Networking and Open Source Software

Maximum Marks : 10

No. of teaching periods : 10

Richa Verma, KIIT

Evolution of Networking

- ARPANET (A network between DOD and Universities)

Internet & Interspace

- Internet is a network of networks
- **Interspace** is a client/server software program that allows multiple users to communicate online with real-time audio, video and text chat in dynamic 3D environments. *Interspace* provides the most advanced form of communication available on the Internet today.

Internet & Interspace

- The *Interspace* is a vision of what the Internet will become, where users cross-correlate information in multiple sources. It is an applications environment for interconnecting spaces to manipulate information, much as the Internet is a protocol environment for interconnecting networks to transmit data.

Different ways of sending data across network

- Circuit Switching
- Message Switching
- Packet Switching

Data Communication Terminology - Baud

- Baud - is synonymous to *symbols per second* or *pulses per second*. It is the unit of symbol rate, also known as *baud rate* or *modulation rate*; the number of distinct symbol changes (signaling events) made to the transmission medium per second in a digitally modulated signal or a line code.
- Bandwidth
- Data Transfer Rate

Data Communication Terminology - Bandwidth

- In computer networking and computer science, the words **bandwidth**,**network bandwidth**,**data bandwidth**,or **digital bandwidth** are terms used to refer to various bit-rate measures, representing the available or consumed data communication resources expressed in bits per second or multiples of it (bit/s, kbit/s, Mbit/s, Gbit/s, etc.).

Data Communication Terminology – Data Transfer Rate

- Home > data transfer rate **data transfer rate**

The speed with which data can be transmitted from one device to another. Data rates are often measured in *megabits* (million bits) or *megabytes* (million bytes) *per second*. These are usually abbreviated as *Mbps* and *MBps,* respectively.

Another term for data transfer rate is *throughput*.

Data Communication terminologies

- Concept of Channel and Data transfer rate (bps, kbps, Mbps, Gbps, Tbps)

- The data transfer rate is commonly used to measure how fast data is transferred from one location to another. For example, a hard drive may have a maximum data transfer rate of 480 Mbps, while your ISP may offer an Internet connection with a maximum data transfer rate of only 1.5 Mbps.

Data Transfer Rate

- **World's Fastest Internet Speed: 186 Gbps Data Transfer Sets New Record**
- 3G telecommunication networks support services that provide an information transfer rate of at least 200 kbit/s.

- **airtel 3G USB modem 7.2 Mbps – E1731**

Find all data card deals and offers at Connectindia. Enjoy High speed internet w
data card or 3G internet speeds with Idea 3G netsetter , Tata docomo and reliance

Refine By Speed

clear

- [ ] 144 Kbps
- [ ] 156 Kbps
- [ ] 3.1 Mbps
- [ ] 3.6 Mbps
- [ ] 6.2 Mbps
- [ ] 7.2 Mbps
- [ ] 9.3 Mbps
- [x] 21.1 Mbps

Refine By Price

clear

- [ ] 500 to 1000
- [ ] 1000 to 1500
- [ ] 1500 to 2000

Rel 3G 21.1

~~Rs. 2299/-~~

Rs. 1999/- 13%

docomo 3g plus

~~Rs. 1699/-~~

Rs. 1599/- 6%

ConnectIndia is an exclusive online store where you can buy best mobile broadbar
brought a range of Wireless Datacards that work on all 2G & 3G GSM mobile SIM
chat, watch live TV, surf and download unlimited, etc with our Wireless Internet
networks including Airtel, Tata, Idea, Reliance, MTS, etc. which offer their service
listed some of the best 3G Data Cards and Internet Plans of various operators th
Card now with best of its plans.

Richa Verma, RMP

Chennai, Pune and Chandigarh.

Players and plans

Despite a decent number of players in the Indian
the average Internet speed in the country remains
sample of Mumbai residents about their Internet s
their 1 or 2Mbps plans at roughly Rs 1,000 per m
high-speed plans, but they are too expensive for
high-speed plans offered by popular players in M

Service Provider	Datausage	Price/ month
Hayai	Unlimited	Rs 4,005
Joister	Unlimited	Rs 2,000
Tata Indicom	Unlimited	Rs 1,950
Tata Docomo	Unlimited	Rs 1,699
Airtel	Unlimited	Rs 1,599
Vovinet	Unlimited	Rs 1,300
You Broadband	Unlimited	Rs 1,212
Reliance	Unlimited	Rs 999
MTNL	Unlimited	Rs 790

* Customers will be asked to adjust their usage to more reasonable

The table shows high-speed plans in India

Richa Verma, KIIT

Tata Docomo 3G Data Card - Tariff Plans

Unlimited Plans

Get unlimited usage without worrying about your bill

Plan Name	Monthly Rental	Free usage bundled per month	Usage beyond bundled usage at speed upto 144 Kbps	Monthly Discount(upto 12 months)
7.2 Mbps unlimited plan	Rs. 1000	6 GB	Unlimited	Rs. 150
7.2 Mbps unlimited plan	Rs. 1250	11 GB	Unlimited	Rs. 150
7.2 Mbps unlimited plan	Rs. 1550	15 GB	Unlimited	Rs. 150
21.1 Mbps unlimited plan	Rs. 2000	15 GB	Unlimited	Rs. 500

Usage Based Plans

Pay according to your usage

Plan Name	Monthly Rental	Free usage bundled per month	Extra Usage Charges
Docomo 1 GB Plan	Rs. 250	1 GB	1.0 Paise/10KB
Docomo 512 MB Plan	Rs. 300	512 MB	1.0 Paise/50KB
Docomo 2 GB Plan	Rs. 450	2 GB	1.0 Paise/10KB

Advance Rental Plans(Half yearly)

Get Data Card absolutely FREE !

Richa Verma, RMT

Plan Name	Advance Rental	Monthly Rental (after 6 months)	Free usage bundled per month at 7.2 Mbps
3G Dep PET - ARP 5000	Rs. 5000	Rs. 950	6 GB

The Vodafone 3G USB Stcik lets you work from anywhere with real-time access to information, and no installation hassles. Just pu
USB Stcik also gives you 3G Broadband speeds even while roaming abroad.

Vodafone 3G USB Stcik K3570

K3570 offers you a speed of up to 3.6 MBPS at all times

It supports MAC and Windows on board so that you can just plug and play to enjoy 3G benefits anytime, anywhere.

Vodafone 3G USB Stick K3765

K3765 offers upto 7.2 MBPS speed and up to 5.7 MBPS uplink speed.

It's memory card slot for Micro SD (up tp 4GB) with plug and play feature lets you enjoy Vodafone 3G services easily.

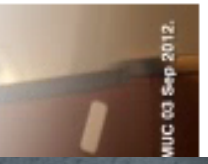
› Mi-Fi *Richa Verma, KIIT*

› Back to Vodafone 3G

Airtel – set for 4G

- Kolkata/New Delhi, April 10:
- After Kolkata, Bharti Airtel will take its fourth generation (4G) technology-based broadband service to Bangalore in the next 30 days.
- This will be followed by similar rollouts in Pune and Chandigarh.
- 4G technology enables users to access wireless broadband services at 30-40 Mbps speeds compared to 3-4 Mbps on 3G platform.
- Airtel on Tuesday became the first telecom company in the country to roll out its 4G-based services in Kolkata. The new technology will allow high speed internet services that include high definition video streaming and instant photo and video downloads.

Microsoft
iya's eyes
pe for
morrow



Sabotage of undersea cables to slow down internet speed for 30 days

4
1.2k
Tweet
Recommend
Submit

Joji Thomas Philip, ET Bureau Mar 29, 2013, 04.01AM IST

Tags: united states | Singapore | France | Falcon | Egypt | BSNL | Bharti Airtel Ltd. | Algeria

NEW DELHI: Internet speeds in India, especially for customers of Bharti Airtel, Tata Communications and state-owned BSNL and MTNL are set to be disrupted for the next 20-25 days, after a key undersea cable, carrying data traffic across 14 countries, from Singapore to France, was cut off the coast of Egypt. Two other key cable networks, linking Asia to Europe, were also allegedly damaged.

The extent of the damage is still being assessed. "Currently, internet and data usage are low because of the festive season. India will feel the impact from Monday when offices and businesses come back. Telcos have diverted all traffic from the Atlantic route to the Pacific, but our connectivity to the latter route is not sufficient to cater to all of India's traffic," explained Rajesh Chharia, president at Association of Internet Service Providers of India.

Richa Verma, KMT

Ads by Google

KBps & Kbps

- The difference between KBps (KB/s) and kbps (kb/s) is that
  1 KBps (1 KB/s) = 1024 bytes per second
  while
  1 kbps (1 kb/s) = 1000 bits per second
- In other words, 1 KBps is around 8 times faster than 1 kbps. This is because 1 byte=8 bits.

Transmission media:

- Twisted pair cable
- coaxial cable
- optical fiber
- infrared
- radio link
- microwave
- link and
- satellite link

Twisted Pair Cable

- Unshielded Twisted Pair (UTP)
- Cable Shielded Twisted Pair (STP) Cable

Unshielded twisted pair (UTP) is the most popular and is generally the best option for school networks

They may be susceptible to radio and electrical frequency interference

Richard Germer, KRT

Twisted Pair Cable

- The quality of UTP may vary from telephone-grade wire to extremely high-speed cable. The cable has four pairs of wires inside the jacket. Each pair is twisted with a different number of twists per inch to help eliminate interference from adjacent pairs and other electrical devices. The tighter the twisting, the higher the supported transmission rate and the greater the cost per foot.

