BACHELOR OF COMPUTER APPLICATIONS

SEMESTER 5

DCA3143

E-COMMERCE

Unit 3

Network Infrastructure for e-Commerce

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1. INTRODUCTION

With the advent of the Internet, B2B marketing has shifted to e-commerce. A typical manufacturing company needs to procure thousands of products from multiple suppliers. The Internet helps to manage the complexity of the buying process. Technological advancements have exerted an enormous influence over the way business transactions are carried out, relationships are formed and profits flow.

Creating a web presence is an important building block for any e-commerce business, which can be done by creating websites and managing them. Even the smallest local business can utilize the power of the Internet to be more efficient and build revenue. A website is not just a marketing tool but a business tool as well. A website increases an organization's visibility, communication with the world, expands its client base and enhances public interest in the organization's products and services. An organization's website needs to transmit messages within a few seconds. It needs to have good, relevant content that explains the message. It needs to load quickly, be reliable and look professional.

This unit starts with a discussion about Internet hierarchy. The unit further discusses the building blocks of e-commerce. Further, it explains the seven layers in the network and TCP/IP protocol. Towards the end, you will learn about the benefits offered by the Internet for e-commerce.

1.1 Learning Objectives

After completing this unit, you will be able to:

- *Describe the hierarchy of Internet*
- *Explain the building blocks of e-commerce*
- *Elucidate seven layers in the network and TCP/IP protocol*
- *Discuss the benefits of internet for e-commerce*

2. INTERNET HIERARCHY

The Internet is a daily tool for millions, if not billions, of people to trade information with each other. It is basically a gigantic network of computer connections; a huge combination of hardware with lots of personal, business and governmental computers, all joined together like a network of roads. The Internet connects personal computers, mobile phones, mainframes, GPS units, music players and even car alarms.

The Internet originated in the United States of America as an outgrowth of its government network called ARPANET. Machines understand one another through a common set of rules called protocols. The APRANET used Network Control Protocol, which allowed different computers in a network to communicate with each other but did not allow APRANET to connect to other networks. Thus, there was a need to develop a protocol that could allow the different networks to connect with each other and permit transmission of messages and information between various computers in the networks. Two of the most important protocols developed to assist in this task were the Transmission Control Protocol (TCP) and Internet Protocol (IP). These allowed the ARPANET to connect to other networks. This adoption of TCP/IP gave birth to a connected set of networks called the Internet. The first customers of the Internet were computer companies, research organizations, universities, scientists, and engineers who used it for transmitting electronic mails. Today, the Internet has become the backbone of the commercial world. People across the globe not only send and receive message through the Internet but also use it to gain access to information on any subject. It has had a tremendous impact on the social lives of people across the globe. Today the Internet's most popular application is the 'World Wide Web' (WWW), which is a network of servers connected to the Internet. A common mistake that people make is to use the words "Internet" and "World Wide Web" (web) as one and the same. They are two different terms. The World Wide Web is a sub-set of the Internet. This uses the infrastructure provided by the Internet to access information. WWW offers access to pages of information which contains text, graphics, sound, and programming.

The World Wide Web (WWW) was developed to access information over the Internet. It allows users to view web pages that may contain text, images, and videos navigable using hyperlinks.

The web as we see it today developed through various versions from Web 1.0 to Web 2.0 to, now, Web 3.0. These versions of the web allow users to navigate through the information on the Internet in different ways. This has been explained below:

- ***Web 1.0:*** Web 1.0 allowed the use of the Internet to find information and websites. An individual would enter numerous words to try to find the information or a related website. Some of the words used in search engines allowed the person to get the required information. However, it allowed a person to only read the information. Hence, Web 1.0 is also referred to as the 'read only web'. It offered little in the way of user interaction or content contribution.
- ***Web 2.0:*** Web 2.0 is the second generation of the World Wide Web and allows collaboration and sharing of information online. Web 2.0 enabled people to interact with others, collaborate on the same document at the same time, post views and creative expressions and so on. Web 2.0 offers a dynamic Web that is more organized, as opposed to the static HTML Web pages of Web 1.0. Web 2.0 provides open communication and sharing of information. Components of Web 2.0 include blogs, wikis, and Web services.
- ***Web 3.0:*** Web 3.0 made networking an interactive phenomenon. However, Web 3.0 enabled web browsers to track and synthesize information about a user's history and provide suggestions to website links and Internet data based on the information. The software that is being used by Web 3.0 leaves some traces of the individual's previous browsing sessions over the Internet, which can later be used to predict his or her preferred websites or links. For example, an individual types in a few words on the Google search bar for a two or three part question and the search puts all the terms together. Web 3.0 does not affect interactions between individuals but extends the use of a computer's capacity for understanding.

