
UNIT 2 PAYMENT MECHANISM IN CYBERSPACE

Structure

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Electronic Fund Transfer (EFT)
 - 2.3.1 How Electronic Fund Transfer Works?
 - 2.3.2 Different Mode of EFT Mechanism
 - 2.3.3 The Electronic Clearing Services (ECS)
 - 2.3.4 RBI EFT
 - 2.3.5 INFINET
 - 2.3.6 Structured Financial Messaging System (SFMS)
 - 2.3.7 Real Time Gross Settlement System (RTGS)
- 2.4 Online Payment Mechanism
 - 2.4.1 How Online Payment Mechanism Works?
 - 2.4.2 Electronic Cash
 - 2.4.3 Electronic Wallets
 - 2.4.4 Smart Card
 - 2.4.5 Digital Cheques
 - 2.4.6 Digital Signature
 - 2.4.7 Digital Certificates
- 2.5 Online Payments and the Information Technology Act, 2000
 - 2.5.1 Online Payments and Negotiable Instruments
 - 2.5.2 Establishment of Public Key Infrastructure (PKI)
- 2.6 Future of E-money
- 2.7 Summary
- 2.8 Terminal Questions
- 2.9 Answers and Hints
- 2.10 References and Suggested Readings

2.1 INTRODUCTION

Payment mechanism in cyberspace is all about paying for goods and/or services ordered or consumed using modern means of information technology. Such payment mechanism in order to be accepted must have all the attributes of a widely accepted offline payment system.

2.2 OBJECTIVES

After studying this unit, you should be able to:

- explain the meaning of electronic fund transfer (EFT) and how it works;

- explain the different modes of EFT mechanism;
- explain EFT as an important tool in online financial and banking networks and its crucial role in electronic settlement;
- discuss the online payment mechanism in the form of credit cards, smart cards, electronic wallet, and digital certificates; and
- describe the role of law in shaping the online payment mechanism.

2.3 ELECTRONIC FUND TRANSFER (EFT)

Electronic Fund Transfer means transferring money from one bank account to another in the same (intra bank) or different bank branches (inter bank). EFT has been in use since 1960s when banks first started using proprietary EDI network to share banking information. This was later converted into automated clearing houses. At a global level, to facilitate faster fund transfer between the remitter and beneficiary, the payment instructions are sent through telex, SWIFT¹ (Society for Worldwide Interbank Financial Telecommunications), Wire Transfer, CHIPS² (Clearing House Interbank Payment System) etc. But when it comes to transfer of funds domestically, the options have been restricted to demand draft, mail transfer or telegraphic transfer.

2.3.1 How Electronic Fund Transfer Works?

Electronic fund transfer implies transfer of money using Internet technologies. This involves participation of payer and payee and their respective banks including an automated clearing house.

