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Introduction to Cyber Security

UNIT- IV

E - Commerce and Digital Payments

Department of Computer Science & Engineering
RV College of Engineering, Bangalore-560059

Unit -IV	8 Hrs
E - Commerce and Digital Payments Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007	

- **e-Commerce or Electronic Commerce or internet commerce** means buying and selling of goods, products or services over the internet.
- It encompasses a wide variety of data, systems and tools for online buyers and sellers, including mobile shopping and online payment
- Transaction of money, funds, and data are also considered as E-commerce.
- Business to Business (B2B), Business to Customer (B2C), Customer to Customer (C2C), Customer to Business (C2B). The standard definition of E-commerce is a **commercial transaction which is happened over the internet.**
- Ecommerce security refers to **the measures taken to protect your business and your customers against cyber threats**.

Types of E-Commerce Models

1. **Business to Business**

Ex. online transactions only involve the manufacturers, wholesalers, retailers etc

2. Business to Consumer

Ex. Amazon, Flipkart, Jabong etc

3. Consumer to Consumer

Ex. OLX, Quikr

4. Consumer to Business

Ex. IT freelancer who demos and sells his software to a company.

Examples of E-Commerce:

- Amazon
- Flipkart
- eBay
- Fiverr
- Upwork
- Olx
- Quikr

e-commerce is one of the fastest growing industries in the global economy

Examples for e-commerce transactions

- **B2B (Business-to-Business)**:
- **Example**: IBM and SAP Partnership
- **Description**: IBM provides hardware and software solutions, while SAP offers enterprise resource planning (ERP) systems. Both companies collaborate to offer comprehensive business solutions to other businesses. IBM and SAP do not directly sell products or services to individual consumers; instead, they cater to other businesses.

- **B2C (Business-to-Consumer)**:
- **Example**: Amazon.com
- **Description**: Amazon is a prime example of a B2C business model. It sells a wide range of products directly to individual consumers through its online platform. Customers can browse, select, and purchase products such as electronics, books, clothing, and groceries from Amazon's website or mobile app.

Examples for e-commerce transactions

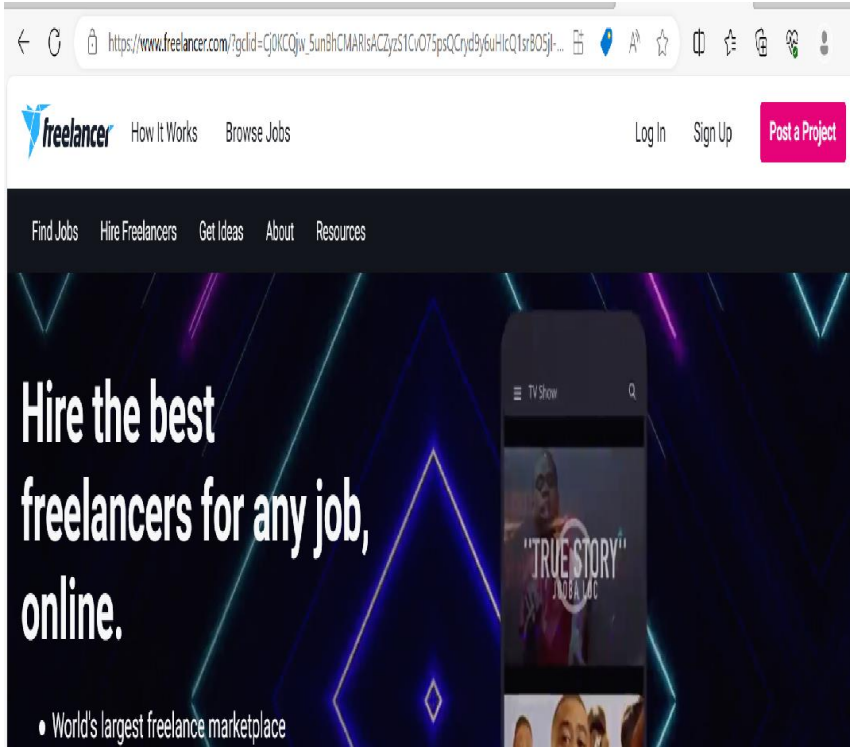
C2C (Consumer-to-Consumer):

- **Example**: eBay,olex
- **Description**: eBay operates as an online marketplace where individual consumers can buy and sell products to each other. Sellers list items for sale, and buyers can browse through listings, place bids, or purchase items at a fixed price. eBay facilitates the transaction by providing a platform for communication, payment processing, and dispute resolution between buyers and sellers.