Activity 1

Find out the names of the web servers which have used Web 1.0, 2.0, and 3.0 each.

SELF-ASSESSMENT QUESTIONS – 1

1. In which country was the Internet originated?
2. Name the two protocols that allowed the networks to connect with each other.
3. The adoption of TCP/IP gave birth to a connected set of networks called the _____.
4. The _____is a sub-set of the Internet.
5. The components of Web 2.0 include _____, _____, and _____.
6. Web 1.0 offers a dynamic Web that is more organized, as opposed to the static HTML Web pages. (True/False)

2. BUILDING BLOCKS OF E-COMMERCE

Nowadays, many people find it convenient to search for products and services through the Internet. Most businesses today have their websites on the Internet. To create a web presence, an organization needs to take the following steps:

1. **Create a website:** The first step to getting a web presence is through creating a website for the business. The organization must tailor its content to potential customers in order to attract and retain them. There are various free online services that allow the creation of websites while some charge a hosting fee to create a website.
2. **Search Engine Optimization (SEO) of the website:** SEO is the process of enhancing the visibility of a website in a search engine's search results. While searching for information over the Internet, users tend to enter words significant to the search. Such words that act as a key to a particular search result are known as keywords. Using a keyword-rich text that details what an organization does can help to create a web presence.
3. **Marketing the website:** Interactive advertising campaigns, promotional offers and linking to other popular websites are some marketing strategies to gain web presence.
4. **Increase traffic by linking to other websites:** It is important to get popular and reputed websites to link back to an organization's website. This helps in gaining more visitors and hence, potential customers. Search engines use these backlinks to assess the popularity of a website and determine its reliability to create a web presence.

5. **Look for feedback:** The organization should constantly look for feedback on its website in the form of visitors' reviews, the number of visitors per day and so on, to improve the quality and content of the website.
6. **Update the website:** Once feedback is received, it should be assessed, and the organization should look for ways to improve and update the website. A periodically updated website will have a greater web presence.

3.1 Domain Registration

The first step in creating a website is to decide on a name for a website. This is referred to as the domain name. For example, http://www.flipkart.com/, the website selling products such as books, electronics and cosmetics online has its domain name as Flipkart. To get a domain name, an organization needs to register with a domain registering company and pay an annual fee to gain the right to use that domain name. This can be done online using free or paid services available for domain name registration. Some examples of domain name registration sites are *http://www.registerwebsitedomain.in/, http://in.godaddy.com/.*

There are numerous benefits of registering a domain name. These are as follows:

- It gives a unique identity to the organization.
- Keywords in domain names help create web presence.
- It initiates creation of professional e-mail addresses.
- It helps avoid piracy and copyright issues.
- It helps visitors remember the domain name for further reference.

3.2 Web Hosting

Once the domain name is registered, it needs to be hosted over the Internet. A web hosting permits individuals and organizations to make their website accessible over the Internet using the World Wide Web (WWW).

There are several types of web hosting. These include:

- ***Shared hosting:*** This is commonly used by new websites for its economic benefits. The website being hosted is positioned on a server with other existing websites to share resources.

- ***VPS (Virtual Private Server) hosting:*** This is used by advanced users with an intention to install specific packages or software not available through shared hosting. The website being hosted is positioned on a server with other existing websites but unlike shared hosting, the number of websites per server is less.
- ***Dedicated servers:*** The websites hosted using dedicated servers get access to the entire server as it is not shared with any other website. This is beneficial for websites with higher traffic or specific requirements not available through shared hosting. It is an expensive hosting technique.
- ***Reseller hosting:*** It is similar to shared hosting with the only difference being that it permits users to create separate and unique hosting accounts. It is recommended for those willing to resell their own hosting company or provide hosting services to others. It allows creation of a personal login through a separate Control Panel. Thus, users with multiple websites use reseller hosting to manage several websites under one Control Panel.

3.3 Development and Maintenance

Web development includes building, creating, and maintaining a website. It refers to the development of websites. It is related to the non-design aspects of building websites like coding and writing markup. Developing a website is often a trade-off between simplicity and customization. Thus, many organizations these days have a dedicated web development team to design and maintain their websites.

