

KEY CONCEPTS

■ Internet ■ Internet Protocols ■ E-commerce ■ Supply Chain Management (SCM) ■ Customer Relationship Management (CRM) ■ Payment Portals ■ Digital Currencies ■ M-Commerce ■ Bluetooth and Wi-Fi

Learning Objectives

To understand:

- The concept of internet and internet technologies
- The different types of internet protocols
- The working of internet protocols
- About e-commerce and its stages of development
- The benefits and limitations associated with e-commerce
- About Supply Chain Management
- The Customer Relationship Management
- The concepts of EFT and EDI
- About digital currencies and its various types
- The Block Chain Technology
- The Payment Portal
- The concept of Mobile Commerce and its various types
- The difference between M-Commerce vs. E-Commerce
- The Future of Mobile Commerce
- The distinction between Bluetooth and Wi-Fi

Lesson Outline

- Internet
- Applications of Internet
- Major Types of Internet Application
- Internet Protocols
- Working of Internet Protocols
- Need of Protocols
- Types of Internet Protocols
- E-commerce and its development
- Benefits and Limitations of E-Commerce
- Types of E-Commerce
- Supply Chain Management (SCM)
- Customer Relationship Management (CRM)
- Electronic Data Interchange (EDI)
- Electronic Fund Transfers (EFT)
- Major Features of Electronic Funds Transfer
- Digital Currency
- Types of Digital Currencies
- Advantages and Disadvantages of Digital Currencies
- Block Chain Technology
- Transaction Process of Block Chain Technology
- Payment Portal
- E-Commerce Security- Mobile Commerce
- Types of M-Commerce
- Working of Mobile Commerce
- M-Commerce vs. E-Commerce
- Future of Mobile Commerce
- Bluetooth and Wi-Fi
- Lesson Round-Up
- Test Yourself
- List of Further Readings
- List of Other References

In 1969, the Government of the United States of America used the internet as a network that could continue to be functional even if some nodes were destroyed, as long as information could pass through other nodes.¹ At that point of time, the purpose of the US government for using the internet was to create a net that could enable a network for ensuring the continuous working and functioning of the military node.² The purpose of information and communication technology was to introduce and allow universal communication between users of computer and other electronic devices with enabled network at a global platform.³ Over the years, internet has become an imperative mode of transferring and sharing of information at a global platform, which in turn, also impacts various segments of human life. Business and commercial activities are particularly impacted by developments in information and tele-communication technologies. Hence, rapid developments in information and tele-communication technology have substantially changed the shape of business organizations and given shape to various new technologies, including fibre optics, electronic data exchange, e-commerce⁴ and many more alike. Hence, this chapter aims to provide an overview of the Internet, its related technologies and other contemporary technologies.

APPLICATIONS OF INTERNET

Applications that can function or can be used only when connected to the internet are called Internet applications. In other words, it can also be said that such applications are made to run from the Internet itself.

Because all the data of internet applications is stored on their servers, if you want to use these applications then you must have an internet connection. So that through the internet your request goes to the server and in return you get information. You can also exchange your information through these applications.

In any case, you need internet service to use the internet application. Without internet service, you cannot access the information of these applications.

Additionally, to use internet applications, you also need a digital device with an internet connection, only then you can use those applications. Examples of digital devices include smartphones, tablet PCs, laptops, desktops, etc.

Application of Internet: Major Types⁵

An Internet application serves some purpose for end users. It is generally not concerned with how data is actually transmitted between the hosts. Here are some distributed applications that require well-defined application-level protocols:

- Sending and receiving email
- Searching and browsing information archives
- Copying files between computers
- Conducting financial transactions
- Navigating (in your car, smart scooter, smart bike, etc.)

1. The internet began as ARPANet, a U.S. Department of Defense project to create a nationwide computer network that would continue to function even if a large portion of it were destroyed in a nuclear war or natural disaster. (April 30, 2012), <http://www.centerspan.org/tutorial/net.htm>.

2. U.S. Government used internet for the first time in its practical use with their defense project in 1969.

3. Anthony Giddens, *Runaway World: The Reith Lectures Revisited Lecture 1: (1999)*. (April 30, 2012),

http://news.bbc.co.uk/1/hi/english/static/events/reith_99/.

4. J.-H. Wu and T.-L. Hsu, *Analysis of E-Commerce Innovation and Impact of Hypercube Model, Electronic Commerce Research and Applications*, Vol. 3, 389–404 (2004).

5. See, <https://cs.lmu.edu/~ray/notes/inetapps/>.

- Playing interactive games
- Video and music streaming
- Chat or voice communication (direct messaging, video conferencing, etc.)

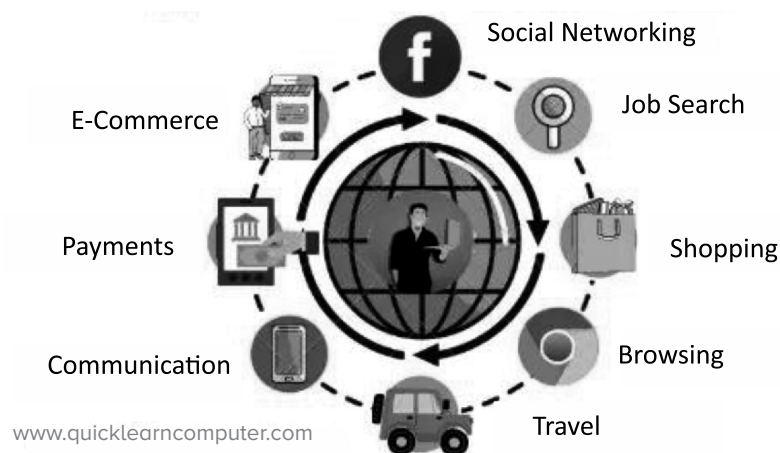
In addition, there are a number of network services such as:

- Name servers
- Configuration servers
- Mail gateways, transfer agents, relays
- File and print servers

Example of Application of Internet⁶

There are various applications of internet in points, which are given below:

Applications of Internet



- Communication
- Job Search
- Online Shopping
- Web Browsing
- Stock Market Updates
- Travel
- Research
- E-Commerce
- Online Payments
- Social Networking
- E-banking
- Education
- Entertainment

6. Reproduced Pandey Avinash (2022) 10 Applications of Internet. What is Internet Applications. Quick Learn Computers.

INTERNET PROTOCOLS⁷

Internet Protocols are a set of rules that governs the communication and exchange of data over the internet. Both the sender and receiver should follow the same protocols in order to communicate the data. In order to understand it better, let's take an example of a language. Any language has its own set of vocabulary and grammar which we need to know if we want to communicate in that language. Similarly, over the internet, whenever we access a website or exchange some data with another device, then these processes are governed by a set of rules called the internet protocols.

Working of Internet Protocol

The internet and many other data networks work by organizing data into small pieces called packets. Each large data sent between two network devices is divided into smaller packets by the underlying hardware and software. Each network protocol defines the rules for how its data packets must be organized in specific ways according to the protocols the network supports.

Note: Hardware refers to all the physical components of the computer system, including the devices connected to it.

Software refers to a set of instructions, data or programs used to operate computers and execute specific tasks.

Need of Protocols

It may be that the sender and receiver of data are parts of different networks, located in different parts of the world having different data transfer rates. So, we need protocols to manage the flow control of data, and access control of the link being shared in the communication channel. Suppose, there is a sender 'X' who has a data transmission rate of 10 Mbps. And, there is a receiver 'Y' who has a data receiving rate of 5Mbps. Since the rate of receiving the data is slow, some data will be lost during transmission. In order to avoid this, receiver Y needs to inform sender X about the speed mismatch so that sender X can adjust its transmission rate. Similarly, the access control decides the node which will access the link shared in the communication channel at a particular instant in time. If not, the transmitted data will collide if many computers send data simultaneously through the same link resulting in the corruption or loss of data.

What is IP Address?

An IP address stands for Internet Protocol address. IP address is a unique address that identifies a device over the network. It is almost like a set of rules governing the structure of data sent over the Internet or through a local network. An IP address helps the Internet to distinguish between different routers, computers, and websites. It serves as a specific machine identifier in a specific network and helps to improve visual communication between source and destination.

Types of Internet Protocol

Internet Protocols are of different types having different uses. These are mentioned below:

1. TCP/IP (Transmission Control Protocol/ Internet Protocol)
2. SMTP (Simple Mail Transfer Protocol)
3. PPP (Point-to-Point Protocol)

⁷ Reproduced Kumar Ankit (2023) Types of Internet Protocols, Geeksforgeeks.org.

4. FTP (File Transfer Protocol)
 5. SFTP (Secure File Transfer Protocol)
 6. HTTP (Hyper Text Transfer Protocol)
 7. HTTPS (Hyper Text Transfer Protocol Secure)
 8. TELNET (Terminal Network)
 9. POP3 (Post Office Protocol 3)
 10. IPv4
 11. IPv6
 12. ICMP
 13. UDP
 14. IMAP
 15. SSH
 16. Gopher.
1. **TCP/IP (Transmission Control Protocol/ Internet Protocol):** These are a set of standard rules that allow different types of computers to communicate with each other. The IP protocol ensures that each computer that is connected to the Internet is having a specific serial number called the IP address. TCP specifies how data is exchanged over the internet and how it should be broken into IP packets. It also makes sure that the packets have information about the source of the message data, the destination of the message data, the sequence in which the message data should be re-assembled, and checks if the message has been sent correctly to the specific destination. The TCP is also known as a connection-oriented protocol.
 2. **SMTP (Simple Mail Transfer Protocol):** These protocols are important for sending and distributing outgoing emails. This protocol uses the header of the mail to get the email id of the receiver and enters the mail into the queue of outgoing mail. And as soon as it delivers the mail to the receiving email id, it removes the email from the outgoing list. The message or the electronic mail may contain the text, video, image, etc.
 3. **PPP (Point-to-Point Protocol):** It is a communication protocol that is used to create a direct connection between two communicating devices. This protocol defines the rules using which two devices will authenticate each other and exchange information with each other. For example, a user connects his PC to the server of an Internet Service Provider by using PPP. Similarly, for connecting two routers for direct communication, PPP is used.
 4. **FTP (File Transfer Protocol):** This protocol is used for transferring files from one system to the other. This works on a client-server model. When a machine requests for file transfer from another machine, the FTO sets up a connection between the two and authenticates each other using their ID and Password. Resultantly, the desired file transfer takes place between the machines.
 5. **SFTP (Secure File Transfer Protocol):** SFTP (also known as SSH FTP) refers to File Transfer Protocol (FTP) over Secure Shell (SSH) as it encrypts both commands and data while in transmission. SFTP acts as an extension to SSH and encrypts files and data then sends them over a secure shell data stream. This protocol is used to remotely connect to other systems while executing commands from the command line.

- 6. HTTP (Hyper Text Transfer Protocol):** This protocol is used to transfer hypertexts over the internet and it is defined by the 'www' (world wide web) for information transfer. This protocol defines how the information needs to be formatted and transmitted. And, it also defines the various actions the web browsers should take in response to the calls made to access a particular web page. Whenever a user opens their web browser, the user will indirectly use HTTP as this is the protocol which is used to share text, images, and other multimedia files on the World Wide Web. ⁸

Note: WWW refers to the world wide web, which is a collection of different websites around the world, containing different information shared via local servers (or computers).