C2B (Consumer-to-Business):

- **Example**: Influencer Marketing Platforms like Famebit (by YouTube) or SocialPubli.
- **Description**: In a traditional B2C model, businesses advertise their products or services to consumers. However, in a C2B model, individual consumers, or influencers, offer their services to businesses. These influencers have significant online followings and leverage their personal brand to promote products or services of businesses through sponsored content, product reviews, or endorsements. Platforms like Famebit or SocialPubli connect businesses with relevant influencers, facilitating collaborations and transactions. Businesses benefit from the authentic and targeted promotion provided by influencers, while influencers monetize their online presence by partnering with brands.

Identify B2B B2C C2C C2B



- Freelancer etc. are C2B where customers provide freelancing work to Business.

- When a consumer sells their own products or services to a business or organization. For example, an influencer offers exposure to their online audience in exchange for a fee, or a photographer licenses their photo for a business to use.

Identify B2B B2C C2C C2B

- Amazon, Flipcart, Bigbasket etc.
- This B2C – Business to customer
- When a business sells a good or service to an individual consumer. For example, when you buy a pair of shoes from an online retailer like Nike.

e-commerce continues to grow, with global ecommerce sales projected to reach $8 trillion and account for 23.6% of all retail activity by 2026!!!

Advantages of E-Commerce

- E-commerce provides the sellers with a global reach. They remove the barrier of place (geography) Now sellers and buyers can meet in the virtual world, without the hindrance of location.
- Electronic commerce will substantially lower the transaction cost. It eliminates many fixed costs of maintaining brick and mortar shops. This allows the companies to enjoy a much higher margin of profit.
- It provides quick delivery of goods with very little effort on part of the customer. complaints are also addressed quickly. It also saves time, energy and effort for both the consumers and the company.
- A customer can shop 24×7. The website is functional at all times, it does not have working hours like a shop.
- without any intermediaries.

Disadvantages of E-Commerce

- The start-up costs of the e-commerce portal are very high.
- Although it may seem like a sure thing, the e-commerce industry has a high risk of failure.
- At times, e-commerce can feel impersonal. lack of a personal touch can be a disadvantage for many types of services and products like interior designing or the jewelry business.
- Security is another area of concern. Only recently, we have witnessed many security breaches where the information of the customers was stolen. Credit card theft, identity theft etc. remain big concerns with the customers.
- Then there are also fulfilment problems. Even after the order is placed there can be problems with shipping, delivery, mix-ups etc. This leaves the customers unhappy and dissatisfied.

Components of e-commerce

- **User:**This may be individual / organization or anybody using the e-commerce platforms.
- **E-commerce vendors:**This is the organization/ entity providing the user, goods/ services. E.g.: www.flipkart.com.
- Technology Infrastructure:This includes Server computers apps etc.

Computers, Servers and Database

These are the backbone for the success of the venture. They store the data/program used to run the whole operation of the organization.

Internet/ Network: This is the key to success of e-commerce transactions.

- Internet connectivity is important for any e-commerce transaction to go through.
- The faster net connectivityleads to better e-commerce. Many mobile companies in India have launched 4G services.
- **Web Portal:**This shall provide the interface through which an individual/organization shall perform e-commerce transactions.
- **Payment Gateway**:Credit / Debit Card Payments, Online bank payments, Vendors own payment wallet, Third Party Payment wallets, like SBI BUDDY or PAYTM, Cash on Delivery (COD) and Unified Payments Interface (UPI).

Components of e-commerce contd..

- E-commerce Vendors further needs to ensure following for better, effective and efficient transaction.
- **Suppliers and Supply Chain Management:** For effectiveness, they need to ensure that –
  - Enoughand the right goods suppliers.
  - Suppliers should be financially and operational safe.
  - Suppliers are able toprovide real-time stock inventory.
  - Order to delivery time is short.
- **Warehouse operations:** From this place online retailers pick products, pack them and prepare those products to be delivered. Many e-commerce companies are investing huge amounts of money in automating the warehouses.
- **Shipping and returns:** Shipping is supplementary and complementary to warehouse operations. Fast and safe returns is also very important for e- commerce vendors.
- **E-Commerce catalogue and product display:** Proper displayincluding product details, technical specifications, is necessary for better sales.
- –**Marketing and loyalty programs:** Loyalty programs is to establish a long- term relationship with customer.E.g. In airline industry, customer can get good discount/ free tickets based on loyalty points accumulated.
- **Showroom and offline purchase:** Few e-commerce vendors over period have realized that their products can be sold fast if customers are able to feel / touch / see those products. These vendors have opened outlets for customer experience of their products.