Once, a website has been created, it needs to be evaluated regularly for its effectiveness. The organization must ensure that the website has desirable features and any update required should be catered to promptly. This necessitates the development of a website based on new features or functionalities and the maintenance of existing webpages as per customer specifications or competitor's updates. Website maintenance can involve simple website updates, such as changing the text or images on the website, or complex updates, such as creating new pages or assigning a new functionality to the website.

SELF-ASSESSMENT QUESTIONS – 2

7. _____use backlinks to assess the popularity of a website and determine its reliability to create a web presence.
8. Which type of hosting permits users to create separate and unique hosting accounts?
9. Developing a website is often a trade-off between simplicity and customization. (True/False)

4. SEVEN LAYERS IN THE NETWORK AND TCP/IP PROTOCOLS

The Internet has made it possible for individuals and organizations around the world to share information with each other. Co-workers thousands of miles apart can share information instantaneously, just as hundreds of workers in a unique location can simultaneously review research data maintained online. All this can be owed to computer networking technologies. The global computer network known as the World Wide Web allows people and organizations to make sale or purchase transactions over the Internet. In this article, we will take a look at networking, so you can understand how these computers connect to one another.

A group of computers in close proximity to each other, connected through a network, is known as a Local area network (LAN). The most common type of LAN is an Ethernet. Fig. 1 shows Ethernet cables used to connect computers and other devices in a network.

Fig. 1 Ethernet Cables

A network switch is a small hardware device that links together several computers in one LAN. A basic network has at least two computing devices with wired or wireless connecting points called “network ports” and at least one “network hub” or “network switch”. These are hardware devices that allow computers to interconnect. Networking is a complicated topic

that dominates the computer industry. It can be understood with the help of an example on how some basic network hardware can be connected to create a simple network in homes or offices.

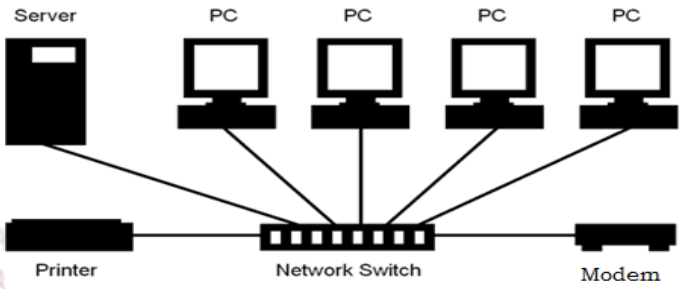

Fig. 2: Example of a wired server network

Source: http://explainingcomputers.com/

In this example, four personal computers are connected with Ethernet cables to a network switch. The network switch is also connected to a network server. A modem is connected to the network to facilitate access to the Internet. The resultant wired server network facilitates access to the Internet for all four connected PCs as well as to the printer.

OSI Model – Seven Layers in the Network

In networking architecture, layering is used which facilitates the clear definition of roles and responsibilities. The most commonly used model is OSI (Open Systems Interconnections) model developed by the International Standards Organization (ISO) which comprises seven layers and explains the entire communication subsystem in all computers. Fig. 3 shows the seven layers of OSI model:

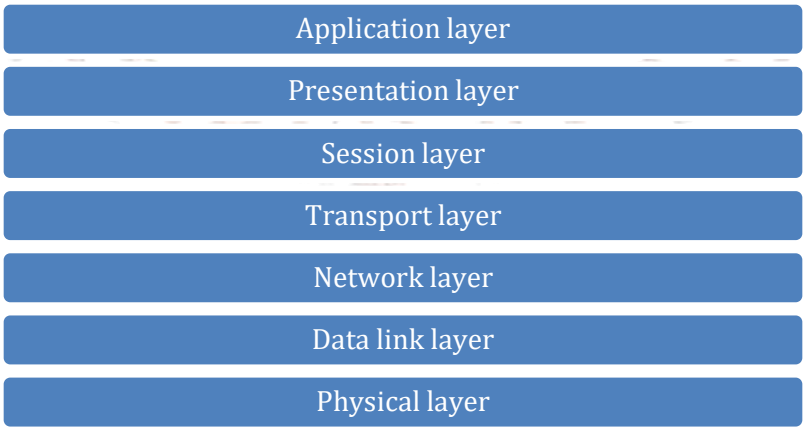

Fig. 3: OSI Model Layers

Let's discuss these layers.

Layer 1 – Physical layer – It is concerned with electrical issues, such as setting up of voltage levels, developing end-to-end paths, and assuring the travel of energy in right paths.