- 7. HTTPS (Hyper Text Transfer Protocol Secure):** HTTPS is an extension of the Hypertext Transfer Protocol (HTTP). It is used for secure communication over a computer network with the SSL/TLS protocol for encryption and authentication. So, generally, a website has an HTTP protocol but if the website is such that it receives sensitive information such as credit card details, debit card details, OTP, etc. then it additionally requires installation of an SSL certificate to make the website more secure. Therefore, before entering any sensitive information on a website, we should check if the link is HTTPS or not. If it is not HTTPS, then it may not be secure enough to share sensitive information.
- 8. TELNET (Terminal Network):** TELNET is a standard TCP/IP protocol used for virtual terminal service, provided by the International Organization for Standards (ISO). This enables one local machine to connect with another. The computer which is being connected is called a remote computer and the connecting computer is called the local computer. TELNET operation enables the user to display anything being performed on the remote computer on the local computer. This operates on the client/server principle. The local computer uses the TELNET client program whereas the remote computer uses the TELNET server program.
- 9. POP3 (Post Office Protocol 3):** POP3 stands for Post Office Protocol version 3. It has two Message Access Agents (MAAs) where one is client MAA (Message Access Agent) and another is server MAA (Message Access Agent) for accessing the messages from the mailbox. This protocol enables the user to retrieve and manage emails from the mailbox on the receiver mail server to the receiver's computer. This is implied between the receiver and the receiver mail server. It can also be called a one-way client-server protocol. The Pop3 works on two ports, i.e. Port 110 and Port 995.
- 10. IPv4:** The fourth and initially widely used version of the Internet Protocol is called IPv4 (Internet Protocol version 4). It is the most popular version of the Internet Protocol and is in charge of distributing data packets throughout the network. Maximum unique addresses for IPv4 are 4,294,967,296 (2³²), which are possible due to the use of 32-bit addresses. The network address and the host address are the two components of each address. The host address identifies a particular device within the network, whereas the network address identifies the network to which the host belongs. In the "dotted decimal" notation, which is the standard for IPv4 addresses, each octet (8 bits) of the address is represented by its decimal value and separated by a dot (e.g. 192.168.1.1).

Note: Dotted Decimal notation is a human-readable representation of IP addresses in the IPv4 (Internet Protocol version 4) format. It is expressed as a series of four decimal numbers, each ranging from 0 to 255, separated by periods (dots). Each decimal number represents an 8-bit binary value (octet), and the entire IP address comprises 32 bits.

- 11. IPv6:** The most recent version of the Internet Protocol i.e. IPv6, was created to address the IPv4 protocol's drawbacks. A maximum of 4.3 billion unique addresses are possible with IPv4's 32-bit addresses.

⁸ Note: Hypertext refers to the special format of the text that can contain links to other texts.

On the contrary, IPv6 uses 128-bit addresses, which enable a significantly greater number of unique addresses. This is significant because IPv4 addresses were running out and there are an increasing number of devices that require internet access. Additionally, IPv6 offers enhanced security features like integrated authentication and encryption as well as better support for mobile devices. IPv6 support has spread among websites and internet service providers, and it is expected to gradually replace IPv4 as the main internet protocol.

- 12. ICMP:** ICMP (Internet Control Message Protocol) is a network protocol that is used to send error messages and operational information about network conditions. It is an integral part of the Internet Protocol (IP) suite and is used to help diagnose and troubleshoot issues with network connectivity. ICMP messages are typically generated by network devices, such as routers, in response to errors or exceptional conditions encountered in forwarding a datagram. Some examples of ICMP messages include:

- Echo Request and Echo Reply (ping)
- Destination Unreachable
- Time Exceeded
- Redirect

ICMP can also be used by network management tools to test the reachability of a host and measure the round-trip time for packets to travel from the source to the destination and back. It should be noted that ICMP is not a secure protocol, it can be used in some types of network attacks like DDoS amplification.

- 13. UDP:** UDP (User Datagram Protocol) a connectionless communication protocol for transporting packets across networks. Unlike TCP, it does not establish a reliable connection between devices before transmitting data, and it does not guarantee that data packets will be received in the order they were sent or that they will be received at all. Instead, UDP simply sends packets of data to a destination without any error checking or flow control. UDP is typically used for real-time applications such as streaming video and audio, online gaming, and VoIP (Voice over Internet Protocol), i.e. a technology that allows you to make voice calls using a broadband Internet connection instead of a regular (or analog) phone line.

UDP is faster than TCP because it has less overhead. It does not need to establish a connection, so it can send data packets immediately. It also does not need to wait for confirmation that the data was received before sending more, so it can transmit data at a higher rate.

- 14. IMAP:** IMAP (Internet Message Access Protocol) is a protocol used for retrieving emails from a mail server. It allows users to access and manage their emails on the server, rather than downloading them to a local device. This means that the user can access their emails from multiple devices and the emails will be synced across all devices. IMAP is more flexible than POP3 (Post Office Protocol version 3) as it allows users to access and organize their emails on the server, and also allows multiple users to access the same mailbox.

- 15. SSH:** SSH (Secure Shell) is a protocol used for secure remote login and other secure network services. It provides a secure and encrypted way to remotely access and manage servers, network devices, and other computer systems. SSH uses public-key cryptography to authenticate the user and encrypt the data being transmitted, making it much more secure than traditional remote login protocols such as Telnet. SSH also allows for secure file transfers using the SCP (Secure Copy) and SFTP (Secure File Transfer Protocol) protocols. It is widely used in Unix-based operating systems and is also available for Windows. It is commonly used by system administrators, developers, and other technical users to remotely access and manage servers and other network devices.

16. **Gopher:** Gopher is a type of file retrieval protocol that provides downloadable files with some description for easy management, retrieving, and searching of files. All the files are arranged on a remote computer in a stratified manner. It is an old protocol and it is not used much nowadays.

E-COMMERCE⁹

E-commerce is a process used to distribute, buy, sell or market goods and services, and also transfer the funds online through electronic communication and networks.¹⁰ It facilitates the conduct of commercial transactions electronically at a global level with the help of technologies like internet, electronic data interchange and electronic fund transfer. E-commerce is not only promoting easy access to products and services but also ensures variety of benefits to the sections¹¹, involved in the e-commerce transactions. Some of the major advantages that e-commerce offers are (a) a large market, (b) extensive access to this large market, (c) easy access to the wide-ranging market of e-commerce porch and alike. These overwhelming benefits of e-commerce market are establishing and sprouting the popularity of e-commerce over the traditional forms of businesses and commerce.

Development of E-commerce

Going back to history, it is important to note that both Electronic Data Interchange and Electronic Fund Transfer were introduced in late 1970s. Introduction of these technologies allowed businesses to send commercial documents like purchase orders, invoices, transactions payments, etc. electronically. In 1979, it was Michael Aldrich who invented the concept of online shopping.¹² In the early 1980s, Credit Cards, Automated Teller Mechanism (ATM) and telephone banking were also developed and they instantly become popular as a form of e-commerce. In 1981, UK launched first B2B¹³ online shopping with the introduction of Thomson Holidays.¹⁴ Thereafter, the beginning of 1990 has witnessed the inclusion of enterprise resource planning system,¹⁵ data mining¹⁶ and data warehousing¹⁷ as other categories of e-commerce.

In 1990 only, Tim Berners-Lee invented the concept of World Wide Web, which has transformed the academic telecommunication network into worldwide everyman everyday communication system called the internet.¹⁸ The development of World Wide Web has significantly transformed the use of the Internet. The development

9. Reproduced from Rajvanshi Gargi (2014), *Online Privacy vis-à-vis Growth of E-Commerce: A Legal Perspective Study*, PhD Thesis submitted for the award of Doctor of Philosophy at Indian Institute of Technology, Kharagpur.

10. eCommerce , eBusiness, Marketing and Design Review; (Online) e-Commerce Optimization. (June 15, 2012), <http://www.ecommerceoptimization.com/ecommerce-introduction/>

11. Sections here refer as the parties involved in e-commerce transactions. The major parties involved in the e-commerce are Buyers, Sellers and Producers.

12. Ewaryst et al., *Internet - Technical Development and Applications*, Springer, 255 (2009); ISBN 978-3-642-05018-3. (June 15, 2012), http://books.google.co.in/books/about/Internet.html?id=a9_NJIBC87gCandredir_esc=y

13. Business-to-business (B2B) describes commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer.

14. Thomson Holidays is a UK based travel operator and part of TUI Travel PLC.

15. Enterprise resource planning (ERP) systems integrate internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, customer relationship management, etc. ERP systems automate this activity with an integrated software application. The purpose of ERP is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. See also, Bidgoli and Hossein, *The Internet Encyclopedia*, John Wiley and Sons, Inc. Vol. 1, 707 (2004).

16. The overall goal of the data mining process is to extract knowledge from an existing data set and transform it into a human-understandable structure for further use.

17. A data warehouse is a relational database that is designed for query and analysis rather than for transaction processing. It usually contains historical data derived from transaction data, but it can include data from other sources. It separates analysis workload from transaction workload and enables an organization to consolidate data from several sources.

18. Berners-Lee, Tim; Mark Fischetti, *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web by its inventor*. Britain: Orion Business. (1999); ISBN 0-7528-2090-7.

of web along with web browsers has opened the access of internet to any person equipped with essential computer understanding, infrastructure and online connectivity.¹⁹

In 1994, Netscape was introduced, which provided a simple browser to its users to surf the internet and to conduct online transactions secured by a new technology called Secure Sockets Layer.²⁰ This concept of secured online transactions has served as a basis for development and growth of e-commerce.²¹ In 1995, two of the biggest companies 'Amazon.com' and 'e-Bay.com' entered the field of e-commerce.²² This gave a bounce to B2C²³ commerce. With the contribution of various companies and their presence on the web for the conduct of online transactions, the era of e-commerce has finally ushered in.²⁴

Note: B2C commerce or business to consumer commerce refers to a model where a business website is a place where all the transactions take place directly between a business organization and a consumer.

SSL or Secure Sockets Layer is the industry standard when it comes to safe and secure online transactions between websites and users. The SSL technology allows for an encrypted connection to take place between a user's web browser and the web server of the website that the customer is browsing.

Fellenstein and Wood,²⁵ estimated that in 1996, e-commerce transactions in US earned \$707 million which increased to \$2.6 billion in 1997 and \$5.8 billion in 1998. Though the period of 1998 to 2002 recorded a perceptible fall in the use and growth of e-commerce transactions, yet e-commerce companies survived this roll and again become successful with the beginning of 2002.²⁶ According to Fraser,²⁷ 100 companies of U.K. predicted in 2000 that 20% of their revenue would be generated from e-commerce transactions. US Department of Commerce (2002 and 2003) estimated that total e-commerce revenues reached a \$45.6 million for 2002 and \$54.9 billion for 2003.²⁸ This trend shows the immense growth in e-commerce businesses.