- **Different Ordering Methods:** These are the way customer can place his/her order, say Cash on Delivery is today most preferred method.
- **Guarantees:** The product/service guarantee associated with product/service being sold e.g. Money back guarantees.
- **Privacy Policy:** Customers are very concerned about the information that they are sharing. E - commerce vendors need to clearly explain them what the vendor plan to do with the information they have collected.
- **Security:** Vendor website needs to state that online data used to transact is safe that vendors is using appropriate security including security systems like SSL (Secure Socket Layer). This guarantees that the data provided by customer will not fall into the hand of a hacker.

Elements of e-commerce security

- Security elements that needs to be preserved are
- Confidentiality
- Integrity
- Availability
- Non-repudiation
- Utility
- Authenticity

cyber security: importance in e-commerce

- It allows to **protect company and customers** from cybercriminals.
- cybersecurity is a concept that encompasses a set of strategies, tactics and technologies that aim to defend systems, digital services and online electronic data belonging to consumers, institutions and companies against theft, manipulation, blocking, disorientation and other damage caused by cybercriminals.
- primarily aimed at protecting consumer data.
- Prevent data such as address, telephone, CPF, credit card numbers and navigation data.
- cybersecurity must be dedicated to protecting servers, databases, networks and endpoints.
- It must find vulnerabilities and fix them before cybercriminals do.

cybersecurity is premised on ensuring:

- **Reliability**: only authorized persons can have access to systems and data;
- **Integrity**: data **cannot be altered or deleted** without authorization;
- **Authenticity**: The **identity of the people** who send data to your company must be preserved.

Why cyber security matters for e-commerce

- Protect **company and customers** from cybercriminals.
- In order for people to be able to shop at your online store, they need to **feel secure enough to enter personal details and payment details.**
- customers' data and customer's information need to be careful.
- Have a cyber security policy in place
- Create strong passphrases
- Use a secure e-commerce platform
- Don't fall for phishing scams

Reference

http://www.cert-in.org.in/

https://cert-in.org.in/s2cMainServlet?pageid=Pre_Sec_Tips1

https://cert-in.org.in/

- Most industries have deployed internet technologies as an essential part of their business operations.
- online banking customers the facilities to access and manage their bank accounts easily and globally.
- Deployed more frequently over the past few decades to support and improve the operational and managerial performance
- internet banking, e-banking or virtual banking

Threats to Online Banking

- Confidentiality, privacy and security of internet banking transactions and personal information are the major concerns.
- steal login data.
- Phishing, pharming, Cross-site scripting, adware, key loggers, malware, spyware, Trojans and viruses.

Best practices for online Banking Users

- Protect your PC.
- Protect your personal information
- Use the Internet cautiously
- Stay alert
- Prompt reporting of suspicious activity

Protect your PC:

- Anti-virus software, anti-spyware security software, firewalls, operating system and internet browser up to date

Protect your personal information:

- hard-to-guess security access codes
- Change your security access codes periodically
- Memorize your security access codes, avoid writing them down
- Do not disclose to ANYONE your security access codes
- Never leave your PC unattended when logged into Online Banking
- "Log-off" button when finished using the e-banking services

Use the Internet cautiously:

- Always access Online Banking internet only by typing the URL in the address bar of your browser.
- Never attempt to access Online Banking internet through an external link of unknown or suspicious origin appearing on other websites, search engines or e-mails.
- check for the Bank's Security Certificate details and the various signs (e.g., green address line and Lock, HTTPs)
- Ignore and delete immediately suspicious fraudulent e-mails
- Never click on a link contained in suspicious e-mails
- Avoid using Online Banking from public shared PCs

Stay alert:

- Sign-on to Online Banking regularly and review your account transactions, checking for any fraudulent activity on your account (e.g. transactions you do not recognize)
- Keep track of your last log-on date and time, displayed at the top left side of the Online Banking Home page
- Once logged into Online Banking, you can also monitor the actions performed online