Step 1: Payee submits the cheque to his bank

Step 2: Payee's bank presents the cheque to the automated clearing house

Step 3: Automated clearing house informs the drawer's bank

Step 4: Drawer's bank clears the cheque

Step 5: Payee receives the payment

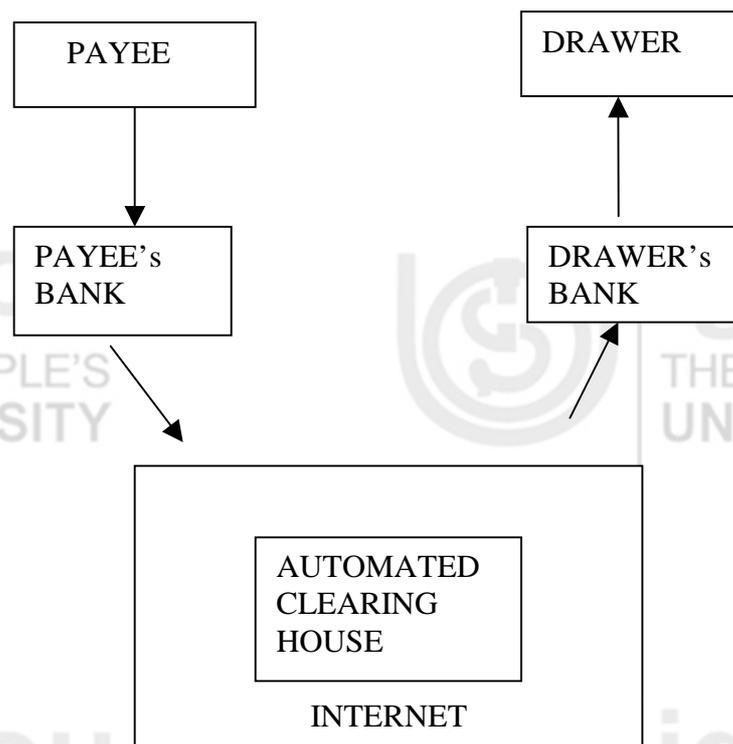


Figure 1: EFT mechanism using Internet

In India, electronic fund transfer system has got a fillip when the Central Government amended the Negotiable Instruments Act, 1881 and brought in forth the Negotiable Instruments (Amendment and Miscellaneous Provisions) Act, 2002, and introduced the concept of a “truncated cheque” in section 6 (b) of the said Act:

Section 6(a) “a truncated cheque” means a cheque which is truncated during the course of a clearing cycle, either by the clearing house or by the bank whether paying or receiving payment, immediately on generation of an electronic image for transmission, substituting the further physical movement of the cheque in writing.

Explanation II. – For the purposes of this section, the expression “clearing house” means the clearing house managed by the Reserve Bank of India or a clearing house recognised as such by the Reserve Bank of India.

As evident from the aforesaid section, the truncation process involves replacing physical cheques with their electronic images, which will travel through the stages of the clearing cycle. During the whole process of truncation the instrument would remain with the collecting bank.

2.3.2 Different Mode of EFT Mechanism

Over the period of time, the Reserve Bank of India (RBI) has taken various initiatives to introduce technology to facilitate electronic fund transfer at both corporate and retail banking level. For example, electronic settlement in the form of the electronic funds transfer services – Electronic Clearing Services (ECS), i.e., Credit Clearing and Debit Clearing and retail Electronic Funds Transfer (EFT) system has been a great success. In 2003-2004, the value of cheque transactions shrunk 16%, while settlements through the ECS³ jumped 200%.

Further, it has introduced Centralised Funds Management System (CFMS), Securities Services System (SSS), Real Time Gross Settlement System (RTGS) and Structured Financial Messaging System (SFMS) to transform the existing systems into a state-of-the-art payment infrastructure in India.

2.3.3 The Electronic Clearing Services (ECS)

The Electronic Clearing Services (ECS) ‘credit scheme’ and the Electronic Clearing Services (ECS) ‘debit scheme’ are two activity lines, which have become important vehicles for furthering improvements in customer services. In ECS – credit, a series of electronic payment instructions are generated to replace the paper instruments. The system works on the basis of a single debit transaction triggering a large number of credit entries. These credits or the electronic payment instructions which possess the 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. ECS – debit is meant for payment of charges to utility services such as electricity, telephone companies, payment of insurance premia and loan installments etc. by customers. ECS – credit, has become popular and is being availed of by most corporate entities and official bodies.

Please answer the following Self Assessment Question.

Self Assessment Question 1

Spend 3 Min.

The two activity lines which have become important vehicles for furthering improvements in customer services areand

2.3.4 RBI EFT

RBI EFT – a scheme introduced by RBI to help banks offer their customers money transfer service from account to account of any bank branch to any other bank branch has widened its reach to more than 150 centres in the country. RBI EFT system is an inter-bank oriented system, wherein RBI acts as an intermediary between the remitting bank and the receiving bank and effects inter-bank funds transfer. The customers of banks can request their respective branches to remit funds to the designated customers irrespective of bank affiliation of the beneficiary.