Categories of Unshielded Twisted Pair

Category	Speed	Use
1	1 Mbps	Voice Only (Telephone Wire)
2	4 Mbps	LocalTalk & Telephone (Rarely used)
3	16 Mbps	10BaseT Ethernet
4	20 Mbps	Token Ring (Rarely used)
5	100 Mbps (2 pair)	100BaseT Ethernet
	1000 Mbps (4 pair)	Gigabit Ethernet
5e	1,000 Mbps	Gigabit Ethernet
6	10,000 Mbps	Gigabit Ethernet

Richa Verma, KIET

Unshielded twisted pair cable

- The standard connector for unshielded twisted pair cabling is an RJ-45 connector. This is a plastic connector that looks like a large telephone-style connector

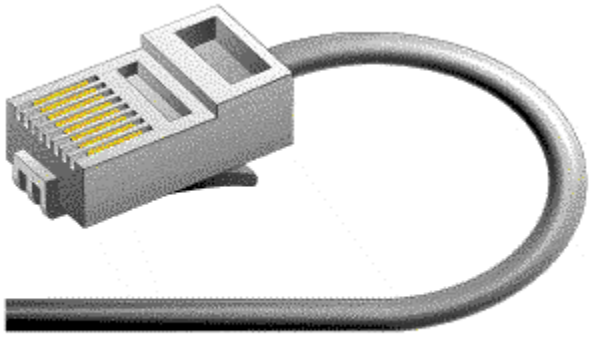
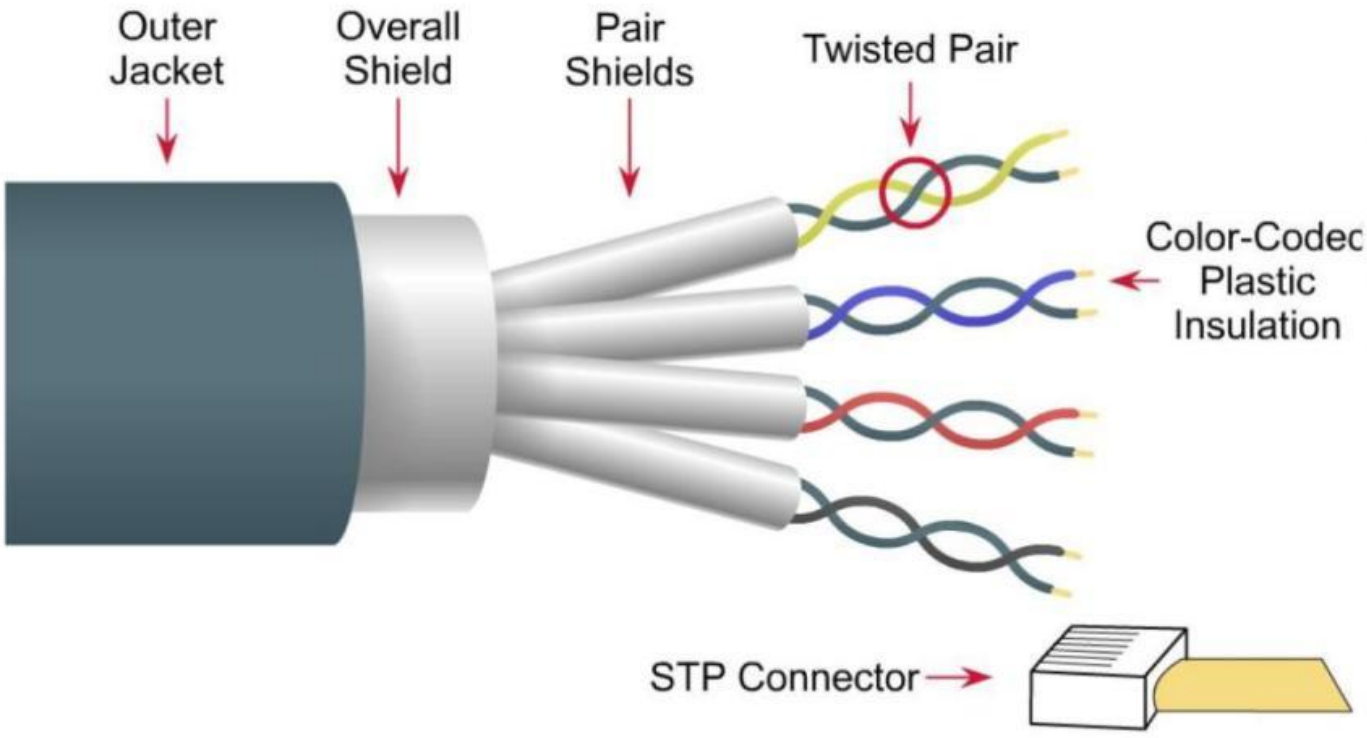


Fig. 2. RJ-45 connector

Shielded Twisted Pair Cable

- Shielded twisted pair cable is available in three different configurations:
- Each pair of wires is individually shielded with foil.
- There is a foil or braid shield inside the jacket covering all wires (as a group).
- There is a shield around each individual pair, as well as around the entire group of wires (referred to as double shield twisted pair).

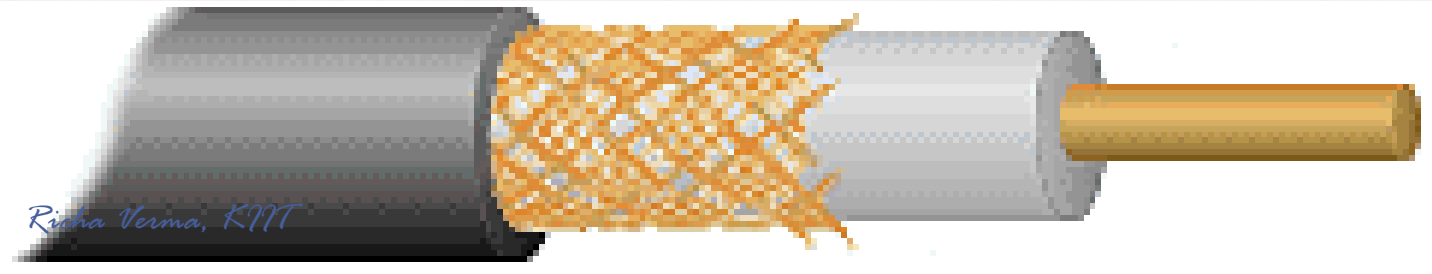


- Speed and throughput: 10-100 Mbps
- Cost per node: Moderately expensive
- Media and connector size: Medium to Large
- Maximum cable length: 100m (short)

Shielded Twisted Pair Cable

Coaxial Cables

- Coaxial cabling has a single copper conductor at its center. A plastic layer provides insulation between the center conductor and a braided metal shield . The metal shield helps to block any outside interference from fluorescent lights, motors, and other computers.

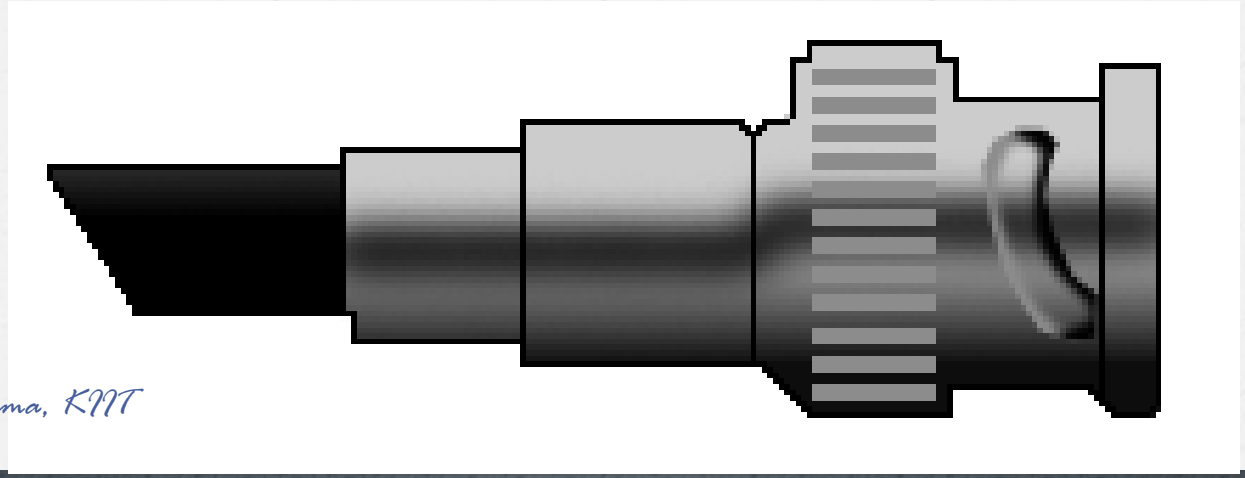


Coaxial Cable

- Although coaxial cabling is difficult to install, it is highly resistant to signal interference. In addition, it can support greater cable lengths between network devices than twisted pair cable. The two types of coaxial cabling are thick coaxial and thin coaxial.

