Unit 5: Electronic Payment System

Introduction:

- Electronic payment system is the alternative to the coin or paper-based cash payment system to ease the user to make payment for their purchased goods or services over the network or internet and in absence of the physical presence.
- Initially cheque in bank payment systems were used to serve the purpose of the same but now in the era of internet and e-commerce, paying securely over the internet is important task for the electronic payment system.
- Currently credit cards are also in use for the payments over the network but still users are in doubt about trustworthiness and the security of their money because of the increase in the frauds which ultimately causes loss of value (money) either of users, merchant or participating banks.
- Present electronic payment system is too far from the ideal payment system because of the higher transaction cost, more fraudulent activities, and multiple parties are involved in the payment processing; simultaneously lacks user's acceptance, proper application plans and incompatible standards/specifications.
- A good payment system should satisfy the user's acceptance and merchants on the mass scale.

Characteristics of Electronic Payment System:

- **Applicability**: Applicability of payment system is the extent with which it is accepted as payment. Users should be able to pay for goods and services easily by using the system.
- **Easy to use:** The system should not be complex. A user from the remote area should be able to use the system.
- **Security**: It means e-payment systems should be able to resist attacks. Creation, modification and over spending of the value (money) should be protected.
- **Reliability:** It means the system should run smoothly in all scenarios. It should be free from failures.
- **Trust:** It is the degree of the confidence that the money and the personal information are safe.
- **Scalability:** Systems should be scalable by timely changes in the underlying infrastructure.
- **Convertibility:** It means funds represented in one mechanism should be easily convertible to funds in another mechanism.
- **Interoperability:** System should be operable in between multiple service providers.
- **Efficiency**: It means cost of the handling payment should be reasonable.
- **Anonymity:** It is a feature related to the privacy of the user. System should be able to protect the identity of the user.
- **Traceability:** System should be able to link spending with the users even if the identity of the user is anonymous.
- **Authorization Type:** It is considered good if a payment system is useful in both online and offline environments.

Stakeholders in Payment Systems:

The main stakeholders in payment systems are consumers, merchants, financial intermediaries and government regulators. Each of them has their own interests.

- **Consumers** are interested primarily in low-risk, low-cost, convenient, and reliable payment mechanisms. Consumers have demonstrated that they will not use new payment mechanisms unless they are equally or more beneficial to them than existing systems. In general, most consumers use cash, checks and/or credit cards. The specific payment system chosen will change depending on the transaction situation. For instance, cash may be preferred to keep certain transactions private and anonymous.
- **Merchants** are interested primarily in low-risk, low-cost, secure and reliable payment mechanisms. Merchants currently carry much of the risk of credit card fraud and much of the hardware cost of verifying payments. Merchants typically prefer payments made by cash, check and to a lesser extent credit card, which usually carry high fees and low truncation to be repudiated after the fact by consumers.
- **Financial intermediaries such** as banks and credit card networks are primarily interested in secure payment systems that transfer risks and cost to consumers and merchants, while maximizing transaction fees payable to them. The preferred payment mechanism for financial intermediaries is checking transfers, debit cards and credit cards.
- **Government regulators** are interested in maintaining trust in the financial systems. Regulators seek to protect against fraud and abuse in the use of payment systems, ensure that the interests of consumers and merchants are balanced against the interest of the financial intermediaries whom they regulate; and enforce information reporting laws.

Electronic Fund Transfer:

An electronic funds transfer (EFT) is a transaction that takes place over a computerized network, either among accounts at the same bank or to different accounts at separate financial institutions. PayPal, Online bill pay, and mobile payments are all examples of recent advancements in electronic payment. These changes are referred to as Electronic Funds Transfer.

Electronic funds transfer uses computer systems to move funds without the need for paper documents. Several ways of Electronic Funds Transfer are:

- Using a credit card or debit card (e.g., card swipe at supermarkets)
- Online Bill Payment (e.g., electricity bill payment using e-Sewa)
- Direct Debit (e.g., Monthly EMI of Car or House being deducted from bank account) •

Direct Deposit (e.g., Receiving salary in Bank Account)

Traditional vs. Electronic Payment:

Because the electronic funds process is simplified and entirely electronic, the cycle of transferring and paying money is much faster. Let's compare both traditional and electronic processes side by side.

- *Writing a Paper Check:*
    - The store manually deposits the check at their bank, and the bank sends the check to a clearing house, or an establishment where checks and bills are exchanged.
    - The clearing house sends the check to the customer's bank to be posted.
    - This is an older process that contains no electronic money transfer and would usually take around a week to complete the cycle.
- *Electronic Funds Transfer Process:*
    - When you use your card at a store, money is electronically transferred from your account and then it is simultaneously deposited in the store account.
    - This may involve an automated clearing house or sometimes a central electronic processor, which could add a day to process, but it is still much quicker.
    - The process for a consumer to set up online bill pay, direct deposit, or direct debit is fairly simple.
    - It usually involves providing data to the financial institutions, including your bank routing and account numbers, vendor account numbers you want to pay and dates of payments.