Indian market of e-commerce is also not an exception. According to a report by IMRB, International and Internet and Mobile Association of India²⁹ (IAMAI), the e-commerce market in India was expected to be INR 31,598 crore by the end of 2010 which is four times more than the market size of INR 8146 crore back in 2007. Forrester Research Firm has estimated revenue of 1.6 billion US Dollar for Indian e-commerce market in 2012 which is expected to grow at 8.8 billion US Dollar in 2016.³⁰ 'TECHINASIA' through its report 'Asian E-commerce Sites Net

19. Short Summary of the World Wide Web Project; Groups.google.com, August 6, 1991.

20. Kenney Martin and Curry James, E-commerce: Implication for Firm Strategy and Industry Configuration; E-economy TM Paper 2, University of California, Economy Project (1999). (June 15, 2012), <http://brie.berkeley.edu/econ/publications/wp/ewp2.html>.

21. Electronic Commerce, (Online), Reference for Business, Encyclopedia of Business, Eco-Ent. (2nd ed.). (June 15, 2012), <http://www.referenceforbusiness.com/encyclopedia/Eco-Ent/Electronic-Commerce.html>.

22. See, Garg Pallavi Sharda, E-Tailing in India-Myths, Realities and Marketing Implications, International Journal of Research in Finance and Marketing, Vol.1, Issue 1 (2011).

23. Business to Consumer is a transaction that occurs between a Company and a Consumer, as opposed to a transaction between companies. The term also describes a company that provides goods or services to Consumers.

24. Kim, D.J. et al., A Trust-Based Consumer Decision-Making Model In Electronic Commerce: The Role of Trust, Perceived Risk, And Their Antecedents, Decision Support Systems Vol. 44, 544-564 (2007).

25. Fellenstein, C. and Wood R., Exploring E-Commerce, Global E-Business and E-Societies. Prentice Hall (2000).

26. Cassidy, J. Dot.Com: The Greatest Story Ever Sold, London: Allen Lane; 292-293 (2002); Cassidy has mentioned that the 'gold rush' of the late 1990s came to be known as the 'dot-com bubble,' and 2000 and 2001 saw the bursting of that bubble. From March 10 to April 14, 2000, the NASDAQ, the high-tech stock exchange, dropped 34.2%, and the Dow Jones Composite Internet Index dropped 53.6%. The stock price for all the 20 leading Internet stocks dropped, including Amazon.com by 29.9%, eBay by 27.9%, Internet Capital by 72.1%, and VeriSign by 59.2%.

27. Fraser, J. et al., The Strategic Challenge of Electronic Commerce, Supply Chain Management: An International Journal Vol. 5 No. 1, 7-14 (2000).

28. Johnson Carrie, A Report on The Growth of Multichannel Retailing; A Forrester Document: National Governor's Association and the National Conference of State Legislatures. (June 15, 2012), <http://www.gfoa.org/downloads/0407MULTICHANNEL.pdf>.

29. Internet and Mobile Association of India (IAMAI). (June 15, 2012), <http://www.iamai.in/reports1.aspx>.

30. Forrester Report on India to be fastest Growing Market in Asia-Pacific. (June 15, 2012), <http://www.iamwire.com/2012/04/india-to-be-the-fastest-growing-e-commerce-market-in-asia-pacific-market-set-to-grow-to-8-8-billion-by-2016/>.

\$ 6.9 Billion in Past 3 years, But the Exits still Tiny (Stats)' stated that though the e-commerce market in India grew from 43 million US Dollars in 2010 to 138 million US Dollars in first quarter of 2011, but second quarter of 2011 evidenced a fall in e-commerce market and reached to 92 million US Dollars. In the last quarter of 2012, the revenue generated by e-commerce in India 32 US Dollars, wherein second quarter of 2013 evidenced the revenue of 137 million US Dollars in e-commerce in India.³¹

With the theatrical rise and fall of the internet companies, e-commerce has confirmed constant and improved growth in revenues and sale. The development and experience of e-commerce transactions is significantly promoting the advantages not only for the companies and consumers but also for the society as a whole.³² For companies, e-commerce is improving efficiency, productivity, access to variety of information or data bases and increase in revenues; for consumer, it is providing convenience, ease and 24*7 (24 hours and 7 days) access to product and services; and for society, it is facilitating acceleration of economic growth and opportunities. Hence, a balance in the need, facilitation and difficulties of all the stake-holders will support the growth of e-commerce.

Benefits and Limitations of E-Commerce

Issac Newton's 3rd Law of Motion confirms that 'for every action there is an equal and opposite reaction'. The same principle applies to e-commerce also. The benefits and limitations of e-commerce transactions for (i) businesses, (ii) consumers and (iii) society as a whole have been outlined below:

Benefits

E-commerce serves the following advantages:

- **Increased Convenience:** In e-commerce transactions, consumers can visit multiple websites at any time, be it day or night. With this ease, they can access all e-commerce websites, can compare the prices and availability of goods and services, and make their purchases, without moving from their house or workplace.
- **Increased Choice:** E-commerce transactions have increased consumer's choice for goods and services with their different variety as compared to traditional brick and mortar stores.
- **Enhanced Product Information:** In e-commerce transactions, consumers get an opportunity to analyse information about the particulars of the product like quality, quantity, product performance, durability, drawbacks and limitations of the product.
- **Lower Prices:** The increased competition on e-commerce platforms allows companies to offer goods and services at competitive prices to the customers.
- **Improved Delivery Process:** E-commerce enables faster delivery specially in the electronic goods and services segment where items like software, audio-visual files, access to online journals and books, etc. are quicker and swifter in comparison to the packages delivered by mail or courier.
- **Global Presence:** With the advent of e-commerce, businesses are confirming global presence at global scale in global market.
- **24/7 Opening:** E-commerce business allows business to operate 24 hours a day and seven days a week, which offers competitive advantage over traditional businesses.
- **Reduced Costs:** E-commerce companies are not required to have a building, staff or incur maintenance expenses like physical form of businesses do. Due to the lower operational cost in e-commerce businesses, they are able to provide goods and services at reduced cost.

31. Asian E-commerce Sites Net \$ 6.9 Billion in Past 3 years, But the Exits still Tiny (Stats); TECHINASIS, (Mar. 13th, 2014)<http://www.techinasia.com/asia-ecommerce-investments-and-exits-2010-to-2013/>

32. A Report on Bringing e-commerce benefits to Consumers, by European Commission, The European Parliament, (2011). (June 15, 2012), http://ec.europa.eu/internal_market/e-commerce/docs/communication2012/SEC2011_1640_en.pdf.

- **Increased Sales and Profits:** As e-commerce provides 24/7 access to products and services, it provides ease to consumers to transact in e-commerce transactions, which leads to increased sales and profit to e-commerce businesses.
- **Improved Customer Information:** Disclosure of accurate information like name, address, and credit or debit card details, is a compulsory requirement for the completion of e-commerce transactions. Hence, it allows e-commerce companies to collect and store consumers' information, which can be used further for improving their services and for marketing purposes.
- **Economic Benefits:** Running an e-commerce business is economical and cost-effective as it allows businesses to participate in global market, which serves them a greater opportunity to receive revenues at a global platform. Moreover, e-commerce does not demand operational costs like physical store space, maintenance, insurance etc., leading to further savings in cost. All a company needs is an idea, unique product and well-designed web storefront to reach consumers. A combination of these factors provides e-commerce with economic advantage to start with higher margins of profit. Thus, e-commerce transactions have proven to be supportive to growth of economy.
- **Social Benefits:** E-commerce serves a range of benefits to the society in the form of enhanced quality of life by providing services with more convenience and satisfaction. For example, (i) for most of the people, it enables them to work from home and to generate earnings and (ii) it connects people at a global platform.
- **Political Benefits:** E-commerce allows public services like health services (i.e. on-line consultation with doctors and nurses) on internet, filling taxes over internet, filling educational forms and extracting educational guidelines over internet.
- **Technological Benefits:** Introduction of e-commerce in any society will allow people to enhance their IT skills, internet literacy and promote advancement of new technologies through applications on e-commerce.

Limitations of e-commerce can be enumerated as under:

Consumers' Concern about Security and Privacy: Privacy is a critical issue in electronic commerce. E-commerce websites store consumer information to make their online account, which facilitates buying, exchange and return of items purchased on their websites. This information includes personal details like residential address, phone numbers, debit and credit card details, etc. Sharing of such sensitive data raises privacy concerns amongst the customers, who the consumers' privacy concern over their information is supported by various studies and surveys³³ as well.

A Business Week/Harris Poll survey found that over 41% of the online shoppers were very concerned over the use of their personal information. A study conducted by UK Cards Association in 2009 has revealed that fraud losses on UK credit and debit cards caused a loss of 440 million euro to UK based consumers of electronic transactions.³⁴ Culnan has also argued that privacy concern is a critical reason, which prevents consumers to adopt online transaction or to disclose their information in electronic transactions or to provide false information in the electronic transactions.³⁵

- **Lack of Instant Gratification:** A majority of consumers are satisfied with the quality and adequacy of the goods only after they have examined the goods physically. This incentive is not available in e-commerce; as goods can only be seen in virtual form at the time of purchase.

33. *Public Opinion on Privacy*. (June 17, 2012) <http://epic.org/privacy/survey/>.

34. *UK banks do report aggregated fraud losses*. In 2009, the total reported losses due to all forms of payment fraud were 440 million (approximately \$641 million). Of that total, 59.7 million (\$87 million) was attributed to online banking losses. (June 17, 2012), <http://www.paymentsnews.com/2010/03/uk-card-and-banking-fraud-losses-down-28-in-2009-to-4403mm.html>.

35. Culnan, Mary J., *Protecting Privacy Online: Is Self-Regulation Working?* *Journal of Public Policy and Marketing*, Vol. 19, No. 1, 20-26 (2000).