Prompt reporting of suspicious activity:

- Contact your bank immediately, if you think someone knows your security access code or in case of theft of your code/ money or in case you have forgotten your credentials.
- Forward any suspicious e-mails to the bank on their phishing reporting email as well as on CERT-In email incident@cert-in.org.in
- Your prompt action is crucial to prevent any (further) damage

Mobile Banking

- usage of Smartphones
- use of a Smartphone or other cellular device to perform online banking tasks

Threats to Mobile Banking

Mobile Banking Malwares

prevention against Malware attacks:

- Download and use anti-malware protection for the mobile phone or tablet device.
- Keep the Banking App software up to date
- Use security software.
- Reputed applications should only be download onto the smart phone

Phishing/Smishing/Vishing Attack

An attacker attempts phishing on to a mobile phone through SMS (Short Message Service), text message, telephone call, fax, voicemail etc. with a purpose to convince the recipients to share their sensitive or personal information.

Prevention against phishing attacks

- Emails or text messages asking the user to confirm or provide personal information (Debit/Credit/ATM pin, CVV, expiry date, passwords, etc.) should be ignored.
- SSL (Secure Sockets Layer) and TLS (Transport Layer Security) should be adequately implemented in mobile banking apps thus helping to prevent phishing and man-in-the-middle attacks.

Best Practices for Users to remain safe

- Enable Passwords On Devices
- IPIN should not be stored on the user's mobile phone.
- report the loss of mobile phone to the bank for them to disable the user's IPIN and his access to the bank's account through Mobile Banking app.
- When downloading the Bank's Mobile app in the mobile device, the user should go to a trusted source such as the App Store on the iPhone® and iPod touch® or Android Market.

Security of Credit Card and Debit Card

Security Threats

- Identity theft
- The fraudulent acquisition and use of person's private identifying information, usually for financial gain.
- It can be divided into two broad categories: Application fraud and Account takeover

Application fraud:

- criminal uses stolen or fake documents to open an account in someone else's name.
- Criminals may try to steal documents such as utility bills and bank statements to build up useful personal information.

Account takeover:

- criminal tries to take over another person's account, first by gathering information about the intended victim, and then contacting their card issuer while impersonating the genuine cardholder, and asking for the mail to be redirected to a new address.
- The criminal then reports the card loss and asks for a replacement to be sent.

Introduction to digital payments

Digital payments

- A digital payment, sometimes called an electronic payment, is the transfer of value from one payment account to another using a digital device or channel.
- This definition may include payments made with bank transfers, mobile money, QR codes, and payment instruments such as credit, debit, and prepaid cards. Digital payments can be partially digital, primarily digital, or fully digital.phone, POS (Point of Sales) or computer, a digital channel communications
- funds are transferred much faster relative to traditional payment methods like checks.
- ePayments allow users to make payments online at any time, from anywhere in the world, and also remove the need to go to banks.

- As part of the '**Digital India**' campaign, the government has an aim to create a 'digitally empowered' economy that is '**Faceless, Paperless, Cashless**'.

A partially digital payment

might be one in which both payer and payee use cash via third-party agents, with payment providers transferring the payment digital between the agents

A primary digital payment

might be one in which the payer initiates the payment digital to an agent who receives it digitally, but the payee receives the payment in cash from that agent.

A fully digital payment

is one in which the payer initiates the payment digitally to a payee who receives it digitally, and it is then kept and spent digitally.

Different ways to transfer funds

- ndia has four funds transfer systems in place to ensure that financial transactions can be conducted efficiently and securely. These systems are:
  - Real Time Gross Settlement (RTGS)
  - National Electronic Funds Transfer (NEFT)
  - Immediate Payment Service (IMPS)
  - Unified Payments Interface (UPI)

➢ **NEFT (National Electronic Funds Transfer)**:

- NEFT is an electronic fund transfer system used for transferring funds from one bank account to another.
- It operates on a deferred settlement basis, where transactions are processed in batches during specific timings.
- NEFT transactions are not instantaneous and can take up to a few hours for the funds to be credited to the beneficiary account.
- There is no minimum or maximum limit for NEFT transactions, but individual banks may impose limits.