2.3.5 INFINET

The setting up of the apex-level National Payments Council in May 1999 and the operationalisation of the Indian Financial Network (INFINET) by the Institute for Development and Research in Banking Technology (IDRBT), Hyderabad have been some important developments in the direction of providing a communication network for the exclusive use of banks and financial institutions. INFINET members include RBI, Public sector banks, Private banks, Foreign banks, Cooperative banks and Financial Institutions.

2.3.6 Structured Financial Messaging System (SFMS)

At the base of all inter-bank message transfers using the INFINET is the Structured Financial Messaging System (SFMS). It would serve as a secure communication carrier with templates for intra-bank and inter-bank messages in fixed message formats that will facilitate straight ‘through processing’. All inter-bank transactions would be stored and switched at the central hub at Hyderabad while intra-bank messages will be switched and stored by the bank gateway. Security features of the SFMS would match international standards.

2.3.7 Real Time Gross Settlement System (RTGS)

It is significant to note that the RTGS system in banking sector has the potential to emerge as a major payment mechanism in India. Through this system both processing and final settlement of fund transfer instructions can take place in real time. It would help banks to scale up transactions that they have been processing. When fully implemented, RTGS would pave the way for a paperless money transfer mechanism. It would facilitate payment/receipt of funds without going through the traditional mode of pay order/demand draft/mail transfer/telegraphic transfer, which takes two to seven days to real time transactions.

RTGS apart from providing a real time funds settlement environment has also become critical to an effective risk control strategy. The risks inherent in a net settlement system are well known. Payment system risks in a net settlement system are such that the default by one bank may lead to a ‘knock-on’ or domino effect to the system. Gross settlement reduces the risk significantly, as transactions are settled one by one on a bilateral basis in a real time mode.

Presently, RBI is aiming to give legal sanctity to the whole EFT system by bringing legislation on the Electronic Funds Transfer and its role in electronic settlement. Moreover, it has suggested numerous amendments in the: Bankers' Book Evidence Act, the Negotiable Instruments Act, the Banking Regulation Act and the RBI Act.

2.4 ONLINE PAYMENT MECHANISM

Plastic money, i.e. credit cards has already made a presence in India and is fast becoming online shoppers' choice⁴. Credit cards have registered a slow but steady growth in India. All the major banks, both public and private sectors, use the major international brand names like VISA and MASTERCARD. The most recent trend is to issue multipurpose cards which function as credit cards, debit cards or Automatic Teller Machines (ATM) cards. This is essentially to enable the holder to exercise a choice of payment option.

2.4.1 How Online Payment Mechanism Works?

Online business requires a website (Sub merchant) which acts as a kind of e-shop for the users. It gives details of products (or services). A customer can buy any of the products listed on such a website by making payment against the same either in cash or cheque or through the route of online payment namely credit card/debit card/net banking. The sub-merchant's are linked to a Payment Gateway facility provided by a Master Merchant, which works in association with a Payment Gateway Bank, which is further linked to VISA or MASTERCARD – the Credit Card Companies.

To illustrate the mechanism, when a prospective customer visits a website (of a Sub-merchant) on Internet and selects a product he intends to buy, he is redirected to the website of Master Merchant (Payment Gateway) where the customer feeds all his details like name, credit card number, billing address etc. and completes the transaction by making the payment online. The Master Merchant at its end analyse the details of credit card holder (name, address, phone number, IP address etc.) and forwards the request to the Payment Gateway Bank and to Credit Card Companies. Depending on the report generated, the Master Merchant accepts or rejects the purchase order of the customer. Acceptance would lead to the customer account being debited by the same amount and the sub-merchant would be required to dispatch the ordered goods to the customer's address.