Point of Sale (POS):

- Point of Sale (or POS in its abbreviated form) is the phrase used to refer to the point or location—where a sales transaction takes place, such as a checkout line or retail counter.
- Point of Sale System is the term used for the combination of computer hardware and software that actually manages the sales transaction.
- There are many benefits of using the Point of Sale system over a traditional cash register, since a computer is able to capture, store, share, and report data (such as sales, payment, or customer information). A POS system saves time and duplication of work, and increases efficiency and accuracy in inventory, reporting, ordering, and providing excellent customer service.
- The main industries where you would find POS systems being used are retail, service and hospitality (restaurants, hotels, hair & beauty).

Types of Payment Systems:

The principal classification of EPSs is based on the form of money representation and the principle of money transfer. Existing payment systems can be divided into two groups:

- Token Based Payment Systems
- Credit Card Based Online Payment System

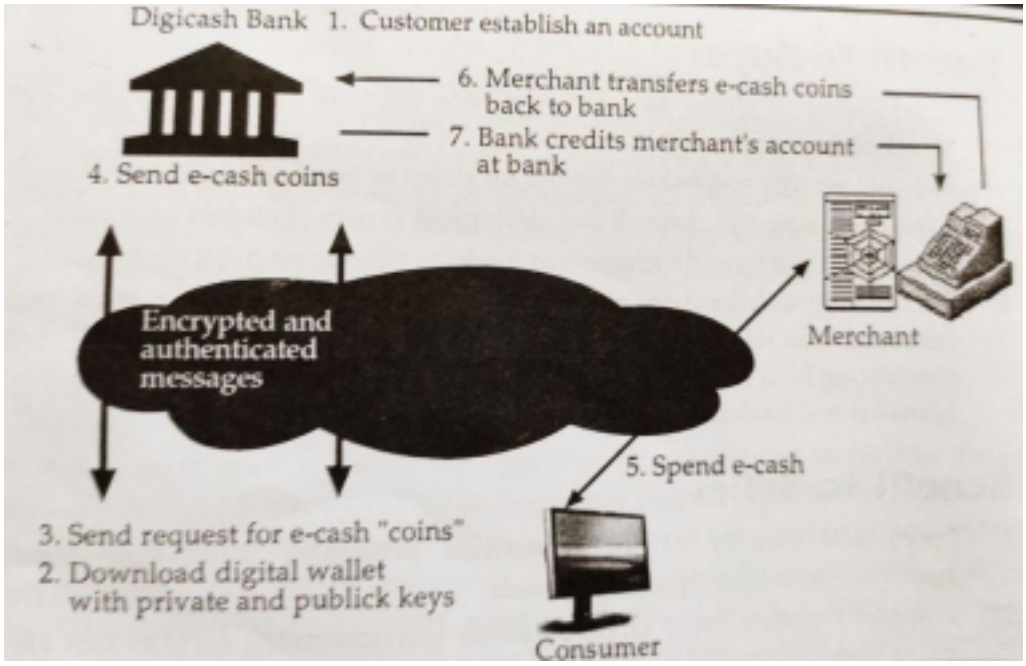
Token Based Payment System:

Electronic tokens are electronic forms of payments backed by a bank or financial institutions to handle smaller payments. Simply stated, electronic tokens are equivalent to cash. Electronic token varies in the protection of privacy and confidentiality of the transactions.
Electronic tokens are of three types. They are:

- Electronic Cash (e-cash)
- Electronic Cheque (e-cheque)
- Smart Cards

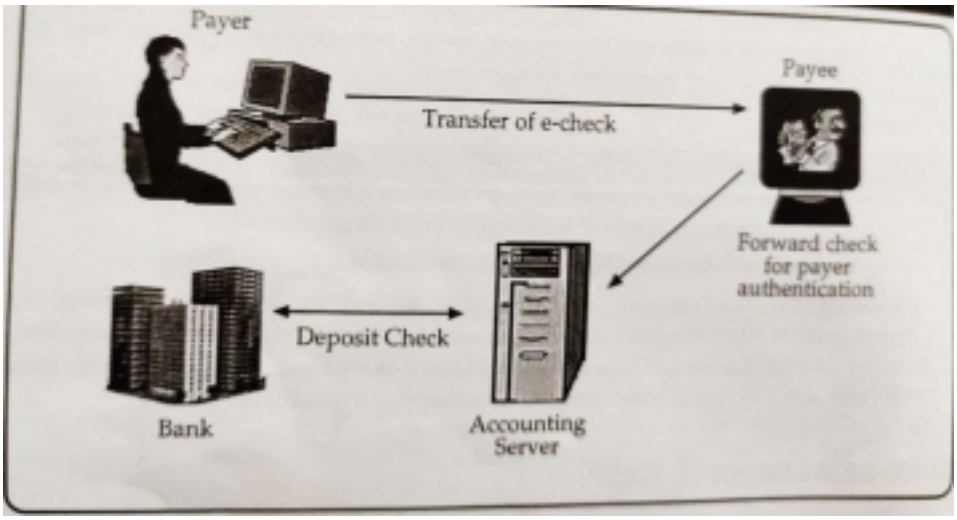
E-Cash (Digital Cash):

- Electronic cash is a new concept in online payment systems because it combines computerized convenience with security and privacy that improve on paper cash.
- Its versatility opens up a host of new markets and application.
- E-cash is an electronic or digital form of value storage and value exchange that has limited convertibility into other forms of value. It requires intermediaries to convert.



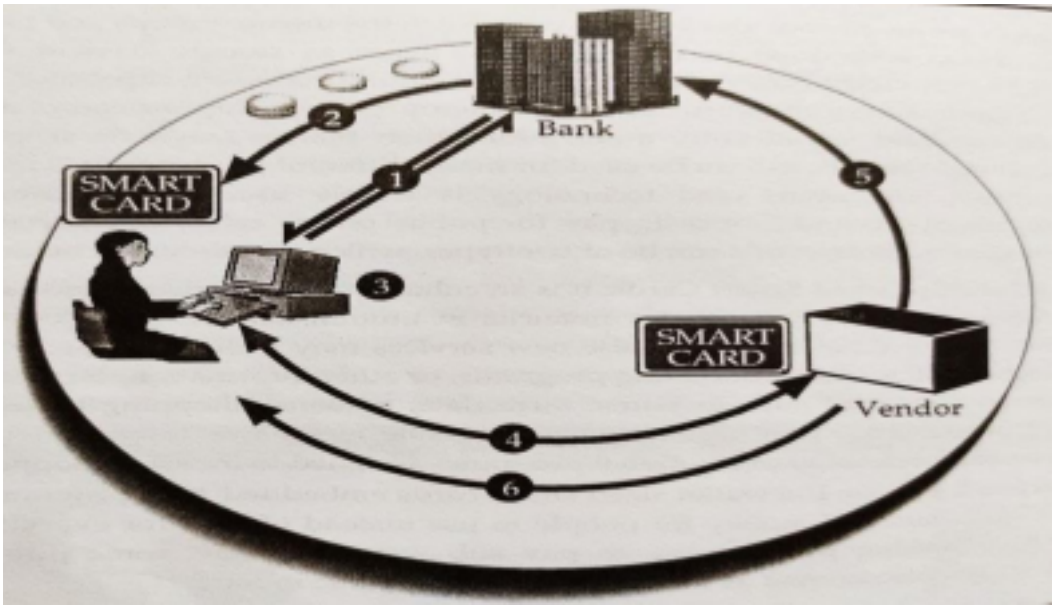
Electronic Cheque (E-Cheque):

- It's simply an electronic version of a paper check. An e-cheque uses the same legal and business protocols associated with traditional paper checks.
- Electronic cheque fulfills the needs of many business organizations, which are previously exchanging paper-based cheques based on the vendors, consumers and government. • Working process of e-cheque is the same as that of the traditional cheque payment system. • An account holder will issue the electronic cheque document which contains the information such as name of the account holder, payee name, name of the financial institution; payer account number and the amount of payment on the cheque.
- Most of the information is in uncoded form. Like a paper check, e-cheques also bear the digital equivalent of signature, which is called digital signature.
- It is a new payment instrument that combines high-security, speed, convenience, and processing efficiencies for online transactions.



Smart Card Based Payment Systems:

- Smart Cards are credit card sized plastic cards with the memory chips and in some cases, with microprocessors embedded in them so as to serve as storage devices for much greater information than credit cards with inbuilt transaction processing capability.
- A single smart card can be used for many different purposes. It is more durable and is less expensive than credit cards.
- The smart card technology is widely used in countries such as Japan, Germany, Singapore and France to pay for public phone calls, transportation and shopper loyalty programs. • Consumers can load money into an account on the card by using an automatic teller machine (ATM) or by placing the card in a slot in a specially equipped computer.
- The embedded chip keeps track of how much money is added to and withdrawn from the account • Smart cards are already quite popular for online sales in some international markets.