- **Lack of social aspect of Shopping:** Many people like to socialize and they enjoy talking to sales staff, to other shoppers, or to their friends and to take their inputs about the efficiency of product and services while they are out for shopping. This retail therapy does not exist in online shopping to some extent.
- **Inconsistent Return Policies:** Sometimes, consumers suffer on account of poor customer services and return policies in online goods and services. This difficulty is not encountered in traditional physical shopping.
- **Start-up Costs:** Creating a website suitable for an e-commerce undertaking is costly as well as time consuming. There are three major costs involved in starting up of an e-commerce website, namely a) purchasing and updating hardware, b) purchasing and updating software, c) employing a web-designer.
- **Issues with Access:** According to Statista, as of April 2023, there are 5.18 billion internet users worldwide, which amounts to 64.6% of the global population³⁶. As everyone is not having access to Internet; limited access to internet may affect the development of e-commerce.
- **Not suitable for all products:** E-commerce is not suitable for some products like perishable goods, food items, furniture³⁷ etc.
- **Increased Competition:** With the increased access to internet and spreading of online markets, e-commerce companies have to face increased level of competition on a global scale in a global market.
- **Social Limitations:** In e-commerce businesses, as people have to interact electronically, this adversely affects personal and social skills of human interactions. Apart from this, e-commerce may lead to social division, as there are probable threats of increase in social divide between technical haves and have-nots.
- **Economic Limitations:** E-commerce markets are quite competitive, leading to a number of economic limitations, e.g. (i) successful companies of other states may earn revenues from the developing and under developed countries, which may be detrimental to the economy of such countries; (ii) lack of proper and adequate regulatory environment may be detrimental to information privacy of individuals and therefore may slow down the development of e-commerce itself; (iii) in e-commerce businesses, tradition of just-in-time manufacturing and procurement is adopted, hence this could shake the economy in the times of crises³⁸ as stocks are kept to the minimum requirement and deliveries are not instant in all cases. Economic crisis may also hamper either the delivery of goods or payment of price on the delivery of goods.
- **Political Limitations:** Ecommerce security threats have the potential to cause havoc in online trading. Frauds, tax evasion, impersonation, debit and credit card frauds, eavesdropping and denial of service attacks are some of the threats associated with online transactions. For example e-commerce businesses may lead to the access of obscene material, misuse of individual's information, theft of financial information, entrapping of children, non-identification of parties etc., hence it creates a liability on the state or industry to address the political and legal challenges arising out of such e-commerce transactions.
- **Technological Limitations:** (i) Reliance on telecommunication infrastructure, power and IT skills may nullify the benefits of e-commerce in developing countries where advanced telecommunication

36. <https://www.statista.com/statistics/617136/digital-population-worldwide/> (June 5, 2023).

37. Khurana Ajeet, *Disadvantages of e-commerce (Online)*. (June 17, 2012), <http://ecommerce.about.com/od/eCommerce-Basics/a/Disadvantages-Of-Ecommerce.htm>.

38. See, Choi et al., *The Economics of Electronic Commerce*, Vol. 18, Macmillan Technical Publications, (1997).

infrastructure, power and IT skills are unavailable, scarce or underdeveloped as in developing countries, (ii) the quick development of new technologies may result in wasted resources in the form of disposal of old computers, hardware, software systems etc.

However, despite the various limitations, e-commerce has come to stay in present day business world. Considering its various benefits, it has been accepted as a viable tool for successful business advances.³⁹ The numerous advantages offered by e-commerce to businesses, consumers and society as a whole over the traditional means of commerce is influencing the growth of e-commerce. According to the market research reports and analysis by IBISWORLD, e-commerce and online auction arena grew 10.4% from 2007 to 2012, with 8.8% more growth expected annually through 2017.⁴⁰

The growth of e-commerce is impacting the Indian commerce market as well. According to Grant Thornton, e-commerce in India is expected to be worth US\$ 188 billion by 2025 and with a turnover of US\$ 50 billion in 2020, India became the eighth-largest market for e-commerce, trailing France, and a position ahead of Canada⁴¹. Along with the enormous benefits served by e-commerce to businesses, consumers and to society as a whole,⁴² one of the major disadvantages of e-commerce is the probability of loss of information shared by the customers and accessed in e-commerce transactions.

TYPES OF E-COMMERCE (B2B, B2C, C2C AND C2B)

Business models of e-commerce can be classified into the following four models: (1) Business to Business (B2B); (2) Business to Consumer (B2C); (3) Consumer to Consumer (C2C); (4) Consumer to Business (C2B).⁴³ These models with the possibility of loss of individual's personal data in the transactions are discussed in detail⁴⁴ as follows:

- (1) **Business to Business Model (B2B):** The B2B model involves electronic transactions between two businesses for ordering, purchasing, selling or distributing the goods. For example, online retail store 'Amazon' provides an online book store which sells books from various publishers. Here, publishers are making business transactions with Amazon to display and sell their books on the Amazon site to get access to a larger audience. This business transaction between business houses for displaying and selling their books to public at large is a business-to-business model. Under this model, majorly businesses are taking the optimum benefit out of other business houses. As customers' personal information are not involved in this model, so there is minimum possibility of loss of personal information in such B2B model.
- (2) **Business to Consumer (B2C) Model:** The B2C model involves transactions between business organizations and consumers. This implies a model whereby business organizations sell their product or services to consumers over the internet. In this model, e-commerce companies directly deal with the consumers and sell goods and services at consumer's offer and demand. This model includes services like online shopping, online banking, travel services, health information etc. For example, eBay is business website which sells diverse goods and services to public at large through online mechanism. Ebay will display and sell a range of products on their website, i.e., 'www.ebay.com'. Details of all the

39. Yen C-H. and Lu H-P., *Factors Influencing Online Auction Repurchase Intention*, *Internet Research*, Vol. 18, No.1, 7-25 (2008).

40. See also, *IBISWorld* (June 15, 2012), <http://www.ibisworld.com/search/default.aspx?st=e-commerce> and *Business Opportunities in E-commerce*, <http://www.inc.com/best-industries-2012/judith-ohikuare/ecommerce.html>.

41. *Indian Brand Equity Foundation, E-commerce Industry in India*, Available at: <https://www.ibef.org/industry/ecommerce>.

42. See, *Ray Sarbapriya, Emerging Trends of E-commerce in India: Some Crucial Issues and Challenges*, *Computer Engineering and Intelligent Systems*, Vol. 2, No. 5 (2011).

43. *Mahadevan B., Business Models for Internet based E-commerce: An Anatomy*, Working paper, *Indian Institute of Management, Bangalore*. See also, *Timmers P., Business Models for Electronic Markets, Electronic Markets*, Vol. 8, No. 2, 3-8 (1998).

44. *e-Commerce Models*. (May 20th, 2013), <http://www.eservglobal.com/uploads/files/index.pdf>.

products offered for sale will be available in the catalogue maintained by eBay. Any individual who is interested in purchasing those goods and services can visit the website and choose the product from the website catalogue. The catalogue will give information about the product like price, availability, discounts and other information which are essential for consumers to decide regarding the purchase of product. Finally, when the consumer will decide to buy the product, he needs to place the order. For placing the order, the consumer needs to specify his personal details like name, address of delivery and credit/debit card information for completion of the transaction. This system involves business organizations on one side and consumers on the other for the completion of business transactions. By the very nature of conduct of business transactions, B2C model of e-commerce seems to be the most fatal for the infringement of data privacy as enormous amounts of consumer information and database is collected, stored and processed by the e-commerce businesses.⁴⁵ Apart from it, B2C model of e-commerce is more prone to security threats because individuals provide their personal information and credit card information for the completion of transactions. In addition to it, consumers might have concerns regarding their personal information and whether it has been secured or used effectively by business organizations or not.⁴⁶

- (3) **Consumer to Consumer (C2C) Model:** The C2C model involves business transactions between consumers. In such model, one consumer sells directly to another consumer. For example, www.olx.in is one of the websites which allows consumers to advertise and sell their products online to another consumer. Here, olx, as an auction website, brings the buyer and seller together to conduct business transactions with a payment of fee by the seller of products.
- (4) **Consumer to Business (C2B) Model:** The C2B is similar to B2C model of e-commerce. C2B model also involves business transactions between consumers and a business organization. In C2B, consumer is the seller and business organization is the buyer. For example in www.monster.com, individuals can post their bio-data for the services they can offer and then any business organization interested in deploying their service can contact individuals and can employ them accordingly.

Apart from the above business models of e-commerce, there are other e-commerce models as well which comes under the category of e-governance like Government to Government (G2G), Government to Consumer (G2C), Consumer to Government (C2G), Government to Business (G2B) and Business to Government (B2G).

SUPPLY CHAIN MANAGEMENT⁴⁷

At the most fundamental level, supply chain management (for brevity, 'SCM') is management of the flow of goods, data, and finances related to a product or service, right from the procurement of raw materials to the delivery of the product at its final destination.

Although many people equate the supply chain with logistics, logistics is actually just one component of the supply chain. Today's digitally based SCM systems include material handling and software for all parties involved in product or service creation, order fulfillment, and information tracking such as suppliers, manufacturers, wholesalers, transportation and logistics providers, and retailers.

Supply chain activities span procurement, product lifecycle management, supply chain planning (including inventory planning and the maintenance of enterprise assets and production lines), logistics (including transportation and fleet management), and order management. SCM can also extend to the activities around global trade, such as the management of global suppliers and multinational production processes.

45. Elliot Steve, *Electronic Commerce: B2C Strategies and Models*, London, John Wiley and Sons Ltd. U.K. (2002).

46. Timmers P., *Business Models for Electronic Markets, Electronic Markets*, Vol. 8, No. 2, 3-8 (1998).

47. Fernando Jason (2022) *Supply Chain Management (SCM): How it Works and Why It Is Important*

Note: Product Lifecycle Management (PLM) is the process of managing the entire lifecycle of a product, right from its inception through the engineering, design and manufacture, as well as the service and delivery of manufactured products. PLM integrates people, data, processes, and business systems and provides a product information backbone for companies and their extended enterprises.

Productivity and efficiency improvements can go straight to the bottom line of a company. Good supply chain management keeps companies out of the headlines and away from expensive recalls and lawsuits. In SCM, the supply chain manager coordinates the logistics of all aspects of the supply chain which consists of the following five parts:

- **Planning:** To get the best results from SCM, the process usually begins with planning to match supply with customer and manufacturing demands. Firms must predict what their future needs will be and act accordingly. This relates to raw materials needed during each stage of manufacturing, equipment capacity and limitations, and staffing needs along with the SCM process. Large entities often rely on ERP system modules to aggregate information and compile plans.
- **Sourcing:** Efficient SCM processes rely very heavily on strong relationships with suppliers. Sourcing entails working with vendors to supply the raw materials needed throughout the manufacturing process. A company may be able to plan and work with a supplier to source goods in advance. However, different industries will have different sourcing requirements. In general, SCM sourcing includes ensuring:
 - the raw materials meet the manufacturing specification needed for the production of goods.
 - the prices paid for the goods are in line with market expectations.
 - the vendor has the flexibility to deliver emergency materials due to unforeseen events.
 - the vendor has a proven record of delivering goods on time and in good quality.

Supply chain management is especially critical when manufacturers are working with perishable goods. When sourcing goods, firms should be mindful of lead time and how well a supplier can comply with those needs.

- **Manufacturing:** At the heart of the supply chain management process, the company transforms raw materials by using machinery, labor, or other external forces to make something new. This final product is the ultimate goal of the manufacturing process, though it is not the final stage of supply chain management.

The manufacturing process may be further divided into sub-tasks such as assembly, testing, inspection, or packaging. During the manufacturing process, a firm must be mindful of waste or other controllable factors that may cause deviations from original plans. For example, if a company is using more raw materials than planned and sourced, due to a lack of employee training, the firm must rectify the issue or revisit the earlier stages in SCM.

- **Delivering:** Once products are made and sales are finalized, a company must get the products into the hands of its customers. The distribution process is often seen as a brand image contributor, as up until this point, the customer has not yet interacted with the product. In strong SCM processes, a company has robust logistic capabilities and delivery channels to ensure timely, safe, and inexpensive delivery of products.

This includes having a backup or diversified distribution methods in case any mode of transportation is temporarily rendered unusable. For example, how might a company's delivery process be impacted by record snowfall in distribution center areas.