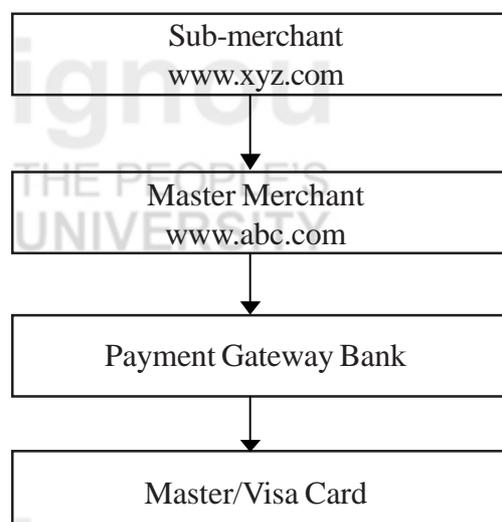


Figure 2: Online payment mechanism using credit card

Apart from credit card based transactions, other online payment systems include:

2.4.2 Electronic Cash

E-cash is a pre-paid system. Consumers buy electronic tokens and build up electronic funds for use over the Internet. It is stored in an electronic device such as a chip card or computer memory. The person who has purchased such cash can use it online for making payments. It is also known as cyber cash⁵.

2.4.3 Electronic Wallets

E-wallets can be useful for making a series of micro payments online for example, downloading MP3 music file, paying for an online article etc. A mechanism is necessary that ensures that the transaction costs of collecting payment for such items do not exceed the value of the transaction. A software wallet requires a user to set up an online account to which heads an amount of money. When transactions are undertaken, the wallet is debited⁶.

2.4.4 Smart Card

Smart cards use a micro controller chip embedded in the card. The cards can be purchased and reloaded again and again. It works as an electronic purse storing digital money, which could be used over public terminals (Websites, ATMs, Telephone lines) etc. Another example of smart card is the Stored Value Cards (pre-paid SIM cards for mobile phones).

2.4.5 Digital Cheques

It is a cheque in the electronic form. Here, the consumer uses his digital signatures to sign an e-cheque. The consumer fills in the cheque online and then sends it via a secure server to the recipient. The amount specified on the cheque is electronically withdrawn from the sender’s account and deposited in the recipient’s account.

2.4.6 Digital Signature

It is a mechanism to ensure authenticity, message integrity, non-repudiation and confidentiality of an electronic record. It is based on asymmetric crypto-system, which uses a private key to encrypt, and a public key to decrypt messages. A digital signature regime requires a trusted third party – Certifying Authority (CA) to verify and authenticate the identity of a subscriber (a person in whose name the Digital Signature Certificate is issued). These days, even smart cards may contain digital signatures of a subscriber.

Please answer the following Self Assessment Question.

Self Assessment Question 2	<i>Spend 3 Min.</i>
Define digital signature.	
.....	
.....	
.....	
.....	
.....	
.....	

2.4.7 Digital Certificates

Digital certificates are like trust certificates developed by a consortium led by Master Card and Visa. These digital certificates provide Secure Electronic Transaction (SET) to the users. SET allows a purchaser to confirm that the merchant is legitimate and conversely allows the merchant to verify that a credit card is being used by its owner. It also requires that each purchase request include a digital signature, further identifying the cardholder to the retailer.

SET is an improvement over SSL (Secure Sockets Layer) encryption method. SSL uses a private key to encrypt data that is then transmitted over the SSL connection. It is used to encrypt customer and credit card information when it is transmitted across the Internet. The message ‘You are about to view information over a secure connection’, is an indication that SSL is in use. Websites protected by SSL also carry a security symbol in the status bar, often in the form of a closed lock⁷.

A key difference between SSL and SET lies in the allocation of risk. SET makes the buyer responsible for proving her credentials, whereas, with SSL, the merchant takes responsibility for checking the buyer’s ability to pay and that the credit card account being referenced belongs to the user initiating the transaction⁸.

Please answer the following Self Assessment Question.