Risks Associated with EPS:

- Tax Evasion:
    - Businesses are required by law to provide records of their financial transactions to the government so that their tax compliance can be verified.
    - Unless a business discloses the various electronic payments, it has made or received over the tax period, the government may not know the truth, which could cause tax evasion.
- Fraud:
    - Electronic payment systems are advantageous to fraud.
    - If there is no proper way of verifying the true identity of the maker of the transaction, identity can easily be stolen.
    - As long as the password and security questions are correct, the system assumes you are the right person.
- Impulse Buying:
    - Electronic payment systems encourage impulse buying, especially online.
    - You are likely to make a decision to purchase an item you find on sale online, even though you had not planned to buy it, just because it will cost you just a click to buy it through your credit card.
    - Impulse buying leads to disorganized budgets and is one of the disadvantages of electronic payment systems.
- Payment Conflict:
    - Payment conflicts may arise if the payments are done by an erroneous automated system.
    - This is especially common when payment is done on a regular basis to many recipients.
    - If you do not check your pay slip at the end of every pay period, for instance, then you might end up with a conflict due to technical glitches.
- Information Disclosure:
    - Must ensure and maintain privacy of customer data.
    - Users must be assured against unauthorized data loss, access and tampering.
    - Need to use proper security measures to prevent information disclosure.
- Credit Risks:

- Failure to settle and manage the electronic transaction by banks may raise payment risks from other stakeholders of the payment system.
- Digital central banks must develop policies to deal with such possibilities.

Debit Cards:

- Debit cards are linked to your bank account so the money spent is automatically deducted from your account.
- Debit cards can be used to pay bills and day-to-day expenses, and monthly statements provide a good overview of the expenditure.
- The balance of the bank goes down with each debit card transaction.

Credit Cards:

- A credit card is an account that lends money to the consumer, meaning consumers are allowed to purchase goods or services on credit. Both consumers and merchants must register with a bank.
- Credit card represents an account that lends money to the consumer, permits consumers to purchase goods or services on credit, and allows consumers to make payments to multiple vendors at one time.
- Over the years, credit cards have become one of the most common forms of payment for e-commerce transactions.

Credit Card Based Online Payment System:

- A credit card is termed as a payment card, representing the majority of online payments because people are familiar with them, and merchants avoid the expense of a paper invoicing system. • In this card payments are simple anywhere and, in any currency, thus it matches the global reach of the internet.
- To avoid the complexity associated with token-based payment methods, consumers and vendors are also looking at credit card payment on the internet as one possible time-tested alternative. • There is nothing new in the basic process. Without doubt, the basic means of payment used and initiated via the internet for consumer transactions till date is the credit card.
- If consumers want to purchase a product or service, they simply send their credit card details to the service provider involved and the credit card organization will handle this payment like any other.

We can break credit cards payment on online networks into three basic categories:

- Payments using Plain Credit Card Details:
  - The easiest method of payment is the exchange of unencrypted credit cards over a public network such as telephone line or the internet.
  - The low level of security inherent in the design of the internet makes this method problematic.
  - Authentication is also a significant problem, and the vendor is usually responsible to

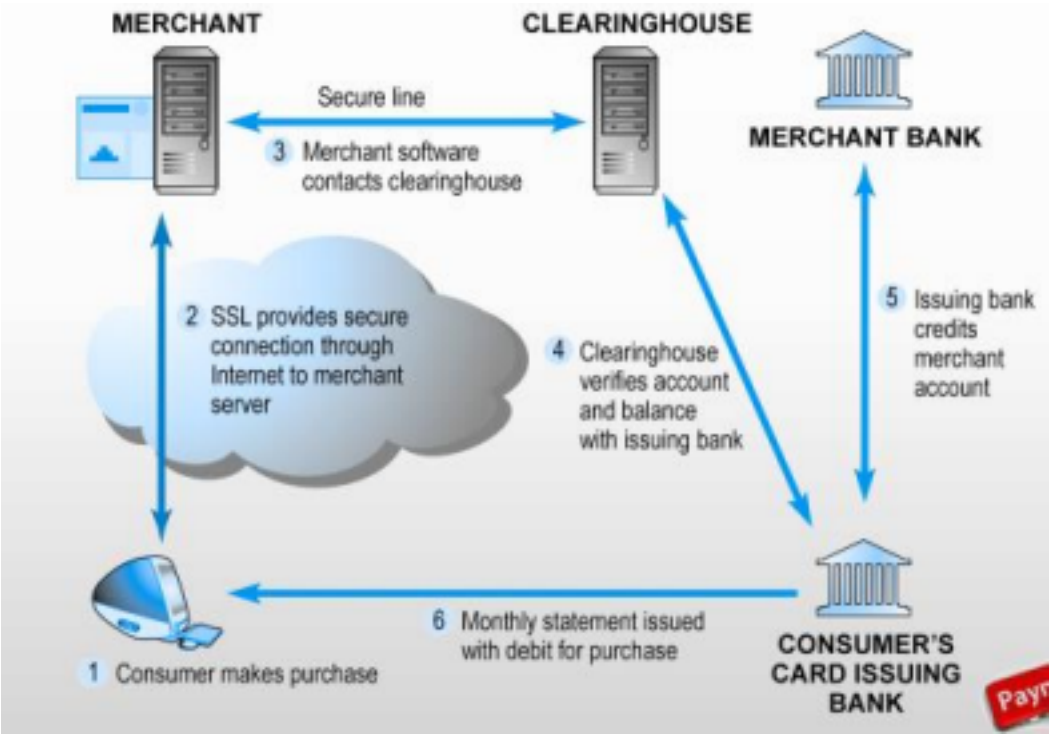
ensure that the person using the credit card is its owner. Without encryption, there is no way to do it.

