Information Super Highway

Introduction

Electronic commerce needs a network infrastructure to transport the content-data, audio, visual, text, animation and so on. This network infrastructure is provided by what is known as the I-way or information super highway.

The information super highway may be defined as a high capacity, electronic pipeline to a consumer or business premise that is capable of simultaneously supporting a large number of e-commerce applications and providing interactive connectivity between users and services. The I-way has emerged as the basic network infrastructure for all types of e-commerce activities due to its capability to provide integrate voice, data and video services.

Components of the I-way

It consist of various components which can be broadly categorized as;

1. Network access equipment
2. Access media
3. Global information distribution networks

1. Network access equipment: - which is at the consumer end and enables the consumer to access the network. It consists of the hardware such as computers, modems, routers, switches for computer networks, set-top boxes for television networks and software platforms such as browsers and operating systems.

2. Access road or media: The access roads is the way in which the consumer homes and work places are linked with the backbone of the network infrastructure for e-commerce. These can be categorized into four major types;

1. Telecom based
2. Cable TV based
3. Wireless based
4. Internet, intranet and extranet based

Each of these access media has its own benefits and limitations and is faced with a number of challenges in this fast growing world e-commerce.

1. Telecom based

The telecom industry provides both long distance and local telephone services for e-commerce applications. The telecom companies provide a high speed pipeline capable for carrying high volumes of interactive voice, data and video to homes and businesses connect these to the global information distribution networks, the backbone of the i-way.

The telecom networks has become the primary foundation for the I-way mainly for two reasons:

It is capable of handling millions of simultaneous calls.

It provides accurate usage tracking and billing.

However they have two limitations:

Lack of digital transmission capability

Uneven capacity distribution

2. Cable TV based

The cable TV network provides a popular media for pushing high speed data to homes. Statistics have shown that cable runs through 90 percent of the US homes today and still has a lot of unutilized capacity. The cable TV based networks may be wired or wireless.

3. Wireless based

The wireless operators are typically radio based i.e. cellular, paper and specialized mobile radio (SMR) based. The wireless based systems have revolutionized the ways of thinking about information delivery.

Technology is the most important factor. The rapid growth in technology has impacted the wireless industry in a number of ways:

o Apart from the voice calls, the cellular technology today has also facilitated short messaging services (SMS) using alphanumeric display and the multimedia services.

o Internet connectivity using the cellular networks has been made possible.

o The cellular networks using the analog technology are now upgrading to digital networks to provide greater capacity at lower costs as well as increase the quality and functionality of the cellular network.

o Applications have been developed to facilitate mobile workers to exchange messages and data from their offices while on the road.

4. The internet

The internet forms a well known component of the global information distribution network. It targets a wide range of e-commerce applications such as video on demand, home shopping, e-mail, EDI, information publishing, information retrieval, video conferencing and many more.

All the components of the I-way together provide a network infrastructure for the e-commerce activities. This requires the use of common standards and installing gateways between various networks. A final requirement is the hardware and software to move huge amounts of data effortlessly over the complex network.

3. Global information distribution networks: providing the infrastructure for connecting across the countries and continents. They include such networks as the long distance telephone lines, the satellite networks and internet.

Consumer access equipment [CAE]

The customer access equipment or customer premises equipment or the terminal equipment consists of the equipment that the customer uses to connect to the network. This may consist of the TV set-top boxes or the TV signal descramblers, the computer and the modem, pagers and cellular phones etc.

Global information distribution networks

The global information distribution networks consist of the infrastructure crossing the countries and continents. They include the long distance

telephone lines, satellite networks, and the internet.

Long distance networks

Long distance telephone connectivity is provided through cable by the inter-exchange carriers. Long distance cellular networks are using the wireless technologies to connect the consumers worldwide.

Satellite networks

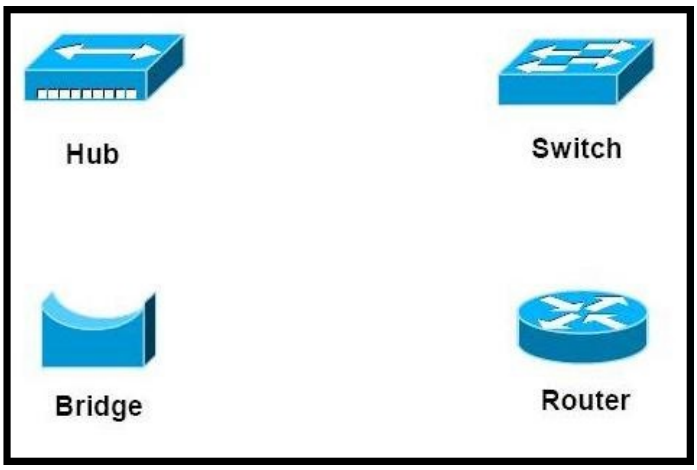
It play a vital role in the communication industry. They have advantages over the terrestrial networks in that:

a. They are accessible from any point of the globe.

b. They can provide broad band digital services to many points without the cost of acquiring wire/cable installation.

c. They can add receiving and sending sites without significant additional costs.