➢ **RTGS (Real Time Gross Settlement)**:

- RTGS is also an electronic fund transfer system used for large-value transactions.
- It operates on a real-time basis, meaning transactions are processed immediately and on an individual basis.
- RTGS transactions are instantaneous and final, with immediate transfer of funds from the remitter's account to the beneficiary's account.
- RTGS is typically used for high-value transactions, as it usually involves significant fees.

UPI (Unified Payments Interface):

•UPI is a real-time payment system that allows users to transfer money between any two bank accounts using a smartphone.

•It enables instant transfer of funds 24x7, including weekends and holidays.

•UPI transactions can be initiated using a mobile app, and they require a virtual payment address (VPA), account number, or Aadhaar number of the beneficiary.

•UPI has gained popularity for its convenience, speed, and interoperability across banks and payment service providers.

- **IMPS (Immediate Payment Service)**:

- IMPS is an instant payment system that enables interbank electronic fund transfers in real time.
- It allows customers to transfer funds using mobile phones or internet banking on a 24x7 basis.
- IMPS transactions can be initiated using the beneficiary's mobile number and MMID (Mobile Money Identifier) or account number and IFSC (Indian Financial System Code).
- IMPS is widely used for person-to-person (P2P) transfers, bill payments, and other purposes requiring immediate fund transfer.

Different methods of digital payments

- Banking Cards
- Unstructured Supplementary Service Data(USSD)
- Aadhaar Enabled Payment System (AEPS)
- Unified Payments Interface (UPI)
- Mobile Wallets
- Bank Prepaid Cards
- PoS Terminals
- Internet Banking
- Mobile Banking
- Micro ATMs

Benefits of Digital Payments

- **Ease and convenience**
- **Economic progress**
- **Safety and efficient tracking**
- Online retail provides an additional sales channel.
- Improved cash flow.
- Security at the forefront.
- Improved payment options for your customers.
- **Multiple payment options:** Several types of payment modes including credit cards, debit cards, net banking, EMIs, and UPI, along with Paytm Wallet and Paytm Postpaid.

Modes of Digital Payments

Banking Cards

- Debit/credit cards, or prepaid cards.
- Andhra Bank launched the first credit card in India in 1981.
- Cards are preferred because of multiple reasons
- Debit Cards, one of the many payment modes, are issued by banks that allow individuals to purchase items at physical stores through Point of Sale (POS) devices or e-commerce marketplaces.
- RuPay Debit Cards, developed by National Payments Corporation of India (NPCI) was launched by the Government of India to allow individuals to make payments digitally.

Unstructured Supplementary Service Data(USSD)

- USSD was launched for those sections of India's population which don't have access to proper banking and internet facilities.
- USSD is often used for various interactive mobile services, such as:
- **Mobile banking:** Users can check account balances, transfer funds, or perform other banking transactions using USSD-based menus.
- **Mobile recharge:** Users can top up their prepaid mobile phone credits using USSD.
- **Service subscriptions:** Users can subscribe to various services or opt-out of services using USSD.

- **Information services:** Users can access information such as weather updates, news, or sports scores through USSD-based menus.
- USSD sessions are usually initiated by dialing a specific shortcode (e.g., *123#) on the mobile device. The service provider then sends menus or prompts to the user, who can navigate through the options using the phone's keypad.
- USSD sessions are typically charged on a per-session basis or according to the specific service being used.
- USSD is widely used in regions with high mobile penetration but limited smartphone adoption, as it provides a simple and accessible way to interact with mobile services using basic feature phones.

Aadhaar Enabled Payment System (AEPS)

- Under this system, customers can use their Aadhaar-linked accounts to transfer money between two Aadhaar linked Bank Accounts.
- As of February 2020, AEPS had crossed more than 205 million as per NPCI data.
- AEPS doesn't require any physical activity like visiting a branch, using debit or credit cards or making a signature on a document.
- This bank-led model allows digital payments at PoS (Point of Sale / Micro ATM) via a Business Correspondent(also known as Bank Mitra) using Aadhaar authentication.

Unified Payments Interface (UPI)

- UPI is a payment system that culminates numerous bank accounts into a single application, allowing the transfer of money easily between any two parties.
- As compared to **NEFT, RTGS, and IMPS**, UPI is far more well-defined and standardized across banks.
- You can use UPI to initiate a bank transfer from anywhere in just a few clicks.
- The benefit of using UPI is that it allows you to pay directly from your bank account, without the need to type in the card or bank details.
- This method has become one of the most popular digital payment modes in 2020, with October witnessing over 2 billion transactions.