- **Returning:** The supply chain management process concludes with support for the product and customer returns. It's bad enough that a customer needs to return a product, and it's even worse if it's due to an error on the company's part. This return process is often called reverse logistics, and the company must ensure it has the capabilities to receive returned products and correctly and promptly assign refunds for returns received. Whether a company is performing a product recall or a customer is simply not satisfied with the product, the transaction with the customer must be remedied.

Many consider customer returns as an interaction between the customer and the company. However, a very important part of customer returns is the intercompany communication to identify defective products, expired products, or non-conforming goods. Without addressing the underlying cause of a customer return, the supply chain management process will have failed, and future returns will likely persist.

Customer Relationship Management (CRM)

Customer Relationship Management (CRM) is a technology for managing all your company's relationships and interactions with customers and potential customers. The goal is simple: Improve business relationships. A CRM system helps companies stay connected to customers, streamline processes, and improve profitability.

When people talk about CRM, they usually refer to a CRM system or platform, a tool that helps with contact management, sales management, productivity, and more.

CRM software helps you focus on your organization's relationships with individual people — including customers, service users, colleagues, or suppliers — throughout your lifecycle with them, including finding new customers, winning their business, and providing support and additional services throughout the relationship.

With a CRM solution, the sales and marketing team can track and follow a customer's interaction journey with your business. This can enhance the customer journey and experience by refining each customer touchpoint.

While all those benefits apply on some level to just about any CRM, customer relationship management includes a large category of customer service, marketing, and sales tools. Different CRM products and methodologies vary in terms of features and focus, and they can be divided into three main categories.

- Collaborative CRM systems
- Operational CRM systems
- Analytical CRM systems

1. **Collaborative CRM systems:** Collaborative CRMs ensure all teams have access to the same up-to-date customer data, no matter which department or channel they work in. Not only does customer support have all the information that marketing and sales teams collected when working with a prospective customer, but agents in a call center have updated data on customer interactions that happened over email or messaging channels.

Collaborative CRM treats each interaction as part of a larger, integrated conversation between the brand and the customer. The integration between departments and channels saves customers from the dreaded experience of repeating themselves each time they speak to a new executive of the company. Each employee they interact with can quickly and easily pull up a record of all past interactions with the consumer to address the query and grievance of the customer.

2. **Operational CRM systems:** Operational CRMs help streamline a company's processes for customer relationships. They provide tools to better visualize and more efficiently handle the full customer journey—even when it includes a high number of touchpoints. It starts from their first interactions with

your company's website, through the whole lead management process as they move through the sales pipeline, and continues with their behaviors once they've become a customer.

Operational CRM systems typically provide automation features. Marketing automation, sales automation, and service automation offload some of the work that your employees would otherwise have to handle. This opens up the schedule of the employees for more creative and personal aspects of their jobs—the stuff that needs a human touch. And it makes it much easier for growing companies to continue to provide top-notch service to scale.

- 3. Analytical CRM systems:** Analytical CRMs have the primary focus of helping in the analysis of customer data, in order to gain important insights. Digital tools and platforms now make it easy to collect large quantities of data. But data analysis—the step required to turn that data into something useful for your company—is a difficult feat. In fact, estimates suggest that over half of the data collected by companies never gets used.

ELECTRONIC DATA INTERCHANGE (EDI)⁴⁸

Electronic Data Interchange (EDI) is a computer-to-computer exchange of business documents in a standard electronic format between two or more trading partners. It enables companies to exchange information electronically in a structured format, eliminating the need for manual data entry and reducing the cost and time associated with paper-based transactions.

EDI was first introduced in the 1960s as a way for companies to exchange business documents electronically. Over time, the standardization of EDI formats and protocols has enabled businesses to integrate their internal systems with those of their trading partners, improving efficiency and reducing errors.

EDI transactions can include purchase orders, invoices, shipping notices, and other business documents. The EDI standard defines the format and content of these documents, ensuring that they are easily interpreted by both the sender and the receiver.

EDI has become an important part of many businesses, particularly those in the supply chain and logistics industries. It allows for faster and more accurate processing of transactions, leading to improved customer satisfaction and increased profits.

Imagine writing a letter to your friend while communicating every time. This may be a little hard to imagine since today humans live in an era where they can very easily communicate through the internet. Now, imagine the same case with businesses, where communication and exchange of important documents are constantly required. Following the traditional method of sending letters for all communications, it will take forever for the messages to reach the other party, but also the documents will pile up as there is a lot of information that is needed to be stored and kept. It is a tedious and cumbersome process indeed and this is where EDI plays its role.

Electronic Data Exchange is the direct exchange of data and important business documents through the Internet in a professional manner. Two different companies sitting at extreme corners of the world can very easily interchange information or documents (like sales orders, shipping notices, invoices, etc.) with the help of EDI.

EDI Documents:

The most common documents exchanged via EDI are:

- Invoices
- Purchase Orders

⁴⁸ Source: *What is EDI (Electronic Data Interchange) (2023)*, geeksforgeeks.

- Financial Information letters
- Transaction Bills
- Shipping requests and notifications
- Acknowledgment and Feedback
- Transcripts
- Claims
- Business Correspondence letters.

EDI Users:

- Central and State Government agencies
- Industry
- Banking
- Retailing
- Manufacturing
- Insurance
- Healthcare
- Automotive
- Electronics
- Grocery
- Transportation.

ELECTRONIC FUNDS TRANSFER (EFT)⁴⁹

Electronic Funds Transfer (EFT) is the process by which a user of one bank can transfer money from their account to another by way of payment. It is also called a direct deposit since it directly deposits money into the receiver's account without the need for any physical interaction involving use of documents and cheques.

Electronic Funds Transfer (EFT): How it works

ETFs work via electronic signals that the sender generates when initiating payments, i.e. sending money to the receiver. Instantly, the networks and the servers or payment terminals receive the signals to initiate and continue with the payment. It involves transactions where receiver and the sender can be parties like employers to their employees, vendors to customers, retailers, etc. The reason why ETFs are so popular is because of easy accessibility and safety of the transaction. They're also very swift, with the money being credited almost instantly or within a window of a few days. ETF is possible by initiating a digital cheque — usually between vendors and retailers during the purchase, direct deposit and phone payments — for utility payments, ATMs and card payments or internet transactions via proper authorization. ETFs are encrypted across 128-bit signals, ensuring security. As such, they are secure and swift, and cost effective for businesses. It requires very little effort to set up, usually requiring a bank account and proper documents to allow transfers at the time of set-up only. During the transfer, there is no necessity of providing documents or physical presence to initiate the transaction.

⁴⁹. Reproduced from Adithyan (2023) *Electronic Fund Transfer, Clear Tax*.

Major Features of Electronic Funds Transfer (EFT)

- Usually, a very small fee is charged to process the payment across a window.
- To make an EFT payment, all you need is your bank information and the receiver's bank information.
- You cannot stop an EFT payment after you've initiated it by clicking continue after entering your bank details.

DIGITAL CURRENCY⁵⁰

Digital currency is a form of currency that is available only in digital or electronic form. It is also called digital money, electronic money, electronic currency, or cyber cash.

- Digital currencies are currencies that are only accessible with computers or mobile phones because they only exist in electronic form.
- Typical digital currencies do not require intermediaries and are often the cheapest method for trading currencies.
- All cryptocurrencies are digital currencies, but not all digital currencies are cryptocurrencies.
- Some of the advantages of digital currencies are that they enable seamless transfer of value and can make transaction costs cheaper.
- Some of the disadvantages of digital currencies are that they can be volatile to trade and are susceptible to hacks.

Note: Cryptocurrency is a digital payment system that doesn't rely on banks to verify transactions. It's a peer-to-peer system that can enable anyone anywhere to send and receive payments. Instead of being physical money carried around and exchanged in the real world, cryptocurrency payments exist purely as digital entries to an online database describing specific transactions. When you transfer cryptocurrency funds, the transactions are recorded in a public ledger. Cryptocurrency is stored in digital wallets.

Digital currencies do not have physical attributes and are available only in digital form. Transactions involving digital currencies are made using computers or electronic wallets connected to the internet or designated networks. In contrast, physical currencies, such as banknotes and minted coins, are tangible, meaning they have definite physical attributes and characteristics. Transactions involving such currencies are made possible only when their holders have physical possession of these currencies.

Digital currencies have utility similar to physical currencies. They can be used to purchase goods and pay for services. They can also find restricted use among certain online communities, such as gaming sites, gambling portals, or social networks.

Digital currencies also enable instant transactions that can be seamlessly executed across borders. For instance, it is possible for a person located in the United States to make payments in digital currency to a counterparty residing in Singapore, provided they are both connected to the same network.

Types of Digital Currencies

Digital currency is an overarching term that can be used to describe different types of currencies that exist in the electronic realm. Broadly, there are three different types of currencies:

⁵⁰. Reproduced from Frankefield Jake (2023) *Digital Currency Types, Characteristics, Pros and Cons, Future Uses*, Investopedia.

- **Cryptocurrencies:** Cryptocurrencies are digital currencies that use cryptography to secure and verify transactions in a network. Cryptography is also used to manage and control the creation of such currencies. Bitcoin and Ethereum are examples of cryptocurrencies. Depending on the jurisdiction, cryptocurrencies may or may not be regulated. Cryptocurrencies are considered virtual currencies because they are unregulated and exist only in digital form.
- **Virtual Currencies:** Virtual currencies are unregulated digital currencies controlled by developers or a founding organization consisting of various stakeholders involved in the process. Virtual currencies can also be algorithmically controlled by a defined network protocol. An example of a virtual currency is a gaming network token whose economics is defined and controlled by developers.

Digital Currencies	Virtual Currencies	Cryptocurrencies
Regulated or unregulated currency that is available only in digital or electronic form.	An unregulated digital currency that is controlled by its developer(s), its founding organization, or its defined network protocol.	A virtual currency that uses cryptography to secure and verify transactions as well as to manage and control the creation of new currency units.

ADVANTAGES AND DISADVANTAGES

Advantages of Digital Currencies

The advantages of digital currencies are as follows:

- Fast Transfer and Transaction Times
- No Physical Manufacturing Required
- Monetary and Fiscal Policy Implementation
- Cheaper Transaction Costs
- Decentralized
- Privacy
- Accessible Around the World.

Disadvantages of Digital Currencies

The disadvantages of digital currencies are as follows:

- Storage and Infrastructure Issues
- Hacking Potential
- Volatile Value
- Limited Acceptance
- Irreversibility
- Change in legal framework may render these currencies infructuous.

Pros and Cons of Digital Currencies

Pros

- Faster transaction times.
- Do not require physical manufacturing.
- Lower transaction costs.
- Make it easier to implement monetary and fiscal policy.
- Offers greater privacy than other forms of currency.

Cons

- Can be difficult to store and use.
- Can be hacked.
- Can have volatile prices that result in lost value.
- May not allow for irrevocability of transactions.
- Still has limited acceptability.