- Payments using Encrypted Credit Card Details:
    - It would make sense to encrypt your credit card details before sending them out, but even then, there are certain factors to consider.
    - One would be the cost of credit card transactions itself. Such a cost would prohibit low value payments (micro-payments) by adding costs to the transactions.
- Payments using Third Party Verification:
    - One solution to security and verification problems is the introduction of a third party; a company that collects and approves payments from one client to another.
    - After a certain period of time, one credit card transaction for the total accumulated amount is completed.

The participants involved in credit card payments include:

- *Customer/Cardholder:* The consumer doing the purchase, using a credit card that has been issued by its issuer.
- *Issuer:* The financial institution (i.e., bank) that issues the card to the cardholder. The issuer guarantees payment for authorized transactions.
- *Merchant:* The merchant offers the goods and services, and has a financial relationship with the acquirer.
- *Acquirer:* The financial institution of the merchant. The acquirer processes credit card authorizations and payments.
- *Clearing House:* The credit card processing centers (clearinghouse) are institutions that handle verification of accounts and balances.

How Credit Cards Work?



• When a consumer wants to make a purchase, he or she adds the item to the merchant's shopping cart.

• When the consumer wants to pay for an item in the shopping cart, a secure tunnel through the Internet is created using SSL. Using encryption, SSL secures the session during which credit card information will be sent to the merchant and protects the information from the interlopers on the Internet.

• SSL does not authenticate either the merchant or the consumer. The transaction parties have to trust one another. Once the consumer credit card information is received by the merchant, the merchant software contacts a clearinghouse.

• A clearing house verifies account balances. The clearing house contacts the issuing bank to verify the account information.

• Once verified the issuing bank credits the account of the merchant at the merchant's banks (usually occurs in a batch process and it may happen in a few hours, or even in a few days).

• Once the merchant has received the payment gateway's digital signature; he will ship the goods to the cardholder knowing that the customer transaction has been approved.

Advantages:

- The system is familiar to users and was widely used before the advent of e-commerce, thus maintaining the user's confidence.
- Transaction costs are hidden from users (i.e., basically met by sellers).
- Payment is simple anywhere and, in any currency, thus matching the global reach of the internet.
- The credit issuing company shares the transaction risk, helping overcome consumer's fear and reluctance to buy goods they have not actually seen, from sellers they do not know.
- Cash back: Many banks offer cash back opportunities if you use your card to pay monthly bills (electricity) or for grocery purchases. Besides, online shopping portals too have cash back offers on various products.
- Reward points: Credit card companies offer reward points for any purchases you make with your card.
- EMIs: If you are making a big purchase (TV, refrigerator, laptop), you can easily convert it to affordable monthly installments. Banks usually charge interest for conversion to EMIs.
- Grace period: You can defer your payments till your bill is due. Banks offer a maximum 50-day grace period for paying back your dues.
- Safety: Credit cards are safer than debit cards as in case of fraud you are not out of money immediately. Payment gateways like Visa, Mastercard also offer additional password protection while using the cards online.

Disadvantages:

- Relatively high transaction cost makes them impractical for small value payments.
- They cannot be used directly by individuals to make payments to other individuals.
- Protecting the security of transaction is vital, especially in the virtual world there is no payment guarantee to the merchant by a bank.
- All of the people do not have access to credit cards, so it can’t be treated as a default payment processing method for all electronic transactions.