Coaxial Cable Connector

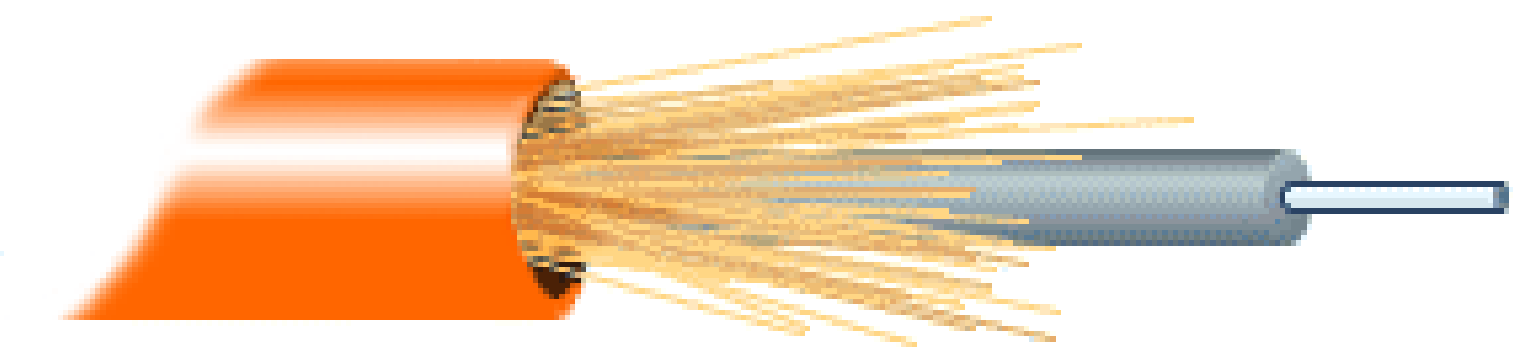
- The most common type of connector used with coaxial cables is the Bayone-Neill-Concelman (BNC) connector



Fiber Optic Cable

- Fiber optic cabling consists of a center glass core surrounded by several layers of protective materials
- It transmits light rather than electronic signals eliminating the problem of electrical interference.
- This makes it ideal for certain environments that contain a large amount of electrical interference. It has also made it the standard for connecting networks between buildings, due to its immunity to the effects of moisture and lighting.

Fiber Optic Cable



Fiber Optic Cable

- Fiber optic cable has the ability to transmit signals over much longer distances than coaxial and twisted pair.
- It also has the capability to carry information at vastly greater speeds. This capacity broadens communication possibilities to include services such as video conferencing and interactive services.
- The cost of fiber optic cabling is comparable to copper cabling; however, it is more difficult to install and modify.

Unguided Media

- Transports electromagnetic waves without using a physical conductor
- This is often referred to as wireless communication
- It includes propagation through ground, sky or line of sight

Wireless LANS

- Use high frequency radio signals, infrared light beams or laser to communicate

Standard	Max Speed	Typical Range
802.11 a	54 Mbps	150 feet
802.11b	11 Mbps	300 feet
802.11g	54 Mbps	300 feet

Commonly used wireless networks

- Infrared
- Radio link
- Microwave link
- Satellite link

Infrared

- Can be used for short range communication
- Line of sight
- Used in home remotes, cordless devices, intrusion detection
- They cannot penetrate through walls
- Fairly reliable
- Don’t cost very much

Infrared – Advantages

- Low power requirements (ideal for laptops, phones)
- Low circuitry cost
- Higher security (Directionality of beam helps ensure that data is not leaked)
- High noise immunity

Infrared - Disadvantages

- Line of sight
- Short range
- Light, weather sensitive
- Speed is low as compared to other wired transmissions
- Almost always one to one technology

Microwave link

- Very short wavelength
- Microwave signals can be focused by antennas into a narrow beam
- Any information that can travel on wires can be transmitted through microwaves

Microwave - Advantages

- Cheaper than laying cables
- Provides high transfer rates
- Small antennas required

Microwave - Disadvantages

- Line of sight
- Signal absorption by atmosphere. Microwaves suffer attenuation due to atmospheric conditions
- Towers are expensive to build.
- Transmitting and receiving antennas need to be properly aligned as signal travel in straight line

Radio Link

- Like visible light, infrared, ultraviolet, X-rays and gamma rays are electromagnetic waves
- Transmitter at radio station converts sound waves to electromagnetic waves which are then encoded onto an electromagnetic wave in the radio frequency range.
- (500 – 1600 kHz for AM stations)
- 86 – 107 MHz for FM stations

Radio link

- Radio electromagnetic waves can travel very long distances without being greatly attenuated
- Your radio receives these radio waves, decodes information and uses speakers to change it back to sound wave

Radio link

- Have longer wavelength
- Can penetrate through obstacles
- Carry lesser energy

Radio Waves

- Easy to generate
- Travel over long distances
- Can penetrate through buildings
- Waves are omni directional
- Relatively inexpensive than wired mediums

Radio Waves

- Signal frequency dependent
- Less secure mode of transmission
- At lower frequency, signal pass through obstacles and power falls off

Satellite link

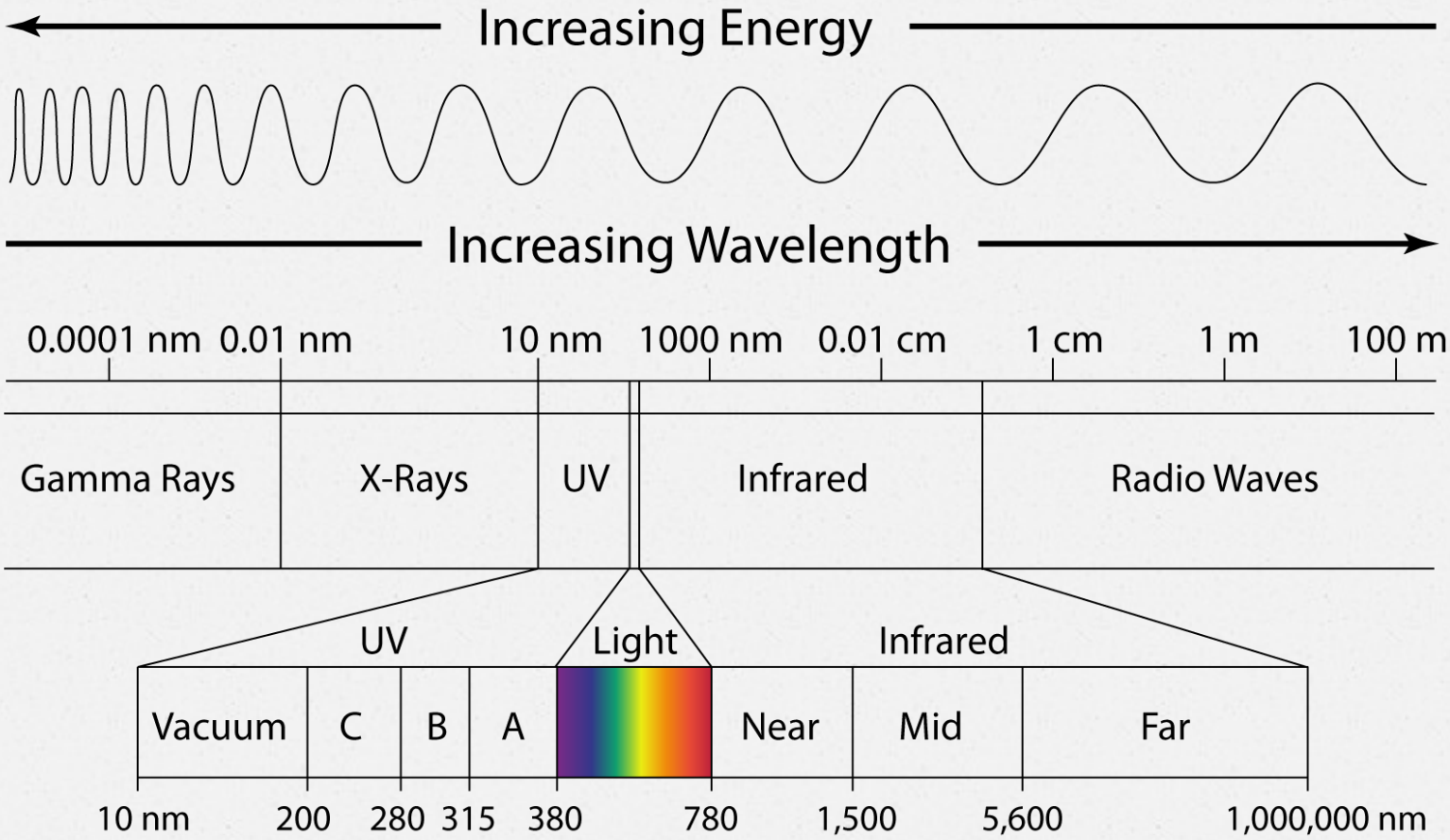
- Uses the communication of the satellite in space with large number of earth stations on the ground
- Signals are transmitted to the satellite through dish antennas. (Uplink)
- The signals are then received by antennas and recd by the users

Satellite - Advantages

- Transmission from any location on earth
- Higher bandwidth are available for use