Layer 2 – Data link layer – It is concerned with the transfer of information over a channel or a link. The layer's main functions involve recognition of information transmission, sequencing, error detection and other associated tasks.

Layer 3 – Network layer – It allows the simultaneous use of several links to enhance information transfer. The layer addresses the issues of routing, flow of information, host-to-network interfaces, and so on.

Layer 4 – Transport layer – It addresses the issues related to network addressing, development of virtual circuits, and processes of entering and exiting from the network.

Layer 5 – Session layer- It deals with the establishment of links between procedures between different endpoints. The layer enables the beginning, ending, administering, and monitoring communications.

Layer 6 – Presentation layer – This layer takes care of display of the inputs and outputs from a user. It enables the data into a standard format for the users.

Layer 7 – Application layer – It facilitates the coordination between several application processes to perform the required information processing as per user demands.

TCP/IP protocols

To facilitate communication between unrelated computer systems, Internet protocols were developed in the 1970s.

A protocol is a set of rules that allow different networks to connect with each other and permit transmission of messages and information between various computers in the networks. Two of the most important protocols developed to assist in this task are Transmission Control Protocol (TCP) and Internet Protocol (IP).

While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data, known as packets. For example, when a file is sent across

through the Internet, the TCP divides the file into one or more units, called packets, for efficient routing, while the IP delivers it to the intended computers. IP gives a unique address to computers in a network. An IP address is a logical 32-bit address used to identify the interface of an IP based TCP/IP node. An IP address has two parts:

a. The subnet prefix: identifies all the hosts that are on the same physical network
b. The host ID: identifies a host on the network

Each interface on an IP based TCP/IP network requires a unique IP address, such as 121.106.1.200. This unique address ensures that data sent and received from different computers in a network reach their correct Internet destinations.

SELF-ASSESSMENT QUESTIONS – 3

10. The most common type of LAN is an _____.
11. A _____is connected to the network to facilitate access to the Internet.
12. Who developed OSI model?
13. How many layers exist in OSI model?
14. An IP address is a logical 32-bit address used to identify the interface of an IP based TCP/IP node. (True/False)
15. What is the function of the host ID?

5. BENEFITS OF INTERNET FOR E-COMMERCE

There are a wide variety of benefits offered by the Internet on e-commerce. These are shown in the Fig. 4:

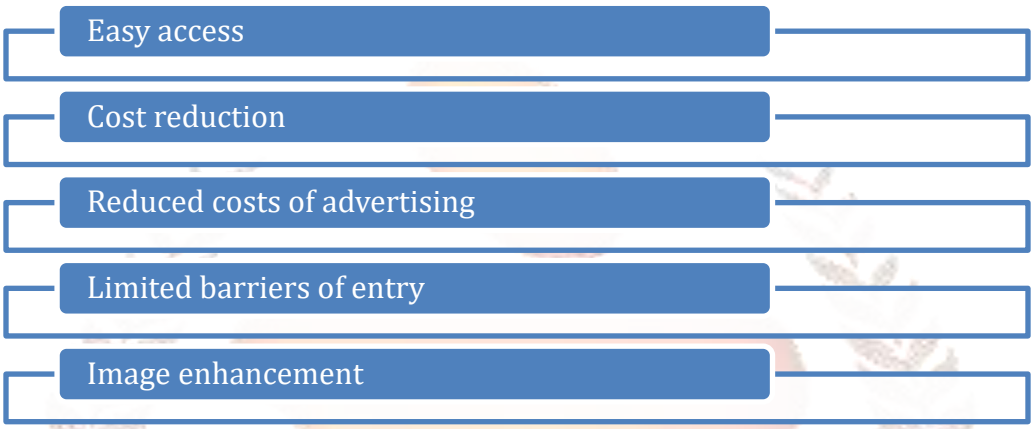

Fig. 4: Benefits of Internet for e-commerce

These benefits are discussed below.

- **Easy access -** It is a fact that in the present age, Internet is one of the best medium for offering information about anything across the globe. In business too, it offers opportunities for organizations to promote their products and services online. Moreover, anyone can access a website and place orders from anywhere in the world. In addition, Internet provides ease of access to information where customers can compare costs and features of product before making any purchase.
- **Cost reduction –** By coming on the Internet, many organizations save a lot of money required to establish and maintain a physical store. They save money on other different costs, like rent, maintenance, inventory management, etc.
- **Reduced costs of advertising –** Internet is an economical mode of advertising products and services. E-commerce companies can promote their products online at reduced costs. They can showcase their products use advertising tools and create customized deals in visually attractive manner to lure wider base of customers.
- **Limited barriers of entry –** To conduct business on the internet, all types of business firms (big or small) at minimum costs. Thus, there exist very few barriers to entry in the online market.