Network Devices (Hub, Repeater, Bridge, Switch, Router and Gateways)



1. Repeater – A repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal becomes too weak or corrupted so as to extend the length to which the signal can be transmitted over the same network. An important point to be noted about repeaters is that they do no amplify the signal. When the signal becomes weak, they copy the signal bit by bit and regenerate it at the original strength. It is a 2 port device.

2. Hub – A Hub is the simplest of these devices. In general, a hub is the central part of a wheel where the spokes come together. Hubs cannot filter data so data packets are sent to all connected devices/computers and do not have intelligence to find out best path for data packets. This leads to inefficiencies and wastage.

As a network product, a hub may include a group of modem cards for dial-in users, a gateway card for connections to a local area network (for example, an

Ethernet or a token ring), and a connection to a line. Hubs are used on small networks where data transmission is not very high.

A hub is basically a multiport repeater. A hub connects multiple wires coming from different branches, for example, the connector in star topology which connects different stations. Hubs cannot filter data, so data packets are sent to all connected devices. In other words, collision domain of all hosts connected through Hub remains one.

3. Bridge – A bridge operates at data link layer. A bridge is a repeater; with add on functionality of filtering content by reading the MAC addresses of source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.

4. Switch –

A device that directs data packets along a path. It may include the function of a router. In general, a switch is a simpler and faster mechanism than a router as it does not maintain knowledge of the networks. A switch is not always required in a network. Many LANs are organized so that the nodes inspect each data packet.

A switch is a multi port bridge with a buffer and a design that can boost its efficiency (large number of ports imply less traffic) and performance. Switch is data link layer device. Switch can perform error checking before forwarding data that makes it very efficient as it does not forward packets that have errors and forward good packets selectively to correct port only. In other

words, switch divides collision domain of hosts, but broadcast domain remains same.

5. Routers – A router is a device like a switch that routes data packets based on their IP addresses. Router is mainly a Network Layer device. Routers normally connect LANs and WANs together and have a dynamically updating routing table based on which they make decisions on routing the data packets. Router divide broadcast domains of hosts connected through it.

6. Gateway – A gateway, as the name suggests, is a passage to connect two networks together that may work upon different networking models. They basically works as the messenger agents that take data from one system, interpret it, and transfer it to another system. Gateways are also called protocol converters and can operate at any network layer. Gateways are generally more complex than switch or router.

Difference between Hub and Switch:

	Hub	Switch
Layer	Physical layer. Hubs are classified as Layer 1 devices per the OSI model.	Data Link Layer. Network switches operate at Layer 2 of the OSI model.
Function	To connect a network of personal computers together, they can be joined through a central hub.	Allow to connect multiple device and port can be manage, Vlan can create security also can apply
Data Transmission form	Electrical signal or bits	Frame (L2 Switch) Frame & Packet (L3 switch)
Transmission Type	Hubs always perform frame flooding; may be unicast, multicast or broadcast	First broadcast; then unicast & multicast as needed.
Ports	4/12 ports	Switch is multi port Bridge. 24/48 ports
Device Type	Passive Device (Without Software)	Active Device (With Software) & Networking device
Used in (LAN, MAN, WAN)	LAN	LAN
Table	A network hub cannot learn or store MAC address.	Switches use content accessible memory CAM table which is typically accessed by ASIC (Application Specific integrated chips).
Transmission Mode	Half duplex	Half/Full duplex
Broadcast	Hub has one Broadcast	Switch has one broadcast domain

Domain	Domain.	[unless VLAN implemented]
Definition	An electronic device that connects many network device together so that devices can exchange data	A network switch is a computer networking device that is used to connect many devices together on a computer network. A switch is considered more advanced than a hub because a switch will on send msg to device that needs or request it
Speed	10Mbps	10/100 Mbps, 1 Gbps
Address used for data transmission	Uses MAC address	Uses MAC address
Device Category	non intelligent device	Intelligent Device
Collisions	Collisions occur commonly in setups using hubs.	No collisions occur in a full-duplex switch.
Spanning-Tree	No Spanning-Tree	Many Spanning-tree Possible
Manufacturers	Sun Systems, Oracle and Cisco	Cisco and D-link Juniper

The three major e-commerce categories are:

1) **Business-to-consumer (B2C) electronic commerce**
2) **Business-to-Business (B2B) electronic commerce**
3) **Consumer-to-Consumer (C2C) electronic commerce**

Business-to-consumer (B2C) electronic commerce

A form of e-commerce in which customers deal directly with an organization and avoid intermediaries. This reduces the inventory overhead and hence reduces the investment of Business.