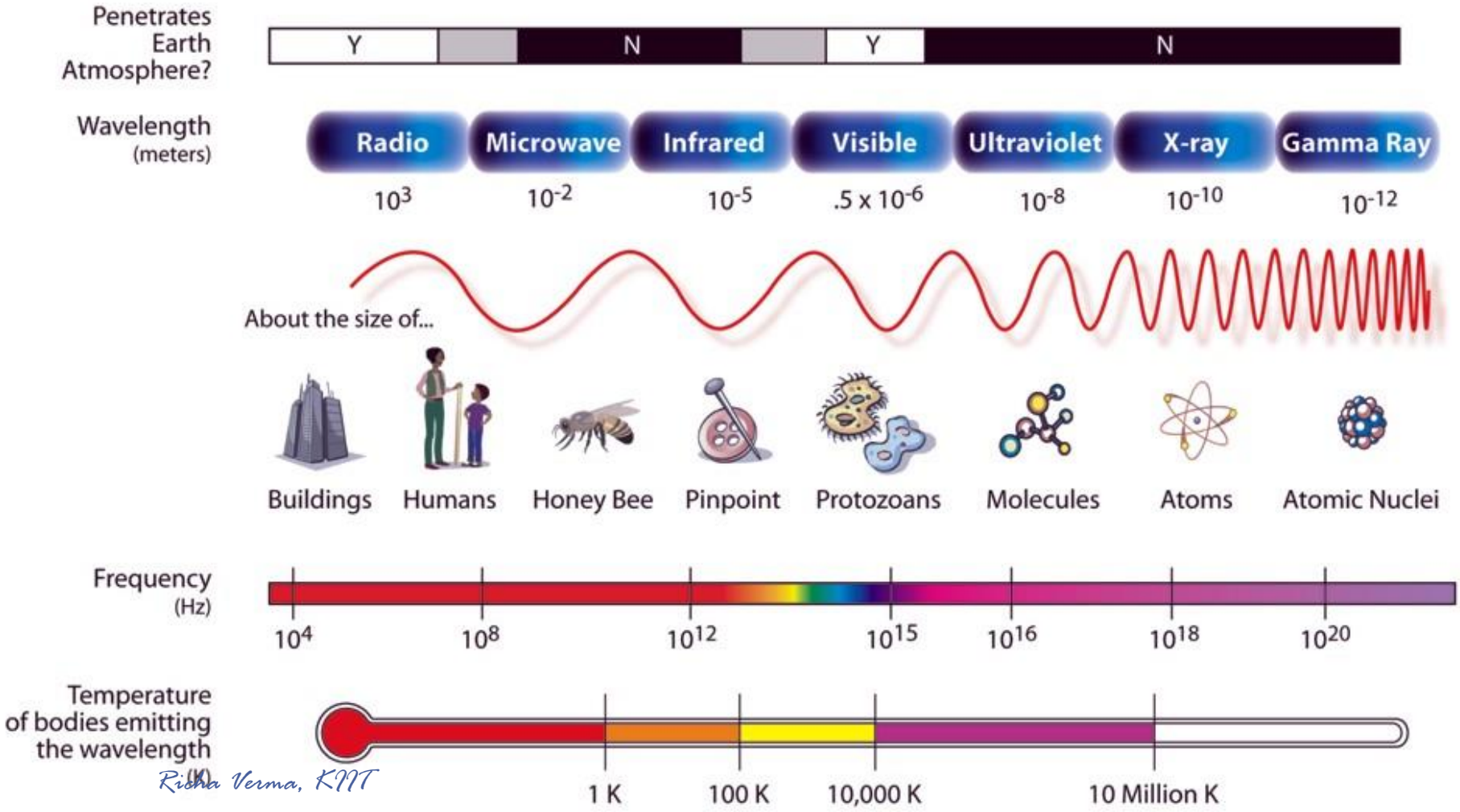
Satellite - Disadvantages

- Launching satellites into orbits is costly
- Satellite bandwidth is gradually becoming used up
- There is larger propagation delay in satellite communication than any other



Richa Verma, KIIT

THE ELECTROMAGNETIC SPECTRUM



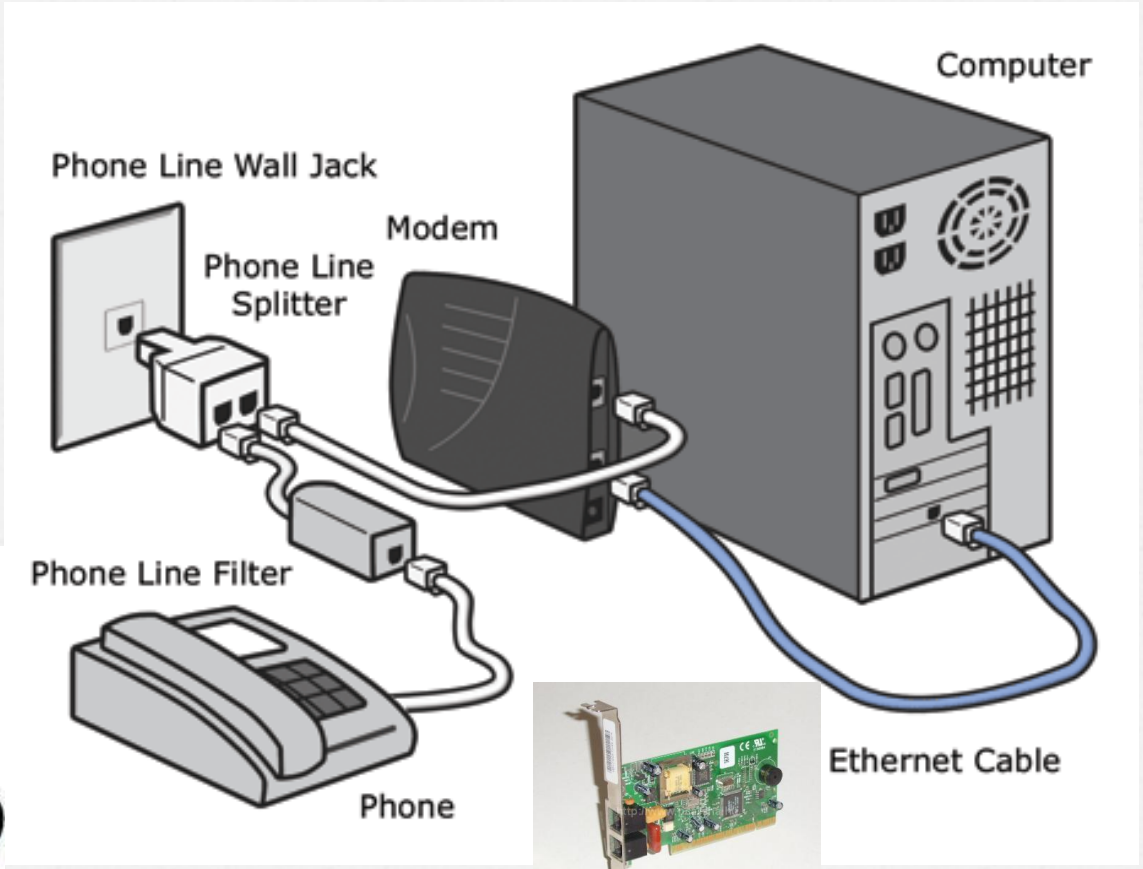
Richa Verma, KIIT

Network devices:

- Modem
- RJ11and RJ45 connectors
- Ethernet Card
- Hub
- Switch
- Gateway

Network devices:

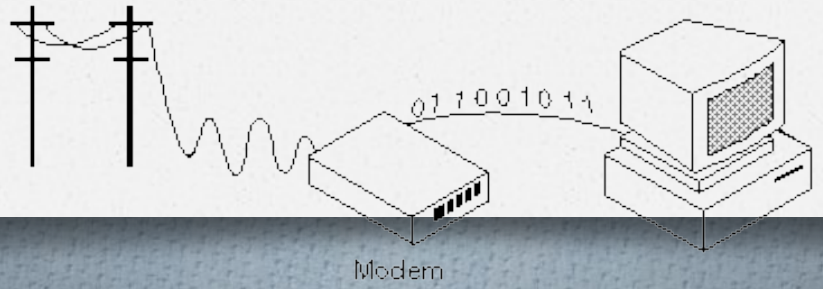
- Modem



Ethernet Cable

Network Devices - Modem

- Short for ***mo****dulator-****dem****odulator.* A modem is a device or program that enables a computer to transmit data over, for example, telephone or cable lines. Computer information is stored digitally, whereas information transmitted over telephone lines is transmitted in the form of analog waves. A modem converts between these two forms.



Richa Verma, KIIT

Network devices:

- RJ11and RJ45 connectors

1.RJ45 is used with ethernet cables in computer networking while RJ11 is used in connecting telephone units

2.RJ45 contains more wires than RJ11

3.RJ45 is physically bigger than RJ11 to accommodate the extra wires

Network devices : Ethernet Card

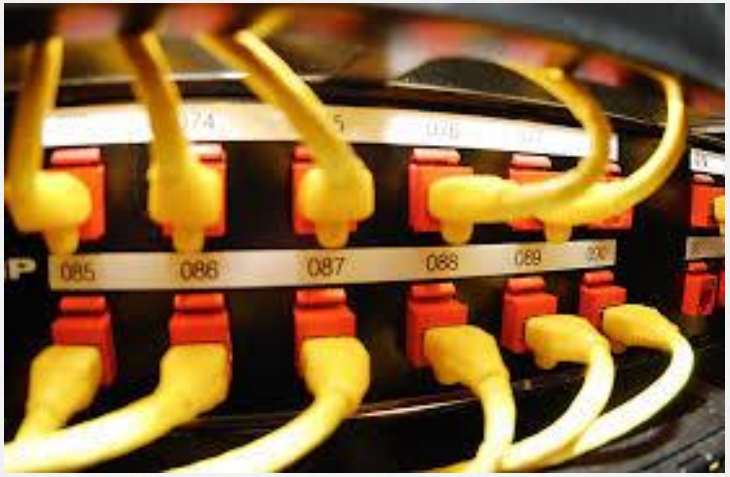
Network Devices : Hub

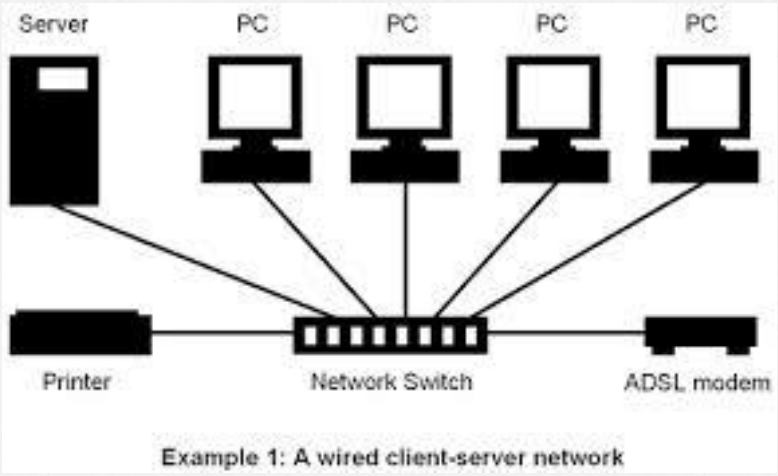
- An **Ethernet hub**, **active hub**, **network hub**, **repeater hub**, **multiport repeater** or **hub** is a device for connecting multiple Ethernet devices together and making them act as a single network segment. It has multiple input/output (I/O) ports, in which a signal introduced at the input of any port appears at the output of every port except the original incoming.