BLOCK CHAIN TECHNOLOGY

Blockchain is a distributed database or ledger shared amongst a computer network's nodes. They are best known for their crucial role in cryptocurrency systems for maintaining a secure and decentralized record of transactions, but they are not limited to cryptocurrency uses. Blockchains can be used to make data in any industry immutable—the term used to describe the inability to be altered.

Because there is no way to change a block, the only trust needed is at the point where a user or program enters data. This aspect reduces the need for trusted third parties, which are usually auditors or other humans that add costs and make mistakes.

Since Bitcoin's introduction in 2009, blockchain uses have exploded via the creation of various cryptocurrencies, Decentralized Finance (DeFi) applications, Non-Fungible Tokens (NFTs), and smart contracts.

Note: Non-Fungible Token (NFT) is a unique digital identifier that is recorded on a blockchain, and is used to certify ownership and authenticity. It cannot be copied, substituted, or subdivided.

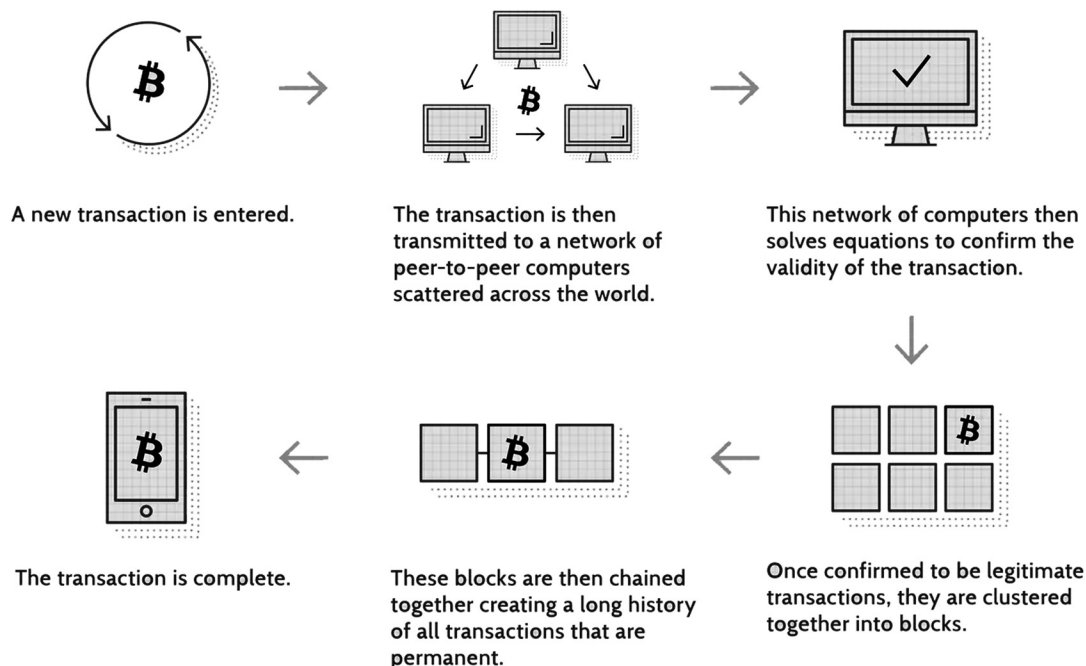
Decentralized Finance (DeFi) is an umbrella term for a variety of financial applications in cryptocurrency or blockchain geared toward disrupting financial intermediaries.

- Blockchain is a type of shared database that differs from a typical database in the way it stores information; blockchains store data in blocks linked together via cryptography.
- Different types of information can be stored on a blockchain, but the most common use for transactions has been as a ledger.
- In Bitcoin's case, blockchain is decentralized so that no single person or group has control—instead, all users collectively retain control.
- Decentralized blockchains are immutable, which means that the data entered is irreversible. For Bitcoin, transactions are permanently recorded and viewable to anyone.

Transaction Process

Transactions follow a specific process, depending on the blockchain they are taking place on. For example, on Bitcoin's blockchain, if you initiate a transaction using your cryptocurrency wallet—the application that provides an interface for the blockchain—it starts a sequence of events.

In Bitcoin, your transaction is sent to a memory pool, where it is stored and queued until a miner or validator picks it up. Once it is entered into a block and the block fills up with transactions, it is closed and encrypted using an encryption algorithm. Then, the mining begins.



Source: Investopedia

The entire network works simultaneously, trying to “solve” the hash. Each one generates a random hash except for the “nonce,” short for number used once.

Every miner starts with a nonce of zero, which is appended to their randomly-generated hash. If that number isn’t equal to or less than the target hash, a value of one is added to the nonce, and a new block hash is generated. This continues until a miner generates a valid hash, winning the race and receiving the reward.

Once a block is closed, a transaction is complete. However, the block is not considered to be confirmed until five other blocks have been validated. Confirmation takes the network about one hour to complete because it averages just under 10 minutes per block (the first block with your transaction and five following blocks multiplied by 10 equals about 60 minutes).

Not all blockchains follow this process. For instance, the Ethereum network randomly chooses one validator from all users with ether staked to validate blocks, which are then confirmed by the network. This is much faster and less energy intensive than Bitcoin’s process.

PAYMENT PORTAL⁵¹

A payment gateway is a technology used by merchants to accept debit or credit card purchases from customers. The term includes not only the physical card-reading devices found in brick-and-mortar retail stores but also the payment processing portals found in online stores. However, brick-and-mortar payment gateways in recent years have begun accepting phone-based payments using QR codes or Near Field Communication (NFC) technology.

⁵¹ Reproduced from Fernando Jason (2021) *What is a Payment Gateway? Definition, How It Works and Example*, Investopedia

- Payment gateways are the consumer-facing interfaces used to collect payment information.
- In physical stores, payment gateways consist of the point of sale (POS) terminals used to accept credit card information by card or by smartphone.
- In online stores, payment gateways are the “checkout” portals used to enter credit card information or credentials for services such as PayPal.
- Payment gateways are distinct from payment processors, which use customer information to collect payments on behalf of the merchant.
- There are also payment gateways to facilitate payment in cryptocurrencies, such as Bitcoin.

Examples of Payment Gateways

Merchants can gain access to payment gateway systems through merchant acquiring bank partnerships, or else they can select their own payment gateway system. Large banks such as Bank of America (BAC) and JPMorgan Chase (JPM) have sophisticated payment gateway systems that they offer to customers along with their own merchant acquiring bank services. Ultimately, merchants can choose a variety of payment gateway technologies as long as they are compatible with the merchant acquiring bank that is being used for payment processing.

One recent example of a payment gateway is Square (SQ), which emphasizes flexible mobile payments for retail businesses. The company’s Square Reader technology allows customers to easily accept payments at ad-hoc locations such as conventions or farmer’s markets, or through roaming storefronts such as food trucks.

With the Square Reader payment gateway technology, a merchant can attach a small piece of hardware to their mobile phone which allows the customer to swipe their payment card for processing through the mobile phone’s electronic connection. The Square Reader sends the payment information to a merchant’s acquiring bank which then processes the information for the merchant momentarily.

It is likely that new products will continue to increase the versatility and speed of payment gateways. In recent years, blockchain startups have even introduced payment gateways for cryptocurrencies.

E-COMMERCE SECURITY – MOBILE COMMERCE (M-commerce)

M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld devices such as smartphones and tablets. M-commerce is a form of e-commerce that enables users to access online shopping platforms without the use of a desktop computer.

Over time, content delivery through wireless devices has become faster, more secure and scalable. As a result, mobile commerce has grown rapidly.

M-commerce encompasses three major approaches to mobility and business.

- Examples of M-commerce include in-app purchasing; mobile banking virtual marketplace apps, such as the Amazon mobile app; and digital wallets, such as Apple Pay, Google Pay and Samsung Wallet.

Examples of M-commerce use in specific industries include the following:

- *Financial services:* Mobile banking and brokerage transactions are done from mobile devices.
- *Telecommunications:* Handheld devices are used to make service changes and bill payments, and to do account reviews.
- *Service and retail:* Consumers place and pay for orders on-the-fly through online stores.
- *Information services:* Financial, sports, traffic, weather and many other news updates are accessed through mobile devices.

Types of M-commerce

M-commerce is categorized based on the following three basic functions:

- **Mobile shopping** enables customers to buy a product using a mobile device with an application such as Amazon or a web app. A subcategory of mobile shopping is app commerce, which is a transaction that takes place over a native app.
- **Mobile banking** is online banking designed for handheld technology. It enables customers to access accounts and brokerage services, conduct financial transactions, pay bills and make stock trades. This is typically done through a secure, dedicated app provided by the banking institution. Mobile banking services may use SMS or chatbots and other conversational app platforms to send out alerts and track account activities. For example, the WhatsApp chatbot lets customers view their account balance, transfer funds, review loans and conduct other transactions in real time through WhatsApp.
- **Mobile payments** are an alternative to traditional payment methods, such as cash, check, credit and debit cards. They enable users to buy products in person using a mobile device. Digital wallets, such as Apple Pay, let customers buy products without swiping a card or paying with cash. Mobile payment apps, such as PayPal, Venmo and Xoom serve the same purpose and are popular options. Mobile consumers also use QR codes to pay for things on their mobile phones. With mobile payments, users send money directly to the recipient's cell phone number or bank account.

Working of Mobile Commerce

With most M-commerce enabled platforms, the mobile device is connected to a wireless network that is used to conduct online product purchases and other transactions.

For those in charge of developing an M-commerce application, important key performance indicators to monitor include the following:

- total mobile traffic;
- total application traffic;
- average order value; and
- the value of orders over time.

Similarly, tracking the mobile add-to-cart rate will help developers see if users are becoming customers. M-commerce developers may also be interested in logging average page loading times, mobile cart conversion rates and SMS subscriptions.

Mobile payment products operate through a form of peer-to-peer sharing. Once a mobile device is paired with a user's bank card information, the phone can be waved over a payment terminal to pay for a product. Contactless payment using a mobile device uses near-field communication technology.

M-commerce vs. E-commerce

Electronic commerce, or e-commerce refers to buying and selling goods and services over the internet. E-commerce and M-commerce are similar, but they come with a few distinctions from each other, such as the following:

- **Mobility:** E-commerce transactions can be conducted through a desktop computer where the user is in a fixed spot. This reduces mobility as it can be difficult to move around a desktop device. M-commerce offers greater mobility as it's conducted through handheld devices that can be used anywhere provided that there is an internet connection, including buses, trains and airplanes or even when exercising at the gym.

- **Location tracking:** Many e-commerce apps make use of location tracking capabilities to pitch users' opportunities based on their location. However, the location tracking capability of e-commerce is limited when it is used with a non-mobile device. For example, the location of an e-commerce shopper is tracked with their IP address. While the IP address provides a broad region of the user's location, it is not capable of identifying the exact location, which might affect the targeted advertising strategies of a business. M-commerce apps, on the other hand, can track locations using Wi-Fi and GPS-based technologies that enable location-specific content and personalized recommendations. For instance, a provider can send push notifications offering personalized discounts that target certain customers as they walk past a specific store in a mall.
- **Security:** Credit cards are still commonly used for non-mobile e-commerce payments. They are considered riskier than other online payment methods, even with security measures, such as multifactor authentication. Most data breaches and identity thefts happen because of credit card misuse. M-commerce closes some security gaps through the addition of measures such as biometric authentication, mobile wallets, quick response or QR codes and even cryptocurrencies.
- **Reachability and convenience:** M-commerce makes it easier to reach a target audience. With mobile apps, businesses can reach more people and make their buying experience easier and faster.