Payment Gateway:

- A payment gateway is the service that processes electronic transactions such as credit card transactions.
- When customers buy something from an online store, they enter their credit card numbers during the checkout process. E-commerce sites sends that credit card information to payment gateway to authorize the transaction and process the payment.
- If the credit card information submitted to the payment gateway matches the information on file with the credit card company and the charge is approved, the payment gateway will then transfer the money from the customer's credit card into merchant's account.
- The detailed working mechanism is as follows:
    - A customer places an order on a website by pressing the "Submit Order" or equivalent button. ○ If the order is via a website, the customer's web browser encrypts the information to be sent between their browser and the merchant's web server. This is usually done via SSL (Secure Socket Layer) encryption.
    - The merchant then forwards the transaction details through to their payment gateway. ○ The payment gateway which receives the transaction information from the merchant forwards it to the merchant's acquiring bank.
    - The acquiring bank then forwards the transaction information to the issuing bank for authorization.
    - The card issuing bank receives the authorization request and sends a response back to the payment gateway with a response: approved or declined.

Digital Wallet:

- Consumers are becoming more enthusiastic about online shopping and they can do shopping repeatedly.
- Entering detailed shipping and payment information each time they make online purchases may be boring for them.
- To address these concerns, many electronic commerce sites include a feature that allows a customer to store name, address, and credit card information.
- An electronic wallet (sometimes called an E-wallet/Digital Wallet), serving a function similar to a physical wallet, holds credit card numbers, electronic cash, owner identification, and owner contact information and provides that information at an electronic commerce site's checkout counter.
- Electronic wallets give consumers the benefit of entering their information just once, instead of having to enter their information at every site with which they want to do business.

Most important functions of a digital wallet are to:

- Authenticate the consumer through the use of digital certificates or other encryption methods. • Store and transfer value
- Secure the payment process from the consumer to the merchant.

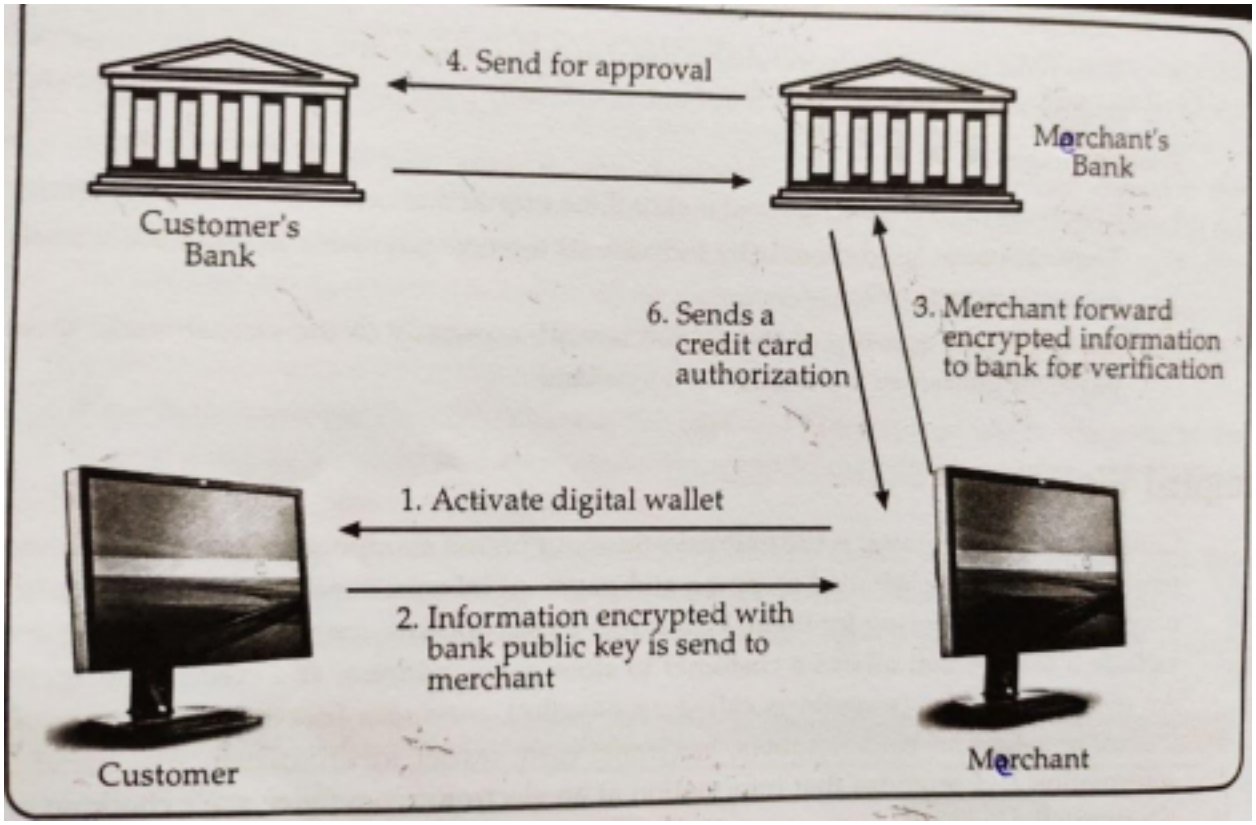
Digital wallets would support payments using a regular credit card, digital cash, digital credit card or digital check.