Network Devices : Switch

- A **network switch** is a small hardware device that joins multiple computers together within one local area network (LAN).
- Network switches appear nearly identical to network hubs, but a switch generally contains more intelligence (and a slightly higher price tag) than a hub.
- Unlike hubs, network switches are capable of inspecting data packets as they are received, determining the source and destination device of each packet, and forwarding them appropriately.
- By delivering messages only to the connected device intended, a network switch conserves network bandwidth and offers generally better performance than a hub.

Network Devices : Hub



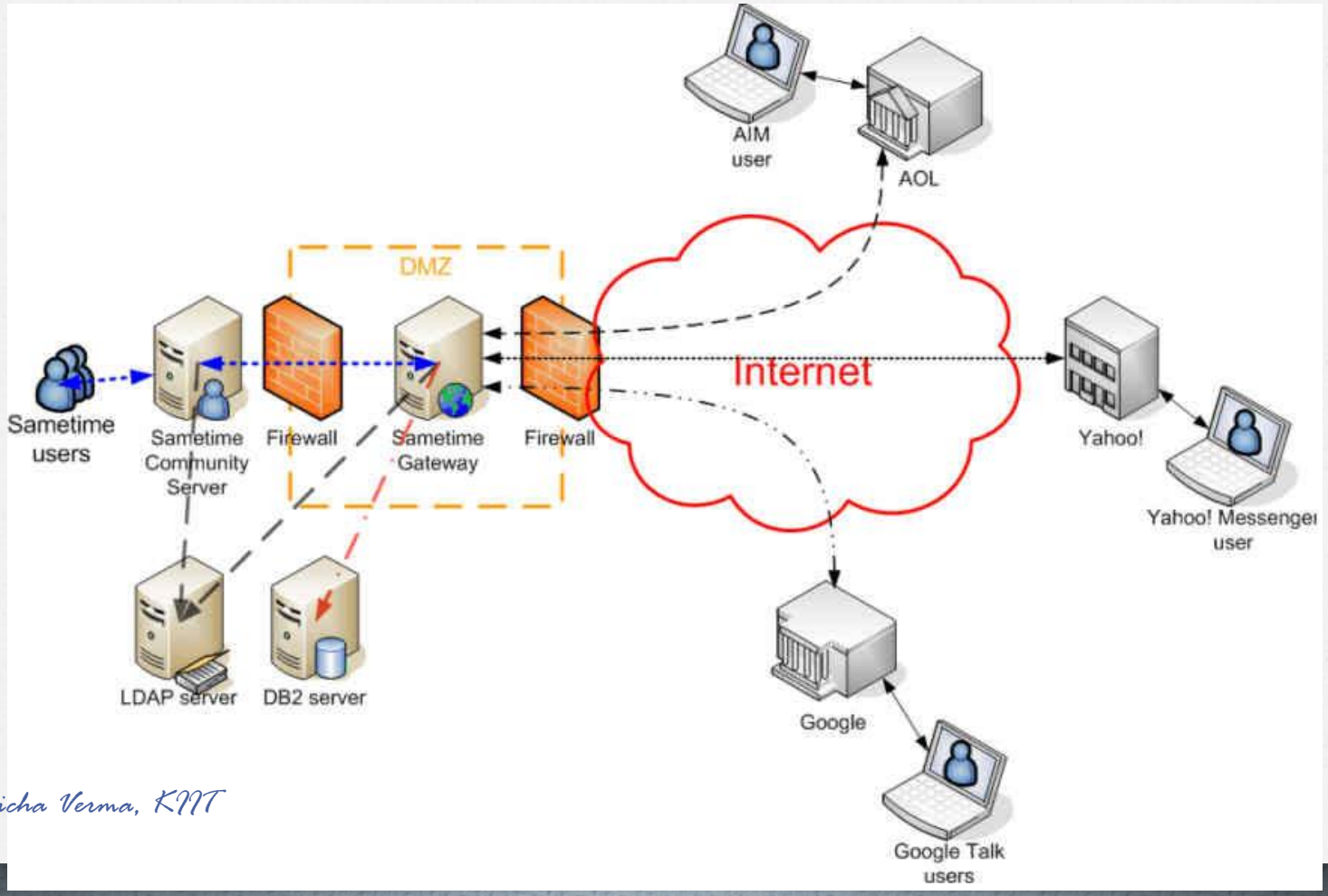


Example 1: A wired client-server network

Network Devices : Gateways

- In a communications network, a network node equipped for interfacing with another network that uses different protocols.
- A gateway may contain devices such as protocol translators, matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks.

Gateway


AIM
user
AOL
DMZ
Internet
Sametime
users
Sametime
Community
Server
Firewall
Sametime
Gateway
Firewall
Yahoo!
Yahoo! Messenger
user
LDAP server
DB2 server
Google
Google Talk
users

Network Topologies and types:

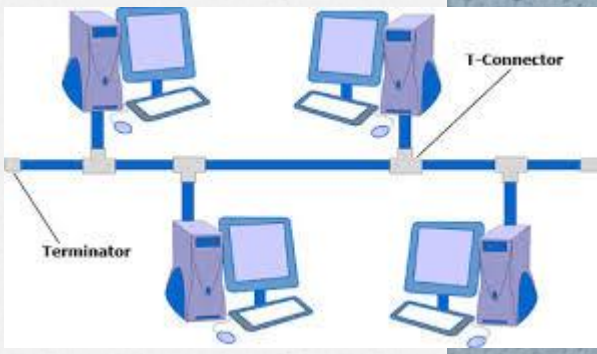
- Topologies :

  Bus, Star, Tree

- Types of network :

  PAN, LAN, WAN, MAN

Bus Topology



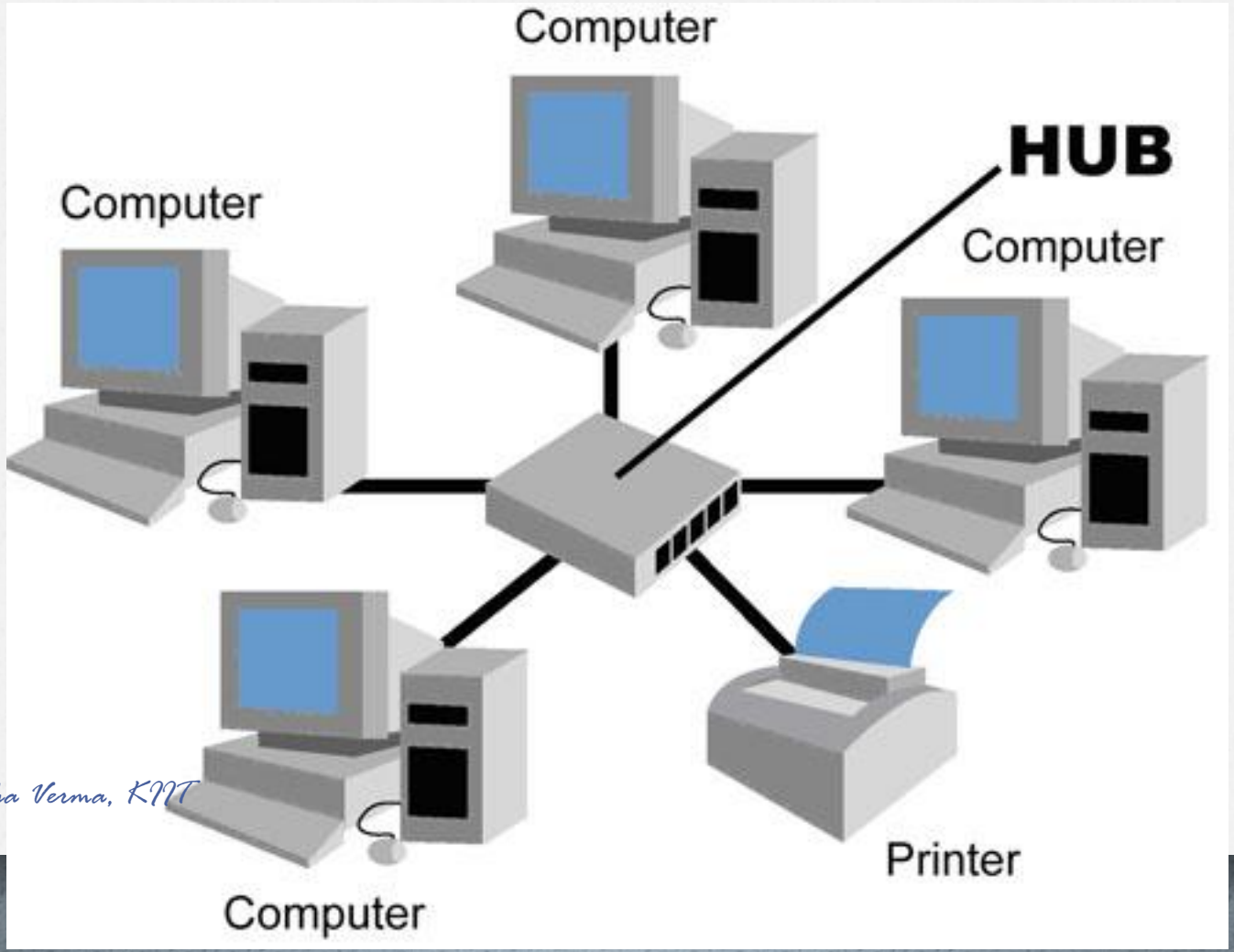
- Ease of installation.
- Simple and cheap.
- If one computer fails it does not affect the other computers.
- Minimizing the amount cable used connecting the network.