It involves retailing products and services to individual consumers.

e.g.

Barner&Noble.com, which sells books, software and music to individual consumers, is an example of B2C e-commerce. Dell is another example of B2C e-commerce, people can specify their own unique computer online and dells assembles the components and ship the computer directly to the consumer within five days. Dell doesn't inventory computers and doesn't sell through intermediate resellers or distributors. The saving is used to increase Dell profit and reduce consumer prices.

Business-to-Business (B2B) electronic commerce

It involves sales of goods and services among businesses. It is a subset of e-commerce where all the participants are organizations.

B2B e-commerce is a useful tool for connecting business partners in a virtual supply chain to cut resupply times and reduce costs.

The organizations reduced the time involved with their order management and quoting process by over 50 percent by implementing a B2B e-commerce system that automates the exchange of information between the two firms.

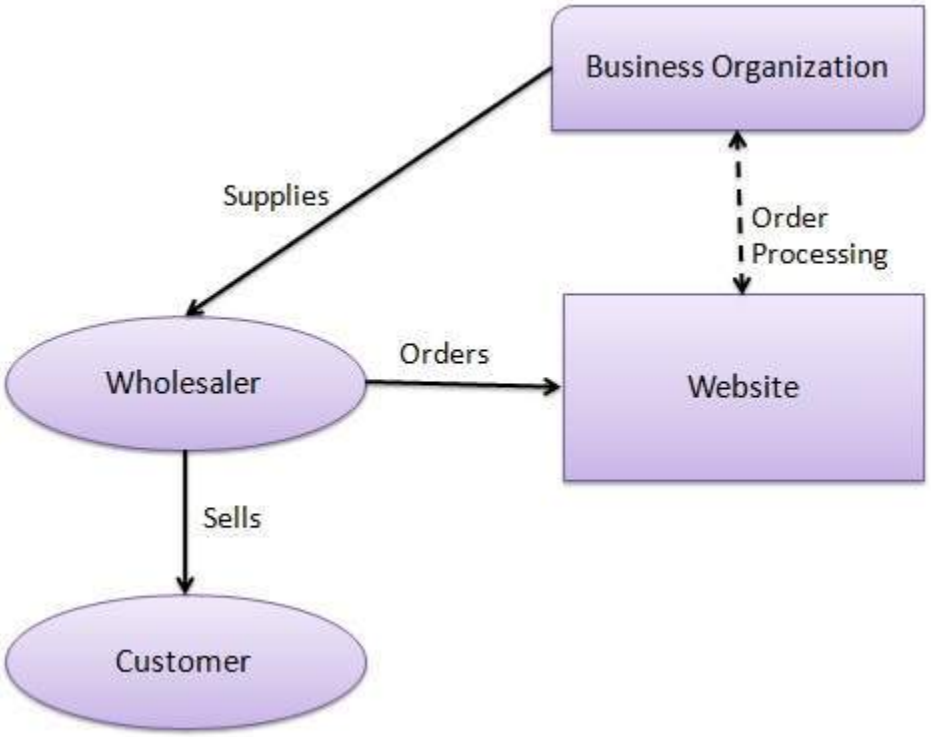
Consumer-to-Consumer (C2C) electronic commerce

It involves consumers selling directly to other consumers.

e.g eBay is an example of a C2C e-commerce site; customers buy and sell items directly to each other through the site. The growth of C2C is responsible for reducing the use of the classified pages of a newspaper to advertise and sell personal items.

E-Commerce - B2B Model

A website following the B2B business model sells its products to an intermediate buyer who then sells the products to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, it sells the end product to the final customer who comes to buy the product at the wholesaler's retail outlet.



B2B identifies both the seller as well as the buyer as business entities. B2B covers a large number of applications, which enables business to form relationships with their distributors, re-sellers, suppliers, etc. Following are the leading items in B2B eCommerce.

- Electronics
- Shipping and Warehousing
- Motor Vehicles
- Petrochemicals
- Paper
- Office products

- Food
- Agriculture

Following are the key technologies used in B2B e-commerce –

- **Electronic Data Interchange (EDI)** – EDI is an inter-organizational exchange of business documents in a structured and machine process able format.
- **Internet** – Internet represents the World Wide Web or the network of networks connecting computers across the world.
- **Intranet** – Intranet represents a dedicated network of computers within a single organization.
- **Extranet** – Extranet represents a network where the outside business partners, suppliers, or customers can have a limited access to a portion of enterprise intranet/network.
- **Back-End Information System Integration** – Back-end information systems are database management systems used to manage the business data.

