.*
depends mainly on paper-based instruments, i.e. cheques, though electronic payment options is slowly gaining acceptance. CMS products offered are primarily in the areas of collection (MICR cheques, cash collections, up-country correspondent bank branch location cheques, etc.) and payments (RTGS, own bank branch demand drafts, capital market IPO payment, etc). Organizations are today migrating to Enterprise Resource Planning (ERP) systems from their traditional accounting procedures. Hence, there is a need to integrate bank’s CMS systems with that of the corporates’ ERP packages. CMS providers also facilitate such an integration, which offers benefits like allowing straight-through processing and streamlining the reconciliation process (Bambawale, 2004).

**Challenges**

In India there are over 10,000 clearing locations which can be categorized into :

(a) RBI-operated clearinghouses (20).

(b) SBI, its associates and other public sector banks-operated clearinghouses (1000).

(c) Direct clearing and through correspondent banks (9000) (Dalmia, 2005).

The efficient management of liquidity across these far-flung locations is the key challenge today before the banks and corporates. This issue can be resolved henceforth by two new developments that have occurred recently : (i) Core Banking Solution implementation at SBI, and (ii) Introduction of RTGS. Due to CBS, banks can track their clearing balances centrally and need not have to maintain balances in separate accounts with individual SBI clearing locations. SBI will also be able to offer sweeping and pooling services with auto-sweeps and sweepbacks. The RBI is also giving considerable importance to this idea. This is evident from the mention of “Single Window Facility” in the RBI’s 2009-12 Vision Document that will be extended to all member banks that are part of the clearing houses managed by major banks. Also leveraging on the RTGS, banks can move money between RBI and SBI accounts according to their liquidity requirements in each location. Clearing through the direct clearing network covering 9,000 locations still remains a problem area. This is primarily due to the undefined settlement cycles that require constant follow up, and, hence add further cost to CMS services. Though 90 per cent of the current transaction volumes are handled by the RBI and SBI locations, direct clearing category is important, as many credit cards, mutual funds, insurance and FMCG
companies have focused on these locations to derive revenues in the future. Bringing more bank branches under CBS would certainly lessen this problem to a great extent.

4.4.4 Government Tax Collection

On Line Tax Accounting System (OLTAS)

Mode of payment infrastructure in India has been undergoing continuous and significant transformation in recent years. This has led to the introduction of several e-payment solution systems. The technology-induced, demand-led and a conducive environment has prompted the government agencies to take steps to simplify various processes for improving the efficiency of payment systems. The public at large increasingly prefers e-payment systems that are characterized by convenience and operational simplicity.

Payment and accounting of “Direct Taxes” are important areas, which are traditionally characterized by operational complexities. “The technology applications have come handy when the government was looking at immediate solution to bring reforms in the tax administration and payment mechanism. This segment turned out to be one of the first e-payment initiatives in the country which over a period of one year and a half having undergone value additions is now widely accepted” (Chopra, 2006). The Income Tax (I-T) Department introduced the system for receipt of taxes called On Line Accounting System (OLTAS), effective from June 1, 2004. This system has simplified the procedure for payment of taxes by taxpayers and also brought about several changes in I-T accounting and monitoring mechanism of direct tax payments in India.

In view of the large volumes and potential for attractive fee-based income, the public sector banks keenly pursued the Government Business Portfolio. Banks with their well-equipped and state of the art IT infrastructure found that OLTAS is a good opportunity for participating in the government business portfolio. Fiscal reforms in India, especially in tax administration, also provide suitable opportunity for promoting OLTAS. “A salient feature of the inadequate tax administration scenario prevalent in the country was the virtual absence of data on both direct and indirect taxes. Taxpayers were neither getting the required service nor attention at the designated counters. High compliance costs combined with inadequate extent of computerization and information systems has resulted in a situation wherein continued interface with taxpayers and tax officials was necessary. Negotiated payment/collection of taxes was the order of the day,
and, often, the ultimate outcome was the low levels of tax compliance. On the other hand, the tax collected used to remain idle in the payment cycle and there were reconciliation issues between Tax Offices and Banks” (Chopra, 2006).

The advisory group on Tax Reforms under the Chairmanship of Dr Kelkar recommended networking of the Income Tax Department, Banks and the Reserve Bank of India (offices) to facilitate on-line transmission of details regarding tax collection/refund, etc., between these offices.

Initially, on a pilot basis the OLTAS was applied to the corporate taxpayers. However, after February 15, 2004, the project covered both, corporate and individual taxpayers. On account of the concerted efforts by the Central Board of Direct Taxes (CBDT), the RBI, the banks and the IBA, the on-line tax accounting for direct taxes has became a reality. “This project is one of its kind in the whole world.” Since June 1, 2005, the project also included the excise and service tax components.

The benefits of OLTAS are very encouraging to all concerned; still a few things need to be tuned up and aligned to provide better services to the taxpayers. The coverage needs to be expanded and further refinements needs to be carried out for bringing about uniformity in the accounting procedures in banks. Banks should take steps to make OLTAS more customer-friendly by using technology more effectively. “The collective goal of all the constituents should be to make use of synergy between the Banks and Tax Collection administration to maximize the benefits to the society” (Chopra, 2006).

4.5 Conclusion

Having examined various instruments, processes and institutional arrangements relating to payment systems in India, progress made in payment systems needs to be assessed through certain growth indicators.