- **Image enhancement –** In the present age, it is perceived that the organizations who do not have presence on the Internet, their existence is questioned. People believe that such organizations have low capability of deploying state-of-the-art technologies. Thus, existence on the Internet enhances the image of business organizations.

Activity 2

Does Internet have any disadvantages too for e-commerce? List them down and discuss in your class.

SELF-ASSESSMENT QUESTIONS – 4

16. Internet is an expensive mode of advertising products and services. (True/False)
17. Internet provides ease of access to information where customers can compare costs and features of product before making any purchase. (True/False)
18. _____ can promote their products online at reduced costs.

6. CONCEPT MAP

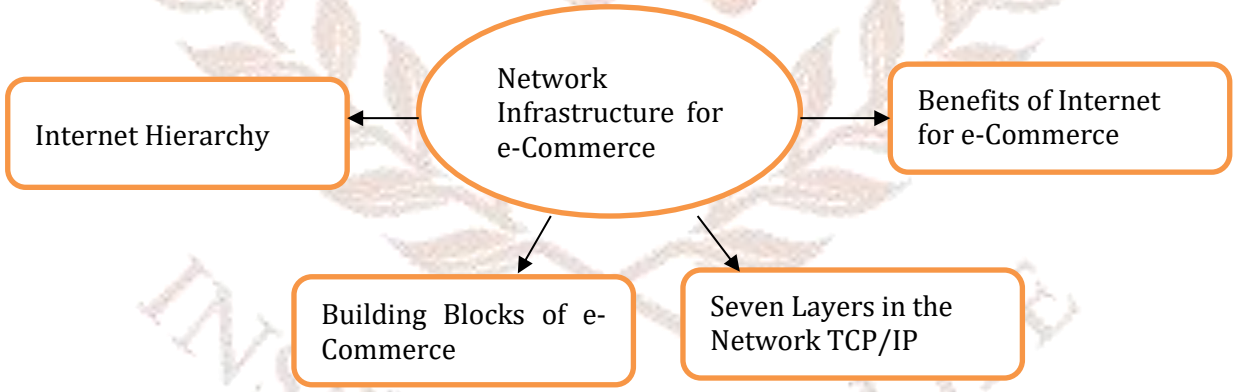

Fig. 5: Concept Map

7. SUMMARY

- Today, the Internet has become the backbone of the commercial world. People across the globe not only send and receive message through the Internet but also use it to gain access to information on any subject.
- The first step in creating a website is to decide on a name for a website. This is referred to as the domain name.
- A web hosting permits individuals and organizations to make their website accessible over the Internet using the World Wide Web (WWW).
- The World Wide Web (WWW) was developed to access information over the Internet. It allows users to view web pages that may contain text, images, and videos navigable using hyperlinks.
- A group of computers in close proximity to each other, connected through a network, is known as a Local area network (LAN). The most common type of LAN is an Ethernet.
- A network switch is a small hardware device that links together several computers in one LAN. A basic network has at least two computing devices with wired or wireless connecting points called “network ports” and at least one “network hub” or “network switch”.
- The most commonly used model is OSI (Open Systems Interconnections) model developed by the International Standards Organization which comprises seven layers and explains the entire communication subsystem in all computers.
- A protocol is a set of rules that allow different networks to connect with each other and permit transmission of messages and information between various computers in the networks. Two of the most important protocols developed to assist in this task are Transmission Control Protocol (TCP) and Internet Protocol (IP).
- In the present age, Internet is one of the best medium for offering information about anything across the globe. In business too, it offers opportunities for organizations to promote their products and services online.

8. GLOSSARY

- **Modem:** Modulation and demodulation of digital data of a computer and the analogue signal of a telephone line.
- **Server:** Computer program which accomplishes access to a principal resource or service in a network.
- **Transport Control Protocol:** A set of rules to send data in the form of message between computers over the Internet.

9. TERMINAL QUESTIONS

Short Answer Questions

1. What is Web 2.0?
2. What are the benefits of registering a domain name.
3. Define protocol. Explain IP address.
4. Long Answer Questions
5. Describe the development of the Internet.
6. Explain the seven layers of network.
7. Explain the steps to be followed by an organization to create a web presence.
8. What are the benefits of internet for e-commerce?