Future of Mobile Commerce

Mobile commerce is evolving and starting to reach a wider audience. According to Insider Intelligence, M-commerce will account for 10.4% of all retail sales by 2025. Many businesses are adopting mobile commerce to avoid falling behind the competitors.

The following are some of the current and future mobile commerce trends:

Mobile Retargeting: This concept is an extension of location-based mobile marketing. Instead of putting ads at random places, this trend targets them contextually only at potential customers. For example, marketers can send an ad to users who have previously visited their mobile app or they might present an active mobile targeted ad to a user who comes into proximity of their store. Mobile retargeting offers a better return on investment compared with other advertisement strategies and is likely to become more popular in the future.

- **Augmented Reality (AR):** The number of mobile applications with embedded AR is growing rapidly. To improve its brand presence and provide digital content optimization, retail giant Ikea introduced an AR mobile application in 2017 that allows shoppers to test products in real time through Apple iOS 11's ARKit technology. Customers use AR models of IKEA furniture from the mobile app to see how those pieces fit in their home and office spaces. Many brands, including Coca-Cola, Zara, Covergirl and Pez, also use embedded AR in their mobile apps.
- **Mobile SEO.** With the growing number of smartphone users accessing the internet, mobile responsive websites have become a necessity. Websites that are not mobile-friendly or do not provide a good user experience risk user abandonment, which in turn increases the bounce rate of their websites. Websites with higher bounce rates rank lower in SEO and Google searches. Therefore, building mobile websites that are adaptive to handheld devices is an important goal for all businesses.
- **Mobile banking:** The biggest advantage of mobile banking is the ability to send money anywhere, anytime. Users can send money to others and conduct transactions with their bank irrespective of their location. This trend is likely to keep growing. According to Business Insider, as of 2021, there are an estimated 169.3 million mobile banking users in the United States, of whom nearly 80% said that mobile banking was their preferred way to access their accounts.

- **AI, chatbots and shopping assistants:** Powered by AI, chatbots are becoming essential e-commerce tools. They help shoppers around the clock with product recommendations, purchase completion, customer support and other tasks. According to a Grand View Research report, the global AI chatbot market is expected to reach \$3.99 billion by 2030. Shoppers are becoming more comfortable with chatbots as they have become accustomed to chatting with their friends and family over chat apps, such as WhatsApp, Facebook Messenger and Telegram.
- **Mobile ticketing:** Gone are the days when users had to wait in long lines to buy movie or concert tickets. With mobile ticketing, users can buy and receive tickets through their smartphones. Mobile ticketing also eliminates the need to print the tickets as users receive them on their phones in a text format with a barcode that gets scanned at events.

BLUETOOTH AND WI-FI⁵²

Both Bluetooth and Wi-Fi are used for providing wireless communication through radio signals. The difference between Bluetooth and WiFi is that, Bluetooth is actually accustomed to connect short-range devices for sharing information whereas WiFi is used for providing high-speed web access or internet. WiFi provides high information measure because the speed of web is a vital issue.

Bluetooth, developed in the late 1990s, is a technology designed to enable short-range wireless communication between electronic devices, such as between a laptop and a smartphone or between a computer and a television. Bluetooth works by using radio frequencies, rather than the infrared spectrum used by traditional remote controls. As a result, Bluetooth eliminates the need not only for a wire connection but also for maintaining a clear line of sight to communicate between devices.

Wi-Fi is similar to Bluetooth in that it also uses radio waves for high-speed data transfer over short distances without the need for a wire connection. Wi-Fi works by breaking a signal into pieces and transmitting those fragments over multiple radio frequencies. This technique enables the signal to be transmitted at a lower power per frequency and also allows multiple devices to use the same Wi-Fi transmitter. Initially developed in the 1990s, Wi-Fi has undergone several standardization processes, approved by the Institute of Electrical and Electronics Engineers (IEEE), to allow for greater bandwidth in data transfer.

Although both are wireless forms of communication, Bluetooth and Wi-Fi differ in terms of their purpose, capabilities, and other factors. Bluetooth allows for short-range data transfer between devices. As an example, it is commonly employed in headsets for mobile phones, enabling hands-free phone use, etc. Wi-Fi, on the other hand, allows devices to connect to the Internet. Bluetooth limits the number of devices that can connect at any one time, whereas Wi-Fi is open to more devices and more users. In addition, Bluetooth, because it requires only an adapter on each connecting device, tends to be simpler to use and needs less power than Wi-Fi, although this is achieved at the expense of range and speed of data transfer, in which Wi-Fi typically exceeds Bluetooth's capabilities.

Let's see the difference between Bluetooth and Wi-Fi:

<i>Bluetooth</i>	<i>Wi-Fi</i>
Bluetooth has no full form.	Wi-Fi stands for Wireless Fidelity.
It requires Bluetooth adapter on all devices for connectivity.	It requires wireless adapter on all devices and wireless router for connectivity.
Bluetooth consumes low power.	It consumes high power.

52. Difference between Wi-Fi and Bluetooth, Geeksofgreeks. Available at <https://www.geeksforgreeks.org/difference-between-bluetooth-and-wi-fi/>

The security of bluetooth is less in comparison to Wi-Fi.	It provides better security than bluetooth.
Bluetooth is less flexible means in this limited users are supported.	Wi-Fi supports large number of users.
The radio signal range of bluetooth is ten meters.	In Wi-Fi, transmission range is hundred meters.
Bluetooth require low bandwidth.	It requires high bandwidth.
Bluetooth frequency ranges from 2.400 GHz to 2.483 GHz.	WiFi frequency ranges from 2.4GHz to 5 GHz.
Bluetooth demands a bluetooth setting or adapter on all devices to set up connectivity.	WiFi demands a wireless router to set up the connectivity and adapter on the device.
WiFi demands a wireless router to set up the connectivity and adapter on the device.	In WiFi, modulation technique is OFDM (Orthogonal Frequency Division Multiplexing) and QAM (Quadrature Amplitude Modulation).
Bit-rate in bluetooth is 2.1 Mbps.	Bit-rate in WiFi is 600 Mbps.
Applications Consumer Games Industry Sport training	Wifi analyser Wifi inspector
It's under IEEE 802.15.	It's under IEEE 802.11 Standard.

LESSON ROUND-UP

- Internet Protocols are a set of rules that governs the communication and exchange of data over the internet. Both the sender and receiver should follow the same protocols in order to communicate the data.
- IP address is a unique address that identifies a device over the network.
- Electronic commerce, or e-commerce refers to buying and selling goods and services over the internet.
- Business models of e-commerce can be classified into the following four models: (1) Business to Business (B2B) (2) Business to Consumer (B2C) (3) Consumer to Consumer (C2C) (4) Consumer to Business (C2B).
- Supply Chain Management (SCM) is the management of the flow of goods, data, and finances related to a product or service, right from the procurement of raw materials to the delivery of the product at its final destination.
- Customer Relationship Management (CRM) is a technology for managing all your company's relationships and interactions with customers and potential customers.

- Electronic Data Interchange (EDI) is a computer-to-computer exchange of business documents in a standard electronic format between two or more trading partners.
- Electronic Funds Transfer (EFT) is the process by which a user of one bank can transfer money from their account to another by way of payment.
- Digital currency is an overarching term that can be used to describe different types of currencies that exist in the electronic realm.
- Cryptocurrencies are digital currencies that use cryptography to secure and verify transactions in a network.
- Virtual currencies are unregulated digital currencies controlled by developers or a founding organization consisting of various stakeholders involved in the process.
- Blockchain is a distributed database or ledger shared amongst a computer network's nodes.
- A payment gateway is a technology used by merchants to accept debit or credit card purchases from customers.
- M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld devices such as smartphones and tablets. M-commerce is a form of e-commerce that enables users to access online shopping platforms without the use of a desktop computer.
- Bluetooth, developed in the late 1990s, is a technology designed to enable short-range wireless communication between electronic devices, such as between a laptop and a smartphone or between a computer and a television.
- Wi-Fi is similar to Bluetooth in that it also uses radio waves for high-speed data transfer over short distances without the need for a wire connection. Wi-Fi works by breaking a signal into pieces and transmitting those fragments over multiple radio frequencies.

TEST YOURSELF

(These are meant for recapitulation only. Answer to these questions are not to be submitted for evaluation.)

1. Enlist and briefly discuss the various internet protocols.
2. Write a brief note on blockchain technology.
3. Discuss the categories of CRM systems.
4. Discuss the pros and cons of digital currencies.
5. What are the benefits and limitations of e-commerce?
6. Discuss the C2C model.
7. Write a short note on:
 - a. Payment Gateway
 - b. EDI
 - c. UDP
 - d. TELNET
 - e. PPP
 - f. EFT

8. Enumerate the differences between M-commerce and e-commerce.
9. Discuss the current and future mobile commerce trends.
10. List out the differences between Bluetooth and Wi-Fi.

LIST OF FURTHER READINGS

- Understanding the Internet: A Clear Guide to Internet Technologies by Keith Sutherland (published by Routledge).
- Web Programming and Internet Technologies, 2nd Edition by Scobey (Released September 2016, Published by Jones & Bartlett Learning).
- Internet Technology and Web Design by Dr. R.K. Jain (Published by Khanna Book Publishing Company)

LIST OF OTHER REFERENCES

- Digital Currency Types, Characteristics, Pros and Cons, Future Uses, Investopedia.
- Electronic Fund Transfer, Clear Tax.
- What is EDI (Electronic Data Interchange) (2023), geeksforgeeks.
- Supply Chain Management (SCM): How it Works and Why It Is Important Fernando Jason (2022).
- Elliot Steve, Electronic Commerce: B2C Strategies and Models, London, John Wiley and Sons Ltd. U.K. (2002).
- Timmers P., Business Models for Electronic Markets, Electronic Markets, Vol. 8, No. 2, 3-8 (1998).
- e-Commerce Models. (May 20th, 2013), <http://www.eservglobal.com/uploads/files/index.pdf>.
- Ray Sarbapriya, Emerging Trends of E-commerce in India: Some Crucial Issues and Challenges, Computer Engineering and Intelligent Systems, Vol. 2, No. 5 (2011).
- Mahadevan B., Business Models for Internet based E-commerce: An Anatomy, Working paper, Indian Institute of Management, Bangalore.
- Timmers P., Business Models for Electronic Markets, Electronic Markets, Vol. 8, No. 2, 3-8 (1998).
- Johnson Carrie, A Report on The Growth of Multichannel Retailing; A Forrester Document: National Governor's Association and the National Conference of State Legislatures. (June 15, 2012), <http://www.gfoa.org/downloads/0407MULTICHANNEL.pdf>.
- Internet and Mobile Association of India (IAMAI). (June 15, 2012), <http://www.iamai.in/reports1.aspx>.
- Forrester Report on India to be fastest Growing Market in Asia-Pacific. (June 15, 2012), <http://www.iamwire.com/2012/04/india-to-be-the-fastest-growing-e-commerce-market-in-asia-pacific-market-set-to-grow-to-8-8-billion-by-2016/>.
- Asian E-commerce Sites Net \$ 6.9 Billion in Past 3 years, But the Exits still Tiny (Stats); TECHINASIS, (Mar. 13th, 2014) <http://www.techinasia.com/asia-ecommerce-investments-and-exits-2010-to-2013/>
- A Report on Bringing e-commerce benefits to Consumers, by European Commission, The European Parliament, (2011). (June 15, 2012), http://ec.europa.eu/internal_market/ecommerce/docs/communication2012/SEC2011_1640_en.pdf.