Self Assessment Question 3	<i>Spend 2 Min.</i>
The difference between SSL and SET lies in	

2.5 ONLINE PAYMENTS AND THE INFORMATION TECHNOLOGY ACT, 2000

The Information Technology Act, 2000 is a facilitating as well as an enabling Act. It facilitates e-commerce by enabling a digital signature regime. It is important to note that a digital signature regime not only authenticates electronic records but also plays an important role in electronic fund transfer.

2.5.1 Online Payments and Negotiable Instruments

When the Information Technology Act, 2000 came into effect on October 17, 2000 it was non-applicable to the negotiable instruments, like promissory note, cheque and bill of exchange but subsequently to facilitate e-commerce related transactions, the Central Government amended the Negotiable Instruments Act, 1881 and brought in forth the Negotiable Instruments (Amendment and Miscellaneous Provisions) Act, 2002 to recognise “a cheque in the electronic form” (e-cheque) and “a truncated cheque”. Therefore, to facilitate e-commerce related transactions, creation and acceptability of ‘e-cheque’ (a signer uses his digital signatures to sign an e-cheque) and payment or receipt on the basis of an electronic image of a ‘truncated cheque’ are now legally valid. Still, the negotiable instruments, like promissory note and bill of exchange are considered non-applicable under the Act.

Further banking transactions in India are being regulated by the Indian Central Bank – the Reserve Bank of India (RBI). Banks, which are going for e-cheque and truncated cheque facilities, have their secured proprietary IT networks in place conforming to the guidelines issued by the RBI from time to time on network banking.

For example, “Punjab National Bank” (PNB) was among the first banks to deploy the first image-based cheque clearing system in India. This provided clearance of inter-city cheques within 48 hours after the cheque is presented, at selected centres using cheque truncation, where there is image based cheque clearing system. Earlier it took about 15-20 days for clearance of outstation cheques. PNB was the first bank to launch the Intra Bank Inter City Cheque truncation project by using NCR’s ECPIX (Electronic Cheque Presentment with Image Exchange) technology. After a successful pilot run the system was introduced by connecting MICR Centres located at Lucknow, Nagpur, Jaipur, Kanpur, Ludhiana, Chandigarh, Jalandhar, Agra, Allahabad and Varanasi.

2.5.2 Establishment of Public Key Infrastructure (PKI)

The Information Technology Act, 2000 gives a legal mandate to the use of digital signatures to protect confidentiality of data protection. It is based on “asymmetric crypto system” [Section 2(1)(f)], wherein two different keys are used to encrypt and decrypt the electronic records. A private key is used to encrypt an electronic record and a public key is used to decrypt the said record. Private key is kept confidential and is to be used by the signer (subscriber) to create the digital signature, whereas the public key is more widely known and is used by a relying party to verify the digital signature and is listed in the digital signature certificate. The subscriber’s public key and private key constitute a functioning key pair. In an asymmetric crypto system, a private key is mathematically related to public key and it is computationally impossible to calculate one key from the other. Hence the private key cannot be compromised through knowledge of its associated public key.

It calls for establishment of a Public Key Infrastructure (PKI), which is based on mutual trust involving subscribers, Certifying Authorities and the Controller of Certifying Authorities (CCA). Public Key Infrastructure (PKI) represents a set of policies, processes, server platforms, software and workstations used for the purpose of administering Digital Signature Certificates (DSCs) and public-private key pairs, including the ability to generate, issue, maintain, and revoke public key certificates.

The Information Technology Act, 2000 provides for a statutory environment for establishment of a PKI to administer DSCs. It has provisions related to powers and functions of the Controller of Certifying Authorities [Sections 17-34 of The Information Technology Act], Certifying Authorities [Sections 35-39 of The Information Technology Act] and Subscribers [Sections 40-42 of The Information Technology Act]. The Controller of Certifying Authorities is a public body and acts as a regulator, whereas the Certifying Authorities could be any person, who fulfills all the licensing conditions put forth by the Controller of Certifying Authorities.