Architectural Models

Following are the architectural models in B2B e-commerce –

- **Supplier Oriented marketplace** – In this type of model, a common marketplace provided by supplier is used by both individual customers as well as business users. A supplier offers an e-stores for sales promotion.
- **Buyer Oriented marketplace** – In this type of model, buyer has his/her own market place or e-market. He invites suppliers to bid on product's catalog. A Buyer company opens a bidding site.
- **Intermediary Oriented marketplace** – In this type of model, an intermediary company runs a market place where business buyers and sellers can transact with each other.

What is supply chain management? Discuss main functions of supply chain management.

Supply chain refers to all the facilities and processes used in supply of goods and services; from procurement of raw material, through manufacturing operations, up to delivery to final user, and supply chain management (SCM) refers to Management of all operations within a company impacting and interfacing other sections of the supply chain to improve entire supply chain performance.

The main functions and components of SCM include:

1. Defining business boundaries and relationships
2. Managing demand and supply
3. Logistics
4. Purchasing
5. Selling system interface
6. Manufacturing system interface
7. Product design interface

    1. Defining business boundaries and relationships is at the core of all SCM initiatives. The most important of these business boundaries relates to the decisions on outsourcing. In addition to general concept of what to manufacture and process in-house, these boundaries also refer to the roles played by supplier and buyers in each other's business decision and operational activities.

2. Demand management is managing the demand for goods and services along the supply chain. The basic demand is the demand for the ultimate product or service from the end user. To meet this demand of end user, different links in the supply chain need to supply some goods or service to the following link in the chain. In turn to meet their supply commitment they need inputs from the previous link.

3. Logistics refers to all the processes involved in storing, moving, transporting or in any other way handling material. Role of logistics in activities before start of material and after completion of manufacture up to transportation to the immediate customer has been well recognized in the past also. But the logistics cost and effectiveness is also affected by, and in turn affects all other activities along the supply chain.

4. Purchasing has the closest links with the supply side of the supply chain. It plays a key role in the total SCM functions. At strategic level, purchasing plays a decisive role in decisions on and implementation of business boundaries. It acts as a link between the vendors and the company to get involvement and help of vendors in matters like purchased material specification, matching of lot sizes and transportation packing.

5. Selling is the closest link with the demand side of the supply chain. It is directly responsible to help customer know, select, buy, pay for, and take away company's product. These products may be sold to the customers directly or through a distribution network. Sales play an important part in decision on design of the distribution and is directly involved in its day-to-day operations.

6. Manufacturing represents the core of internal operations of a company. No SCM policies can operate in isolation from the manufacturing activities. Manufacturing supports SCM in many ways like, reducing manufacturing lead times and supplying material closely matched to customer lot size and time requirements.

7. Product design has significant impact on efficiency and effectiveness of both supply and demand side of supply chain. In addition the basic quality of the finished product sold to the end user can be improved substantially by better collaboration among channel partners.

- **Local or access road, or on-ramps** : This segment of I-way simplify linkages between businesses, universities, and homes to the communications backbone. There are four different types of provider of access ramps: - telecom-based - cable TV-based - wireless-based and - computer-based online information services. These providers link users and e-commerce application providers.

Global information distribution networks:

There are two major technologies in global information distribution network. They are:

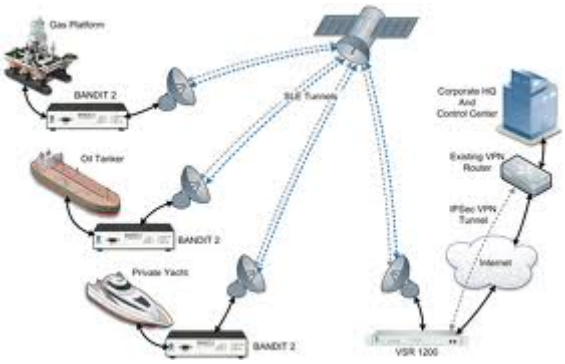
1. Fibre optic long-distance network

2. Satellites

Fibre optic long-distance network:

The long distance network connectivity is mainly done through guided media cables which are like fibre optic cables. These cables are responsible for carrying large packets of data from long distance within few seconds of time. The data which is passed through these cables is covered with full fledged security and accuracy. These cables provide better quality service for interactive applications. These provide attractive economic advantage for selected routes fulfilling the required communication. Now a day the major long distance carriers are keeping their focus on wireless technologies and are making plans to work with different companies on wireless technology. This technology helps increase of communication with accuracy.

Satellite network:



These have advantages over different networks. They are accessible from any spot on the globe and able to provide broad band digital services, including voice, data and video to many points without the cost of wire installation and other costs. The role of satellite in communication industry has changed the communication environment since from many years giving support to transport of long distance Tele-communication and one-way video broadcasts. In 1980's industry introduced a new class of satellites. These VAST satellites require small ground antennas

for point to point network services. Now a day's VAST networks are being utilized by large corporation to link hundreds of retail sites.