10. CASE STUDY: E-COMMERCE OPERATIONS AT ICICI BANK

ICICI is the second largest private-sector bank in India. It has successfully established a network of 3,377 branches. However, it has also expanded its business in other countries. While progressing in the e-banking trend, ICICI has established over 11,000 ATMs in India (as per ICICI data, 2013). ICICI also provides debit and credit card facilities to its customers, with the help of which its customers enjoy the benefits of plastic money.

Online net banking and mobile banking facilities are also available with ICICI. The bank launched Internet Banking services with the name of 'Infinity' in December 1997. At present, more than 30 lakh customers have joined the bank through its Internet banking system. The different e-banking facilities offered by the ICICI bank are categorised as follows:

- ***ATM Banking:*** Offers anytime banking through a widespread network of the ICICI Bank ATMs. ATM banking makes the banking experience easy and convenient for users. In every ICICI bank ATM, there is a user-friendly graphic screen that provides easy-to-follow instructions to the users for performing their desired banking functions. The ATM also facilitates a choice of language for the convenience of the user.
- ***Internet or Net Banking:*** Provides access to all the banking operations from cash transaction to loan and credit cards. The Demat account (a dematerialized account of shares and debentures) customers can also use the net banking facility. The most commonly performed net banking operations include checking account balance, transferring funds, downloading online account statement, paying bills, and conducting online transactions.
- ***Mobile Banking:*** Allows account-related enquiries, transfer of funds, payment of credit card bills and utility bills and much more through mobile phones. The ICICI Bank's iMobile application enables users to perform all these banking operations free of cost. Users only have to download this application on their mobile phone, and it brings a bank branch on the mobile phone of the user.
- ***Phone Banking/IVR Banking:*** Offers the banking operations to be performed by making a toll-free telephone call. This telephone call is answered by the ICICI Bank's Instant Voice Response (IVR) banking service. The user may select their desired function from the options given by the IVR.

- ICICI takes care of its customers' convenience while offering e-banking facilities. The bank provides steps to guide its customers in net banking transactions. The website states, "just three easy steps to go online Internet banking". Apart from convenience, secure banking is one of the major areas of attention for the ICICI bank. It provides all the essential guidelines to its customers to ensure safe access to their ICICI accounts.

Source:http://www.thehindubusinessline.com/industry-and-economy/banking/icici-bank-opens-140-rural-branches/article5015697.ece

Questions:

1. Name the different heads under which the e-banking facilities offered by the ICICI bank are categorised.
2. How does the ICICI bank take care of its customers' convenience while offering e-banking facilities?

11. ANSWERS

Self-Assessment Questions

1. United States of America
2. Transmission Control Protocol (TCP) and Internet Protocol (IP)
3. Internet
4. World Wide Web
5. blogs, wikis, Web services
6. False
7. Search engines
8. Reseller hosting
9. True
10. Ethernet
11. modem
12. International Standards Organization (ISO)
13. Seven
14. True
15. It identifies a host on the network.
16. False

17. True

18. e--Commerce

Terminal Questions

Short Answer Questions

Answer 1: Web 2.0 is the second generation of the World Wide Web and allows collaboration and sharing of information online.

For more details, refer section 2.

Answer 2: A protocol is a set of rules that allow different networks to connect with each other and permit transmission of messages and information between various computers in the networks.

For more details, refer section 4.

Answer 3: Registering a domain name initiates creation of professional e-mail addresses.

For more details, refer section 3.

Long Answer Questions

Answer 1: The Internet originated in the United States of America as an outgrowth of its government network called ARPANET.

For more details, refer section 2.

Answer 2: The first step to getting a web presence is through creating a website for the business.

For more details, refer section 3.

Answer 3: The most commonly used model is OSI (Open Systems Interconnections) model developed by the International Standards Organization (ISO) which comprises seven layers and explains the entire communication subsystem in all computers.

For more details, refer section 4.

Answer 4: Internet provides ease of access to information where customers can compare costs and features of product before making any purchase.

For more details, refer section 5.

12. SUGGESTED E-REFERENCES AND E-BOOKS

E-Books

- E-commerce: Business, Technology, Society, By Kenneth C. Laudon
- E-commerce: Fundamentals and Applications, By Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang

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- The History Of Ecommerce: How Did It All Begin?. Blog.miva.com. (2022). Retrieved 7 October 2022, from https://blog.miva.com/the-history-of-ecommerce-how-did-it-all-begin.
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