Electronic wallets fall into two categories based on where they are stored:

- Server- side Electronic Wallet:
    - A server-side electronic wallet stores a customer's information on a remote server belonging to a particular merchant or wallet publisher.
    - The main weakness of server-side electronic wallets is that a security breach could reveal thousands of users' personal information including credit card numbers.
- Client-Side Wallet:

- A client-side electronic wallet stores a consumer's information on his or her own computer.
- Many of the early electronic wallets were client-side wallets that required users to download the wallet software.

Payment processing by using electronic wallet is shown in the figure below:



E-Sewa:

- E-Sewa is the first online payment gateway of Nepal. It is an associate service of F1Soft International launched on 21 January 2010. Its headquarters is located at Hattisar, Kathmandu, Nepal.
- eSewa is a digital wallet. It facilitates its users to pay and get paid online.
- “e” means electronic, Sewa means "Service”: Electronic Service
- Registration and Merchant payment is free of cost, and can be accessed using mobile application or web browser.
- Services like funds transfer to banks may incur charges depending on the policies adopted by eSewa.

- To register with eSewa, customer needs:
    - Citizenship card (scanned or photocopy) and
    - Passport size photo (scanned copy or original)
- eSewa is available in two modules: B2B and B2C.
- Currently, it provides following online services:
    - Sending and Receiving Money
    - Online Shopping
    - Payment of Utility Bills
    - Purchase of Air Tickets and Movie Tickets
    - Purchase of Recharge Cards and Mobile Top Up
    - Payment of School and College Bills
    - Payment of Internet Service Bills
    - Subscription of Newspapers and Magazines
    - Payment of Credit Card Bills
    - Facility of all eSewa services through mobile phone (mSewa)
    - Withdraw funds from local bank account
    - Upload funds to local bank
- eSewa offers various ways to load/prefund your eSewa account:
    - Internet Banking:

      You can transfer funds to your eSewa wallet using internet banking from a bank that is partnered with eSewa. For this, customers will need to have an Internet banking enabled account with one of the partner banks.
    - Mobile Banking:

      If you have a mobile banking enabled account with one of the banks then you can prefund your eSewa account using mobile banking.
- For the customers who don't have an account in the above banks or the customers without mobile banking & internet banking can load their eSewa account through the process of counter deposit.

Online Banking facilities in Banks of Nepal:

What is Internet Banking/e-Banking/Online Banking/Virtual Banking?

- Internet banking/e-banking is an electronic payment system that enables customers of a bank or financial institution to conduct a range of financial transactions through the financial institution's website.
- Using internet banking, we can obtain our account balances, a list of recent transactions, various utility bill payments, and funds transfers between accounts.
- We can access all these facilities from anywhere and anytime using mobile or computer. •

It's less time consuming, and very safe and secure.

- Nowadays, mobile banking is also gaining popularity but it shouldn't be mistaken with internet banking.
- In mobile banking, we use our smartphone's application or internet but the two have significant differences. Both are the modes of e-Banking.

E-banking services includes: -

- ATMs
    - Cash Withdrawal
    - Balance Inquiry
    - Fund Transfer is not available.
- PoS Terminals
    - Financial transactions are made via Cards.
    - Cash is debited from the client's account(s).
    - Cash cannot be deposited.
- Tele-Banking
    - Account Status check
    - Balance Inquiry
    - No fund transfer facility.
- SMS-Banking (Mobile Banking)
    - Similar to Tele-Banking except telephone
    - Cell phone is required instead of telephone.
- Online Banking / Internet Banking
    - Viewing account balances, recent transactions
    - Bank statements
    - Funds transfers between the customer's linked accounts
    - Paying third parties, including bill payments and third-party fund transfers
    - Many more including non-transactional tasks and transact banking tasks

History of Online Banking in Nepal:

- Establishment of the first Joint Venture Bank, Nepal Arab Bank Limited (now NABIL Bank), in 1984 was the first step towards e-banking in Nepal. It introduced Credit Cards in Nepal in early 1990. • Automated Teller Machine (ATM) was first introduced by another Joint Venture Bank, Himalayan Bank Ltd. in 1995. Himalayan Bank Limited was also the first bank to introduce Tele-Banking (Telephone Banking) in Nepal.
- Internet-Banking was first introduced by Kumari Bank Limited in 2002.
- Laxmi Bank Limited was the first bank to introduce SMS-Banking (or Mobile Banking) in Nepal in 2004.
- The channels in e-Banking available in Nepal are Automated Teller Machines (ATM), Point of Sales (PoS), Telephone Banking (Tele Banking), Internet Banking, Mobile Banking (SMS Banking).