Bharat Interface for Money (BHIM):

- Bharat Interface for Money (BHIM) is a mobile app for easy and quick payment transactions using Unified Payments Interface (UPI). User can make instant bank-to-bank payments and pay and collect money using Mobile number, Bank a/c and IFSC code, Aadhaar number or Virtual Payment Address (VPA).

- BHIM has the facility to scan & pay through QR code. User can check transaction history and can also raise complaint for the declined transactions by clicking on Report issue in transactions.

- BHIM is available in 20 regional languages (English, Hindi, Marathi, Tamil, Telugu, Malayalam, Oriya, Punjabi, Gujarati, Marwari, Haryanvi, Bhojpuri, Urdu, Konkani, Manipuri, Mizo, Khasi, Kannada, Bengali, Assamese) for better user experience.

UPI 123PAY:

UPI 123PAY is an instant payment system for feature phone users who can use Unified Payments Interface (UPI) payment service in a safe and secure manner. Feature phone users will now be able to undertake a host of transactions based on four technology alternatives. They include calling an IVR (interactive voice response) number, app functionality in feature phones, missed call-based approach and proximity sound-based payments.

UPI Lite:

“UPI LITE” offers a wallet in BHIM-UPI app for an amount of up to ₹2,000 on a smart phone, eliminating the need for the user to first obtain electronic authorisation from his/her bank while making the payment, offering the user better experience in terms of improved speed and transaction success rate.

e-RUPI

e-RUPI is a person and purpose specific, contactless and cashless digital payment solution.

It can be issued as a prepaid QR code or SMS based electronic voucher which can be used by the Government/Private organizations for delivery of a specific subsidy or welfare benefit to the targeted citizens.

The beneficiaries will be able to redeem e-RUPI voucher without a card, digital payments app or internet banking access, at the merchants accepting e-RUPI, simply by showing SMS or QR code.

This contactless e-RUPI is easy, safe, and secure as it keeps the details of the beneficiaries completely confidential.

The entire transaction process through this voucher is relatively faster and at the same time reliable, as the required amount is already stored in the voucher.

Mobile Wallets

- type of wallet in which you can carry cash but in a digital format.
- Often customers link their bank accounts or banking cards to the wallet to facilitate secure digital transactions.
- Another way to use wallets is to add money to the Mobile Wallet and use the said balance to transfer money.
- Some popularly used ones include Paytm, Freecharge, Mobikwik, mRupee, Vodafone M-Pesa, Airtel Money, Jio Money, SBI Buddy, Vodafone M-Pesa, Axis Bank Lime, ICICI Pockets, etc.

Bank Prepaid Cards

- A bank prepaid card is a pre-loaded debit card issued by a bank, usually single-use or reloadable for multiple uses.
- It is different from a standard debit card because the latter is always linked with your bank account and can be used numerous times. This may or may not apply to a prepaid bank card.
- A prepaid card can be created by any customer who has a KYC-complied account by merely visiting the bank's website.
- Corporate gifts, reward cards, or single-use cards for gifting purposes are the most common uses of these cards.

PoS Terminals

- PoS(Point of Sale) is known as the location or segment where a sale happens.
- The most common type of PoS machine is for Debit and Credit cards, where customers can make payment by simply swiping the card and entering the PIN.
- With digitization and the increasing popularity of other online payment methods, new PoS methods have come into the picture. First is the contactless reader of a PoS machine, which can debit any amount up to Rs. 2000 by auto-authenticating it, without the need of a Card PIN.

Internet Banking

- Internet Banking, also known as e-banking or online banking, allows the customers of a particular bank to make transactions and conduct other financial activities via the bank's website.
- E-banking requires a steady internet connection to make or receive payments and access a bank's website, which is called Internet Banking.
- Today, most Indian banks have launched their internet banking services. It has become one of the most popular means of online transactions.
- Every payment gateway in India has a virtual banking option available. NEFT, RTGS, or IMPS are some of the top ways to make transactions via internet banking.

- Digital payment methods, such as IMPS, NEFT, RTGS, IMPS, investments, bank statements, bill payments, etc., are available on a single platform in mobile banking apps.
- Banks themselves encourage customers to go digital as it makes processes easier for them too.

Modes of digital payments- Banking

https://www.meity.gov.in/modes-digital-payment

https://www.meity.gov.in/cyber-security-division

Thank you