Bus Topology

- If the main cable fails, all the other sources will die
- Terminators are required at both ends
- At a time only one node can transfer data
- Difficult to identify the problem if the entire network shuts down

Richa Verma, RMT

Star Topology



Star Topology

- **Star networks** : A star network consists of one central switch, hub or computer, which acts as a conduit(duct/tube/pipe/channel) to transmit messages. This consists of a central node, to which all other nodes are connected; this central node provides a common connection point for all nodes through a hub.

Star

- Easy to manage
- If a problem occurs in the network, it can be isolated and cleared
- Easy to extend
- No collision of data

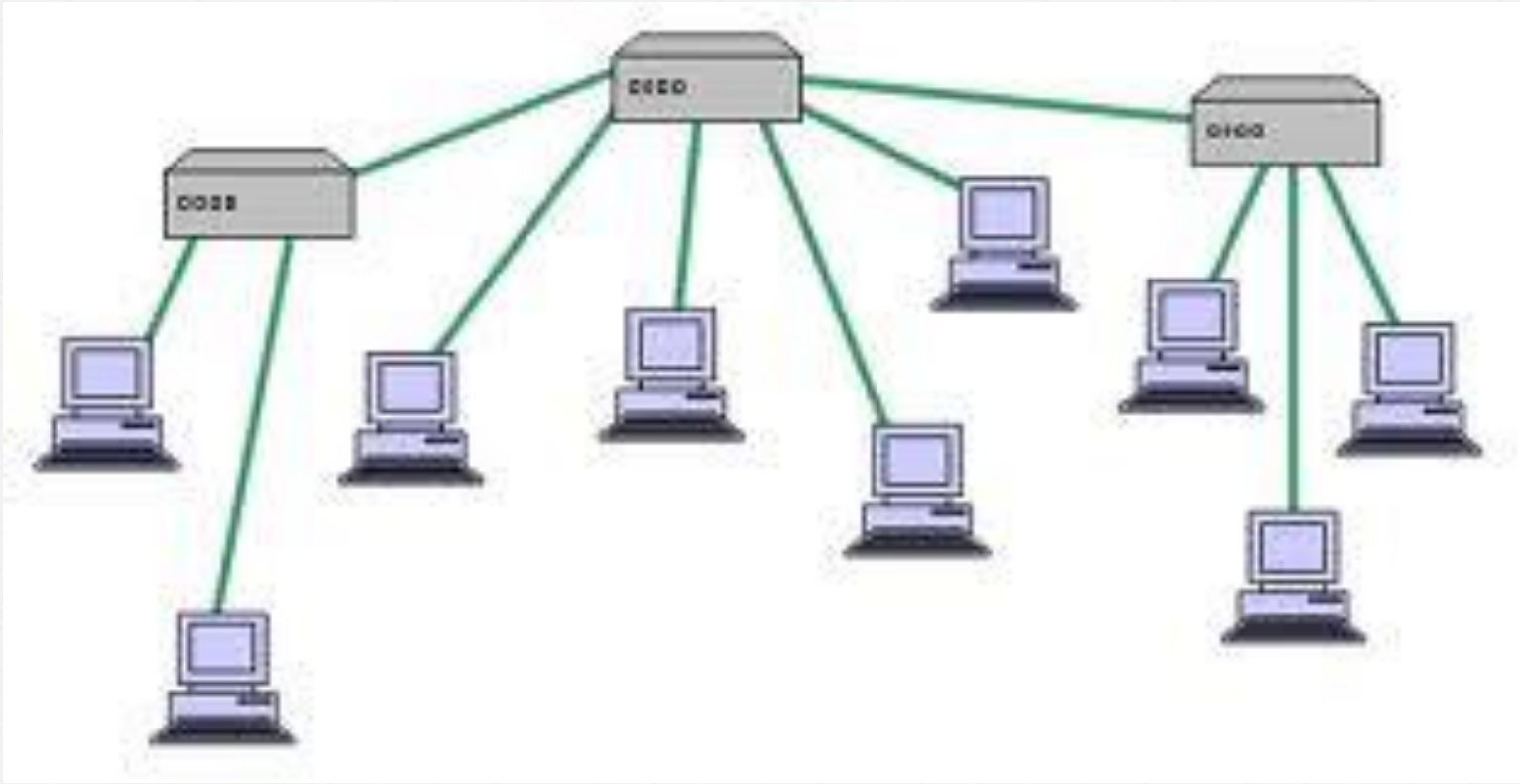
Star

- Complete dependence on hub
- Network connection may slow down when the number of nodes increases or the cable lengthens
- Star topology needs more cable length
- More expensive than bus

Star

- High dependence of the system on the functioning of the central hub.
- Failure of the central hub renders the network inoperable

Tree



Tree

- It is possible to form a point to point connection with tree topology
- All computers can access other computers which are in other larger and immediate network

Tree

- Entire tree topology would fail if the central truck fails
- More complex . As it grows it becomes difficult to manage
- It is expensive as more hubs and cables are required

Network Protocols

- Include guidelines that regulate –
- Access methods
- Allowed physical topologies
- Type of cabling
- Speed of data transfer

- They can be implemented in hardware or software

Network Protocol:

- TCP/IP, File Transfer Protocol (FTP), PPP, Remote Login (Telnet), Internet
- Wireless/Mobile Communication protocol such as GSM, CDMA, GPRS, WLL,
- Mobile Telecommunication Technologies : 1G, 2G, 3G and 4G
- Electronic mail protocols such as SMTP, POP3
- Protocols for Chat and Video Conferencing VOIP
- Wireless protocols such as Wi-Fi and WiMax

TCP/IP

- Main protocol for communication on internet
- TCP for breaking & assembling data
- IP responsible for sending packets to correct destination – it decides the route

File Transfer Protocol

- Enables file sharing between hosts

PPP

- **Point to Point Connection** is a private data connection securely connecting two or more locations for private data services. A point to point connection is a closed network data transport service which does not traverse the public Internet and is inherently secure with no data encryption needed.

PPP

- An example is a telephone call, in which one telephone is connected with one other, and what is said by one caller can only be heard by the other. This is contrasted with a *point-to-multipoint* or *broadcast* communication topology,

Remote Login (Telnet)

- TELNET is used for remote login to other computers on the Internet.
- **Telnet** is a network protocol used on the Internet or local area networks to provide a bidirectional interactive text-oriented communication facility
- Not secure
- The **tlntadmn** commands allow you to remotely manage a computer running Telnet Server. These commands are run from the command prompt. Used without parameters, **tlntadmn** displays local server settings.

- Telnet clients – Microsoft, Unix

Telnet

- To use **telnet** commands at the Telnet prompt

To start Telnet Client and to enter the Telnet prompt

Syntax

telnet [*RemoteServer*]

Internet Protocol

- The **Internet Protocol** (**IP**) is the principal communications protocol in the Internet protocol suite for relaying datagrams across network boundaries. Its routing function enables internetworking, and essentially establishes the Internet.