Present Scenario of Online Banking in Nepal:

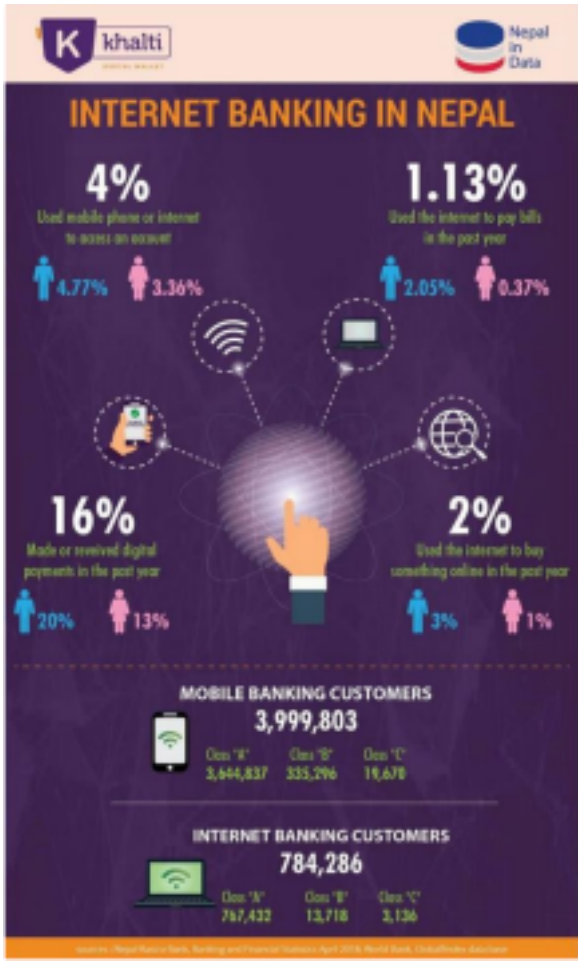


Fig: Online Banking Statistics in Nepal in 2018 (Khalti Digital Wallet)

Some of the services accessible through Internet banking in Nepal are:

- Online tax payment
- Access the account to check balance,
- Online trading of shares,
- Online remittance of money,
- Electronic bill payment system,
- Transfer of funds from one customer's account to other, etc.

Important Security Tips to Use Online Banking Safely:

- Access your bank's website/web portal/application only by typing the URL in the address bar of your browser
- Clicking on any links from email or SMS to access the bank's site may lead to a breach of your personal information.
- No banks will send you an SMS/email or call you over the phone to provide your personal information or OTP. So, make sure to avoid such scams.
- To improve your security, update your operating system, mobile application, and use the latest version of your browser.
- Also, make sure to scan your computer regularly with antivirus and ensure that the firewall is enabled.
- If possible, change your Internet Banking password at a regular interval.
- Monitor your transactions and activity log.
- Avoid accessing your online banking services from shared PCs, cyber cafes, or untrusted devices.

Bitcoin Payment:

- Bitcoin is a new currency that was created in 2009 by Satoshi Nakamoto.
- Transactions are made with no middle men - meaning, no banks. There are no transaction fees and no need to give your real name. So, Bitcoin can be used to pay anonymously. • International payments are easy and cheap because bitcoins are not tied to any country or subject to regulation.
- Small businesses may like them because there are no credit card fees. Several marketplaces called Bitcoin exchanges allow people to buy or sell bitcoins using different currencies.
- People can send bitcoins to each other using mobile apps or their computers. It's similar to sending cash digitally.
- Bitcoins are stored in a "digital wallet," which exists either in the cloud or on a user's computer. • The wallet is a kind of virtual bank account that allows was to send or receive bitcoins, pay for goods or save their money.
- Bitcoins have several different features:
    - It's decentralized (no single authority)
    - Easy to set up (no burden for maintaining accounts in banks or financial institutions) ○ It's Anonymous (no personal identification, can have multiple bitcoin addresses) ○ Completely Transparent (everyone can know the bitcoins available with each bitcoin address, just can't access it)
    - Free Transactions
    - Faster payment processing
    - Non-refundable unless the receiver returns it