WARNING

Regulation 27 of the Company Secretaries Regulations, 1982

In the event of any misconduct by a registered student or a candidate enrolled for any examination conducted by the Institute, the Council or any Committee formed by the Council in this regard, may suo-moto or on receipt of a complaint, if it is satisfied that, the misconduct is proved after such investigation as it may deem necessary and after giving such student or candidate an opportunity of being heard, suspend or debar him from appearing in any one or more examinations, cancel his examination result, or registration as a student, or debar him from re-registration as a student, or take such action as may be deemed fit.

It may be noted that according to regulation 2(ja) of the Company Secretaries Regulations, 1982, 'misconduct' in relation to a registered student or a candidate enrolled for any examination conducted by the Institute means behaviour in disorderly manner in relation to the Institute or in or around an examination centre or premises, or breach of any provision of the Act, rule, regulation, notification, condition, guideline, direction, advisory, circular of the Institute, or adoption of malpractices with regard to postal or oral tuition or resorting to or attempting to resort to unfair means in connection with writing of any examination conducted by the Institute, or tampering with the Institute's record or database, writing or sharing information about the Institute on public forums, social networking or any print or electronic media which is defamatory or any other act which may harm, damage, hamper or challenge the secrecy, decorum or sanctity of examination or training or any policy of the Institute.

PROFESSIONAL PROGRAMME
ARTIFICIAL INTELLIGENCE, DATA ANALYTICS AND
CYBER SECURITY – LAWS & PRACTICE
GROUP 1 • ELECTIVE PAPER 4.4

(This test paper is for practice and self-study only and not to be sent to the Institute)

Time allowed: 3 hours

Maximum Mark: 100

Answer all Questions

Question 1

Read the following case study and answer the questions that follow:

M/s Tech Info consulting firm sent a small team to South America to complete a client project. During their stay, an employee used a business debit card at a local ATM. A month after returning to the US, the firm received overdraft notices from their bank. They identified fraudulent withdrawals of \$10,000, all originating from South America. There was an additional \$1,000 overdraft fee.

The criminals installed an ATM skimmer device to record card account credentials. Many false debit cards were manufactured and used at ATMs in different cities across South America.

Realizing they had been defrauded, the firm contacted their bank and closed the impacted account immediately. Their attempts to pursue reimbursement from the bank were unsuccessful. The commercial account used at the ATM for local currency had different protections from consumer accounts and the bank was not required to reimburse them for their losses. The bank went on to deduct the \$1,000 overdraft fee from the firm owner's personal account. The firm severed ties with that bank. The new bank offered comprehensive fraud protection guarantees. The firm created two business accounts: one for receiving funds and making small transfers and another one for small expense payments. The firm updated travel protocols, banning the use of company-provided debit cards. Employees now prepay expenses electronically, pay cash, or use a major credit card, as necessary.

The entire cash reserve for the small business was wiped out, netting losses of almost \$15,000.

In view of the above, answer the following:

- (i) Knowing how the firm responded, what would you have done differently?
- (ii) What are some steps you think the firm could have taken to prevent this incident?
- (iii) Is your business susceptible?
- (iv) How are you going to reduce your risk?
- (v) Explain efforts made by India to ensure cybersecurity.

(5 Marks each)

Question 2

- (a) A small family-owned construction company made extensive use of online banking and Automated Clearing House (ACH) transfers. Employees logged in with both company and user-specific ID and password. Two challenge questions had to be answered for transactions over Rs.10,000. The owner

was notified that an ACH transfer of Rs. 1,00,000 was initiated by an unknown source. They contacted the bank and identified that in just one-week cybercriminals had made six transfers from the company bank accounts, totaling Rs. 5,50,000. Cybercriminals were able to install malware onto the company's computers, using a keylogger to capture the banking credentials.

One of their employees had opened an email from what they thought was a materials supplier but was instead a malicious email laced with malware from an imposter account. How this malware impacted the banking transactions of the company?

(5 Marks)

- (b)** One group of cyber attackers transferred Rs. 10,00,000 from one of the Indian banks to another foreign bank situated in London. The criminals have hacked into the bank's computer system network through the use of some information they acquired from the keylogger programs.

What do you understand by keylogger? What type of keylogger used in the above scenario.

(5 Marks)

- (c)** A new start-up SME (Small-Medium Enterprise) based in Singapore with an E-government model has recently noticed anomalies in its accounting and product records. It has undertaken an initial check of system log files, and there are several suspicious entries and IP addresses with a large amount of data being sent outside the company firewall. They have also recently received several customer complaints saying that there is often a strange message displayed during order processing, and they are often re-directed to a payment page that does not look legitimate.

What do you understand by cybersecurity forensics and how would you like to have cybersecurity forensics for the given scenario?

(5 Marks)

- (d)** The accused in the case were working in a BPO, that was handling the business of a multinational bank. The accused, during the course of their work had obtained Personal Identification Numbers (PIN) and other confidential information about the bank's customers. Using these the accused and their accomplices, through different cyber cafes, transferred huge amount of money from the accounts of different customers to fake accounts.

How are you going to reduce your risk of online banking specific in the above scenario?

(5 Marks)

Analytics is the discovery and communication of meaningful patterns in data. Especially, valuable in areas rich with recorded information, analytics relies on the simultaneous application of statistics, computer programming, and operation research to qualify performance. Analytics often favors data visualization to communicate insight. In a nutshell, analytics is the scientific process of transforming data into insight for making better decisions. Data Analytics aims to get actionable insights resulting in smarter decisions and better business outcomes. It is critical to design and build a data warehouse or Business Intelligence (BI) architecture that provides a flexible, multifaceted analytical ecosystem, optimized for efficient ingestion and analysis of large and diverse data sets.

What is Data Analytics and Business Intelligence?

(5 Marks)

Question 3

- (a)** Mr. Akash is running one small business with his family. Their employees do the online transactions by logged in with both company and user-specific IDs and password. The net banking facility of their

bank won't allow any transaction without giving answers to two challenge questions for transactions over Rs.1,000. They receive few messages of debit form their company accounts which were initiated by an unknown source. They contacted the bank and identified that in just one-week cybercriminals had made ten transfers from the company bank accounts for Rs. 4,50,000. Cybercriminals had installed the malware onto the company's computers, using a keylogger to capture the banking credentials.

One of their employees received an email from an unknown sender about winning a lottery price of \$1,00,000 and he opened that email on his office laptop which he used for net banking transactions. That email was malicious email laced with malware from an imposter account. What precautions one should have while reading email received from an unknown sender?

(5 Marks)

- (b) ACH (Automated Clearing House) is run by an organisation called Nacha (previously NACHA - National Automated Clearing House Association) and may also be referred to as the ACH network or ACH scheme. Payment processing via the ACH network has existed since the 1970s. ACH moved financial transactions worth more than Rs.72.6 trillion in 2021, an increase of over 17 percent from the previous year.

What do you understand by Automated Clearing House (ACH) transfers?

(5 Marks)

- (c) A staff member in advisory practice opened a file attached to an email received one morning. It turned out the attachment contained a 'worm' that infected not only the staff member's computer, but it also spread to all other computers in the practice network. This malware caused all computers in the office to shut down. The adviser needed to use the platform software that day to ensure his clients participated in a Corporate Action that was closing the following day. With the help from their Business Development Manager, the office worked through the issue, so they were able to log into the platform software to complete this critical work from a home laptop that hadn't been infected with the virus.

Define malware and how you would like to save your system through malware in the above scenario?

(5 Marks)

- (d) Technological advances have great societal benefits and make it easier for people to access information, and to collaborate with their communities. They also expose users to risks such as cybercrime, identity theft or misuse of personal data. Software companies share a responsibility to design and operate products and services in a manner that both helps protect customers from these harms and promotes respect for fundamental rights. And software companies share, with many other stakeholders, a collective responsibility to help make the Internet more reliable and trustworthy.

How are you going to improve the security aspects in the above scenario?

(5 Marks)

- (e) The banking systems need reporting systems and improve the data warehouse architecture to achieve a smooth and consistent workflow. The challenge was to develop and integrate a data warehouse, to implement a liquidity risk management system in cooperation with the European Bank for Reconstruction and Development. The final goal was to get a "golden source" and develop the main analytical and reporting dashboards.

Define data warehouse architecture for the above scenario?

(5 Marks)

Question 4

- (a) Imagine a scenario where you are visiting some websites and one of them seems to be a little slow. You might blame their servers to improve their scalability as they might be experiencing a lot of user traffic on their site. Most of the sites already take this issue into account beforehand. Chances are, they might be a victim of what is known as a DDoS attack, Distributed Denial of Service Attack.

Discuss the types of DDoS (Distributed Denial of Service) used in the above scenario.

(5 Marks)

- (b) The online threat landscape continues to evolve at an accelerating pace with hackers launching more distributed denial of service attacks than ever before, taking aim at new targets, and creating new botnets. The demand for solutions for a wide range of business needs and the rollout of 5G technologies has accelerated the proliferation of Internet of Things (IoT) around the world, creating a huge pool of unsuspecting and under protected new recruits for botnet armies used to launch attacks on massive scales. DDoS attacks are expected to continue to increase in number and complexity as botnets and inexpensive DDoS-as-a-service platforms proliferate.

Based on the above scenario differentiate the DoS and DDoS attack.

- (c) Mr. B want to start a new business of trading of readymade garments. He wants to set up his office in his home. He approached you to get knowledge of hardware and software required to set up his small office at home. Assume you are computer hardware and software specialist and advise him as per his requirements.

(5 Marks)

- (d) ABC Hospital is top ranked hospital out of 10 pediatric specialty hospitals, with about 25,000 inpatient admissions each year and 5,28,000 patients' visits scheduled annually through 200 plus specialized clinical programs. One fine day their computer systems were stopped working and the entire network go down. Later on, it came to their knowledge that the hackers entered in to their server and the entire data of patients was stolen.

Now hospital want to know that what remedies for such cyber-attack on their server are available for an organization and under which law?

(5 Marks)

- (e) Company X is in retail business that wants to improve its sales. They have collected data on their sales over the past year, including information on the products that were sold, the location of the stores, and the demographics of the customers. The data analytics team at Company X is asked to analyze this data to identify trends and patterns that can inform the company's sales strategy.

Discuss the different approach of Data Analytics?

(5 Marks)