Technologies used in cellular phones

3 main technologies

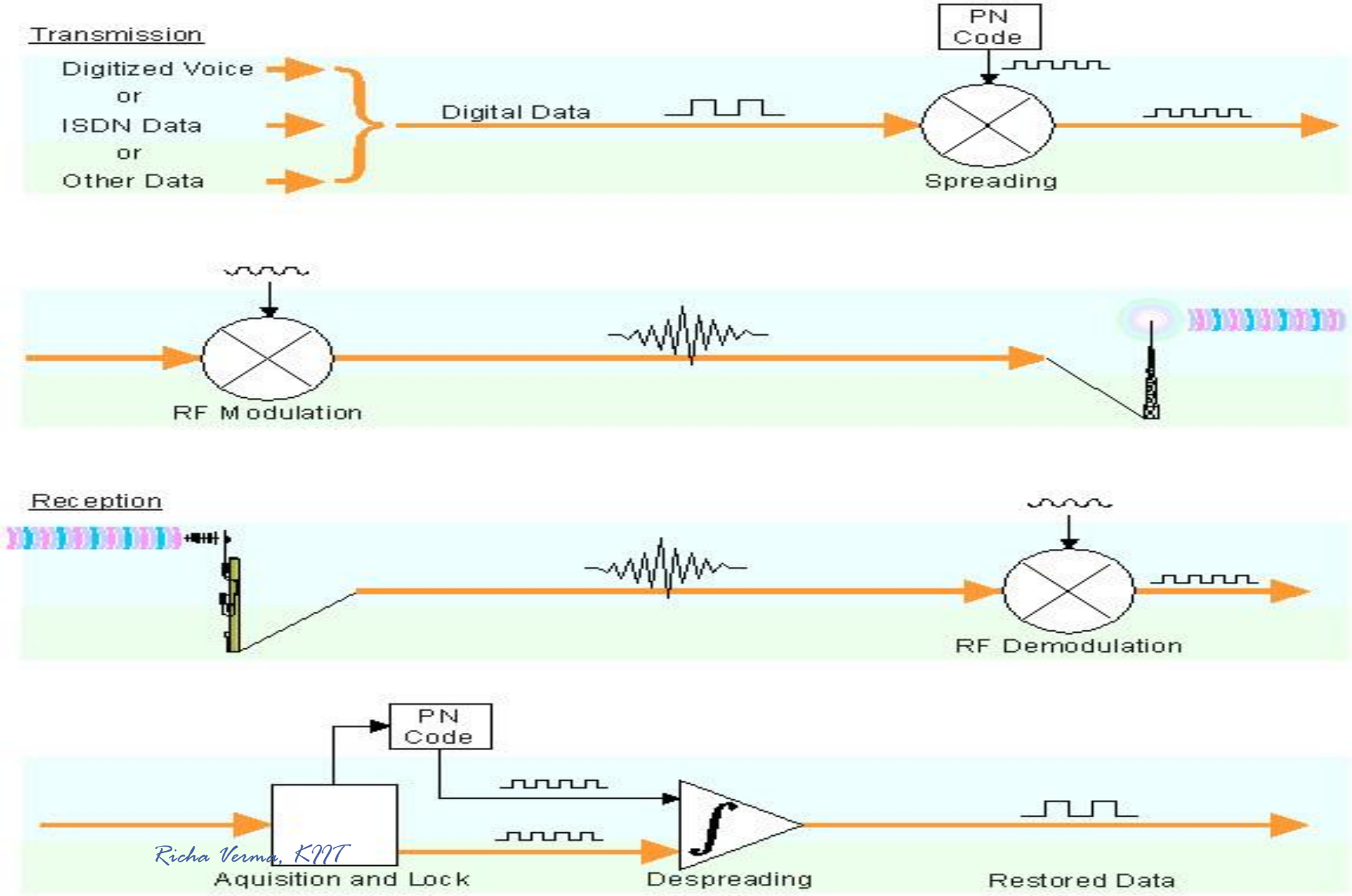
- GSM
- TDMA
- CDMA

CDMA

- An analogy to the problem of multiple access is a room (channel) in which people wish to talk to each other simultaneously. To avoid confusion, people could take turns speaking (time division), speak at different pitches (frequency division), or speak in different languages (code division).

CDMA is analogous to the last example where people speaking the same language can understand each other, but other languages are perceived as noise and rejected.

Similarly, in radio CDMA, each group of users is given a shared code. Many codes occupy the same channel, but only users associated with a particular code can communicate.



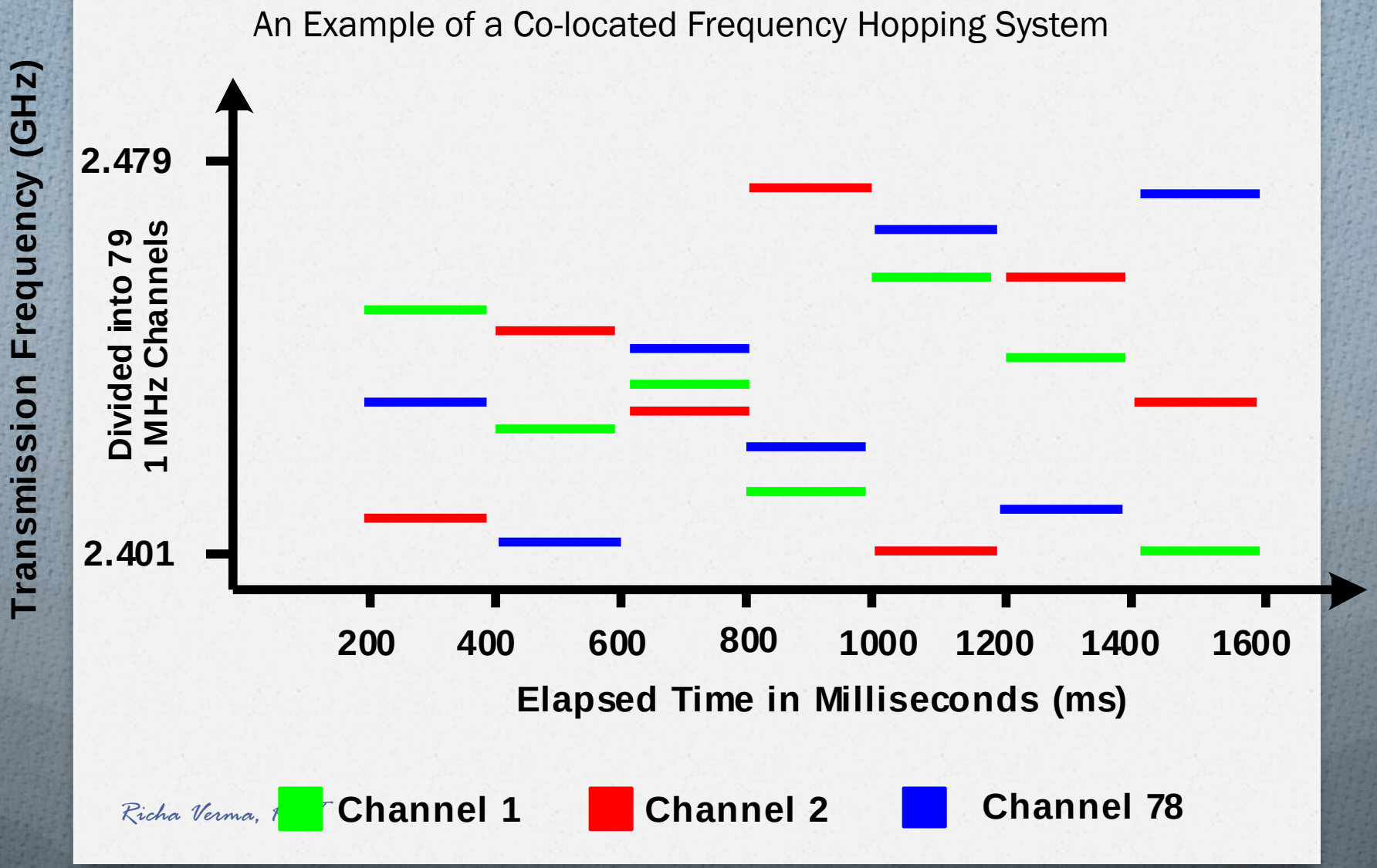
Richa Verma, KIIT

CDMA

- CDMA does not assign a specific frequency to each user.
- Instead, every channel uses the full available spectrum.
- Individual conversations are encoded with a pseudo-random digital sequence.

- CDMA consistently provides better capacity for voice and data communications than other commercial mobile technologies, allowing more subscribers to connect at any given time, and it is the common platform on which 3G technologies are built.

Frequency Hopping Spread Spectrum



Richa Verma,

Frequency hopping

- The hopping channels for the US and Europe are shown below.

Set	Hopping Pattern
1	{0,3,6,9,12,15,18,21,24,27,30,33,36,39,42,45,48,51,54,57,60,63,66,69,72,75}
2	{1,4,7,10,13,16,19,22,25,28,31,34,37,40,43,46,49,52,55,58,61,64,67,70,73,76}
3	{2,5,8,11,14,17,20,23,26,29,32,35,38,41,44,47,50,53,56,59,62,65,68,71,72,77}

Dwell time per frequency is around 100 ms

GSM

- Operates at either 900 MHz 0r 1800 MHz frequency band
- Was first launched in Finland in 1991
- Today, 690 mobile networks provide GSM services over 213 countries
- GSM represents 82.4% of all global mobile connections

GSM

- Many GSM network operators have roaming agreements with foreign countries
- GSM is also known as 2 G technology
- Mature and stable technology
- Consistent service

GSM

- Has pulse nature which can interfere with some electronic devices including pace makers, hearing aids
- That is why hospitals require you to turn off cell phones
- GSM uses TDMA (Time division multiple access)

CDMA & GSM

- For call quality, the technology you use is much less important than the way your carrier has built its network. There are good and bad CDMA and GSM networks, but there are key differences between the technologies.

CDMA & GSM

- It's much easier to swap phones on GSM networks, because GSM carriers put customer information on a removable SIM card. **Take the card out, put it in a different phone,** and the new phone now has your number. What's more, to be considered GSM, a carrier must accept any GSM-compliant phone. So the GSM carriers don't have total control of the phone you're using.

Wireless/Mobile Communication protocol GPRS, WLL

- GPRS

General packet radio service (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM).

promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users.