The success of this PKI model can be gauged from the fact that presently, in India there are seven licensed Certifying Authorities, namely, Safescrypt, Institute for Development & Research in Banking Technology (IDRBT), Tata Consultancy Services (TCS), National Informatics Centre (NIC), Mahanagar Telephone Nagar Limited (MTNL), (n) Code Solutions Ltd. and Department of Customs and Excise. Moreover, it is important to note that most of these Certifying Authorities are quite active in both business-to-consumer (B2C) and business-to-business (B2B) domain. For example, TCS is issuing DSCs for online Tax Filing, Northern Railway e-procurement, ONGC e-procurement etc.; MTNL is issuing free DSCs to MTNL Broadband customers; Safescrypt is issuing DSCs for EXIM (Export-Import)

purposes to vendors dealing with the Directorate General of Foreign Trade and (n) Code Solutions Ltd. is issuing DSCs to Northern Railway vendors (e-procurement).

Please answer the following Self Assessment Question.

Self Assessment Question 4

Spend 2 Min.

PKI is based on system.

2.6 FUTURE OF E-MONEY

The growth of e-commerce depends on effectiveness and acceptability of online payment mechanisms. Newer technologies are making online world a safer, convenient and cost effective medium to do monetary transactions.

What would be the result of these technological advances, replacing money with digital cash? This gradual e-monitisation can shrink cash demand and may affect the money supply and rate of interest in the long term. It will also restrict RBI's ability to conduct open market operations. The current trends, involving e-monitisation transactions through credit cards and Internet will require monetary policy to take not of the ongoing revolution in the payments and settlement system⁹. According to RBI the spread of e-monitisation does not require monetary and financial aggregates to be redefined, as long as transactions take place through the banking channel. However, e-money instruments, like credit cards, debit cards and stored-value cards have a potential to bypass the banking channels altogether and serve as parallel money suppliers.

Let us now summarize the points covered in this unit.

2.7 SUMMARY

- Online payment is fast emerging as a good alternative to physical mode of payments.
- Electronic fund transfer mechanisms are a reality now.
- Financial institutions and banks have transformed themselves into huge financial networks providing real time facilities to their customers.
- The traditional 'brick-and-mortar' banking model has given way to 'click- and-mortar' banking model which has made many online payment options available to a consumer.
- Significantly, the law also grants legal validity to such online payment instruments.

2.8 TERMINAL QUESTIONS

1. It is said that technology has made online world a safer, convenient and cost effective medium to do monetary transactions. Do you agree with this statement? Give reasons.
2. What is the role of public key infrastructure in creating trust in an online medium?
3. Explain the working of online payment mechanism?

2.9 ANSWERS AND HINTS

Self Assessment Questions

1. Electronic Clearing Services (ECS) 'credit scheme' and Electronic Clearing Services (ECS) 'debit scheme'.
2. It is a mechanism to ensure authenticity, message integrity, non-repudiation and confidentiality of an electronic record.
3. The allocation of risk.
4. Asymmetric crypto system.

Terminal Questions

1. Refer the unit and analyse the problem in your own way.
2. Refer to sub-section 2.4.2 of the unit.
3. Refer to section 2.4 of the unit.

2.10 REFERENCES AND SUGGESTED READINGS

1. SWIFT is a reliable. Secure. high-speed. global telecommunications network owned by its bank participants and used to transmit financial instructions in machine-readable formats worldwide.
2. CHIPS are a computerised funds transfer system operated by the New York Clearing House Association. It is used primarily for high-value, cross-border payments.
3. www.rbi.org.in
4. According to Power Shopper Report - IOAI Ecommerce Report 2005. 62% of online shoppers have used 'credit cards' for online purchase.
5. See: www.cybercash.com
6. See: www.ecoin.net
7. Rowley Jennifer. "E-business – Principles & Practice". p.249. Palgrave. 2002.
8. Ibid. p.252
9. Sharma Vakul. 2004 "E-commerce: A New Business Paradigm". in Legal Dimensions of Cyberspace. Ed. Verma. S.K. and Mittal Raman. ILI Publications.