5. Electronic Commerce Technology

5. Introduction

There are three types of communication networks (internet, intranet and extranet) used for electronic commerce, depending on whether the intent is to support cooperation with a range of stakeholders, cooperation among employees, or cooperation with a business partner. Each of these topologies is briefly described, and we discuss how they can be used to support electronic commerce.

5.1 Internet Technology

Computers can communicate with each other when they speak a common language or use a common communication protocol. Transmission Control Protocol/Internet Protocol (TCP/IP) is the communication network protocol used on the Internet. TCP/IP has two parts. TCP handles the <u>transport of data</u>, and IP performs <u>routing</u> and <u>addressing</u>.

5.1.1 Data Transport

The two main methods for transporting data across a network are circuit and packet switching. Circuit switching is commonly used for voice and package switching for data. Parts of the telephone system still operate as a circuit-switched network. Each link of a predetermined bandwidth is dedicated to a predetermined number of users for a period of time.

The Internet is a packet switching network. The TCP part of TCP/IP is responsible for splitting a message from the sending computer into packets, uniquely numbering each packet, transmitting the packets, and putting them together in the correct sequence at the receiving computer. The major advantage of packet switching is that it permits sharing of resources (e.g., a communication link) and makes better use of available bandwidth.

5.1.2 Routing

Routing is the process of determining the path a message will take from the sending to the receiving computer.

It is the responsibility of the IP part of TCP/IP for dynamically determining the best route through the network. Because routing is dynamic, packets of the same message may take different paths and not necessarily arrive in the sequence in which they were sent.

5.1.3 Addressability

Messages can be sent from one computer to another only when every server on the Internet is uniquely addressable. The Internet Network Information Center (InterNIC) manages the assignment of unique IP addresses so that TCP/IP networks anywhere in the world can communicate with each other. An IP address is a unique 32-bit number consisting of four groups of decimal numbers in the range 0 to 255 (e.g., 128.192.73.60). Humans can more easily remember addresses like uoitc.edu.iq A Domain Name Server (DNS) converts uoitc.edu.iq to the IP address 192.169.152.125. The exponential growth of the Internet will eventually result in a shortage of IP addresses, and the development of next-generation IP (IPng) is underway.

5.2 Infrastructure

Electronic commerce is built on top of a number of different technologies. These various technologies created a layered, integrated infrastructure that permits the development and deployment of electronic commerce applications (see figure (5.1)). Each layer is founded on the layer below it and cannot function without it.



Figure (5.1) E-Commerce infrastructure

5.2.1 National Information Infrastructure

This layer is the bedrock of electronic commerce because all traffic must be transmitted by one or more of the communication networks comprising the national information infrastructure (NII). The components of an NII include the TV and radio broadcast industries, cable TV, telephone networks, cellular communication systems, computer networks, and the Internet. The trend in many countries is to increase competition among the various elements of the NII to increase its overall efficiency because it is believed that an NII is critical to the creation of national wealth.

5.2.2 Message Distribution Infrastructure

This layer consists of software for sending and receiving messages. Its purpose is to deliver a message from a server to a client. For example, it could move an HTML file from a Web server to a client.

Messages can be unformatted (e.g., e-mail) or formatted (e.g., a purchase order). Electronic data interchange (EDI), e-mail, and hypertext text transfer protocol (HTTP) are examples of messaging software.

5.2.3 Electronic Publishing Infrastructure

The Web is a very good example of this layer. It permits organizations to publish a full range of text and multimedia. There are three key elements of the Web: • A uniform resource locator (URL), which is used to uniquely identify any server.

- A network protocol.
- A structured markup language, HTML.

5.2.4 Business Services Infrastructure

The principal purpose of this layer is to support common business processes. Nearly every business is concerned with collecting payment for the goods and services it sells. Thus, the business services layer supports secure transmission of credit card numbers by providing encryption and electronic funds transfer. Furthermore, the business services layer should include facilities for encryption and authentication.

5.2.5 Electronic Commerce Applications

Finally, on top of all the other layers sits an application. Consider the case of a book seller with an on-line catalog (see figure (5.2)). The application is a book catalog; encryption is used to protect a customer's credit card number; the application is written in HTML; HTTP is the messaging protocol; and the Internet physically transports messages between the book seller and customer.

Electronic commerce applications	Book catalog
Business services infrastructure	Encryption
Electronic publishing infrastructure	HTML
Message distribution infrastructure	HTTP
National information infrastructure	Internet

Figure (5.2) E-Commerce application