GPRS

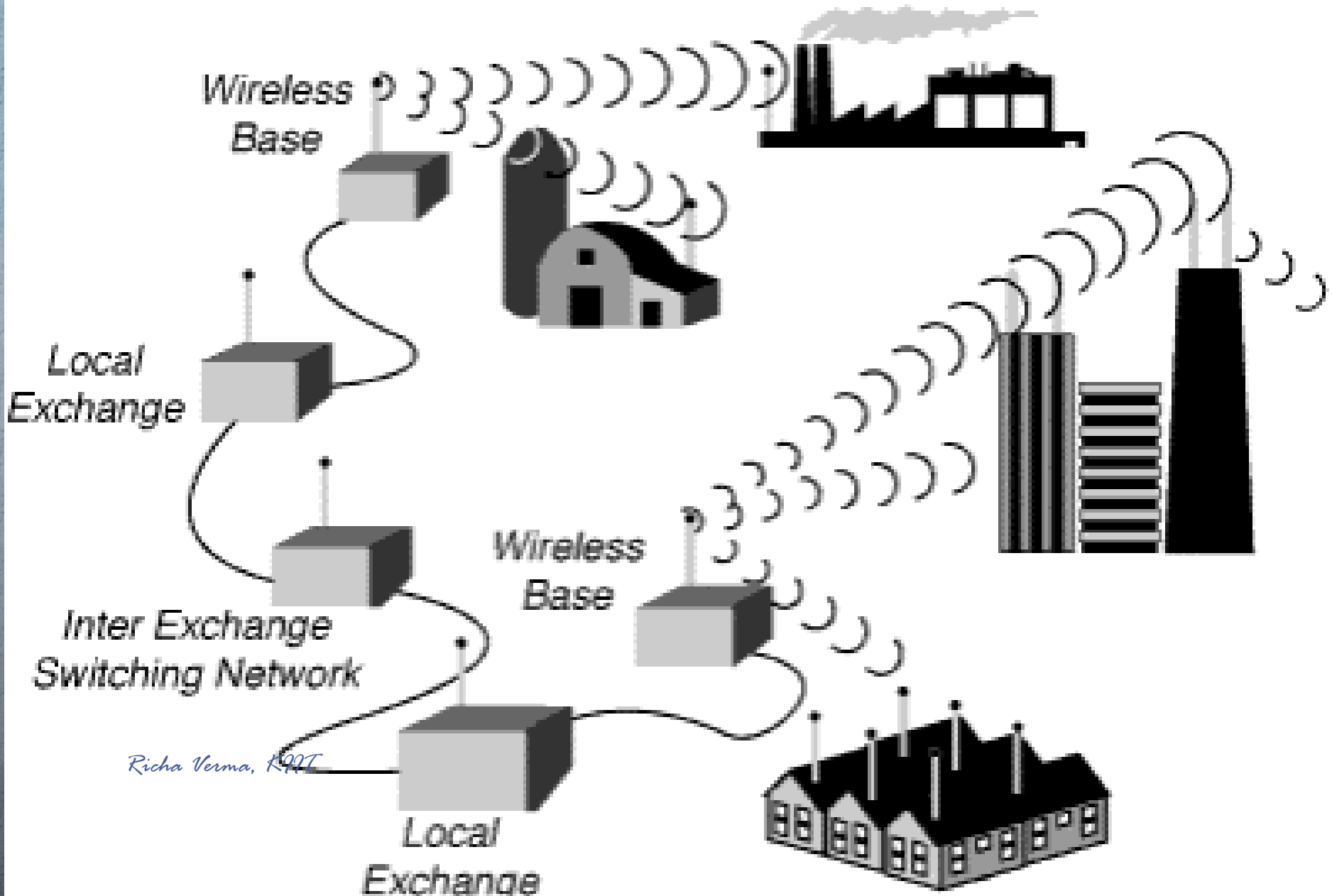
- General Packet Radio Services (GPRS) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users.

WLL

- WLL stands for Wireless Local Loop and it is basically the use of radio to provide a telephone connection to the home. It is sometimes called radio in the loop (RITL) or fixed-radio access (FRA).

WLL

- When WLL connects subscribers to the public switched telephone network (PSTN), radio signals are used as a substitute for copper for all or part of the connection between the subscriber and the switch. Included in this is: cordless access systems, proprietary fixed radio access, and fixed cellular systems.



Richa Verma, RIIT

Mobile Telecommunication Technologies : 1G, 2G, 3G and 4G

1 G:

- used in the first mobile phones.
- Used analog radio signals
- Was introduced in 1980s & continued till 1992
- Eg. AMPS(Advanced Mobile Phone Systems)

CDPD (Cellular Digital Packet Data)

2G

- Came in 1992
- Used digital format
- Introduced text messaging
- Introduced data services for mobiles starting with SMS

- Eg GSM, Digital AMPS, CDMA

3 G

- More efficient ways of carrying data
- Faster web services – live chats, fast downloading, video conferencing etc. on mobile phones

- Introduced by DoCoMo

4 G

- High quality streaming video and anytime, anywhere
- Anytime where is called MAGIC (Mobile multimedia: Anytime/Anywhere; Global mobility support; Integrated wireless solution, Customized personal services)
- Totally wireless
- Data transmission at much higher rate

Electronic mail protocol SMTP

- Users receive and send email using

Simple Mail Transfer Protocol

Electronic mail protocol POP3 & IMAP

- Post Office Protocol allow users to retrieve and store mail messages

Protocols for Chat and Video Conferencing VOIP

- A technology that allows you to make calls using broadband Internet Connection. (Voice Over Internet Protocol)
- Converts your voice signals into digital that travels over the internet

Wireless protocol - WiFi

- WiFi – Wireless fidility
- Allows an electronic device to exchange data wirelessly (using radio waves) over a computer network, including high-speed Internet connections.

- **A device that can use Wi-Fi** (such as a personal computer, video-game console, smartphone,digital camera tablet, or digital audio player)

can connect to a network resource such as the Internet via a wireless network access point. Such an access point (or hotspot) has a range of about 20 meters (65 feet) indoors and a greater range outdoors

Wireless protocol - WiMax

- **WiMAX** (**Worldwide Interoperability for Microwave Access**) is a wireless communications standard designed to provide 30 to 40 megabit-per-second data rates

WiMax & WiFi Compared

- WiMax has greater range
- When multiple users connect to WiFi there is a constant battle for broadband access while with WiMax each user has constant broadband access
- WiMax algorithm limits the number of users to connect to WiMax access point, if more try they are redirected to another access point

Network Security Concept

- **Network Security Concepts:**
- Threats and prevention from Viruses, Worms, Trojan horse, Spams
- Use of Cookies, Protection using Firewall;
- India IT Act, Cyber Law, Cyber Crimes, IPR issues, Hacking.

Threats and prevention from Viruses, Worms, Trojan horse, Spams

Use of Cookies, Protection using Firewall;

India IT Act, Cyber Law, Cyber Crimes, IPR issues, Hacking.

Web Services

WebServices:

- WWW, Hyper Text Markup Language (HTML), eXtensible Markup Language (XML); Hyper Text

Transfer Protocol (HTTP); Domain Names; URL; Protocol Address; Website, Web browser, Web

- Servers; Web Hosting, Web Scripting - Client side (VB Script, Java Script, PHP) and Server side
- (ASP, JSP, PHP), Web 2.0 (for social networking)

HTML & XML

- HTML => Hyper Text Markup Language
  XML => Extensible Markup Language

  HTML => Use only Predefined Tags
  XML => Users must create their own tags

  HTML => Not Case Sensitive **Example :** HTML as start tag and html as end tag are accepted.
  XML => Case Sensitive **Example:** BOOKS as start tag and Books as end tag are not accepted

  HTML => For displaying data (presentation language)
  XML => For describing data

  HTML => Static (Content is not changed every time page is reloaded)
  XML => Dynamic (Content is changed every time page is reloaded)

  HTML => Every tag need not having an end tag.
  XML => Every tag must have an end tag.

Richa Sharma KEC

HTML & XML

- Hypertext Markup Language (HTML) is a page description language used on the World Wide Web that defines the hypertext links between documents. Extensible Markup Language (XML) is an outgrowth of HTML, it is a markup language that allows data to be stored in a human readable format. The language also allows users to create unique tags or other elements.

HTTP

- HTTP is the foundation of data communication for the World Wide Web.
- Hypertext is a multi-linear set of objects, building a network by using logical links (the so-called hyperlinks) between the nodes (e.g. text or words). HTTP is the protocol to exchange or transfer hypertext.

DOMAIN NAME

- Domain names are used to identify one or more *IP addresses*. For example, the domain name *microsoft.com* represents about a dozen IP addresses. Domain names are used in URLs to identify particular Web pages. For example, in the URL *http://www.pcwebopedia.com/index.html*, the **domain name is *pcwebopedia.com.*** `

URL

- A **uniform resource locator**, abbreviated **URL**, also known as **web address**, is a specific character string that constitutes a reference to a resource. In most web browsers, the URL of a web page is displayed on top inside an address bar.
- Eg.
- http://www.kiitworld.in

Protocol Address

- An **Internet Protocol address** (**IP address**) is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol for communication. An IP address serves two principal functions: host or network interface identification and location addressing

Protocol Address

- IP addresses are binary numbers, but they are usually stored in text files and displayed in human-readable notations, such as 172.16.254.1

Website

Web browser – IE, FIREFOX

Web Servers – APACHE, IIS

Scripting :

Web Scripting - Client side (VB Script, Java Script, PHP)

Server side(ASP, JSP, PHP)

Web 2.0 (for social networking)

- - A Web 2.0 site may allow users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community

- Examples of Web 2.0 include social networking sites, blogs, wikis, video sharing sites,

Web hosting

- Web Hosting - A **web hosting service** is a type of Internet hosting service that allows individuals and organizations to make their website accessible via the World Wide Web. Web hosts are companies that provide space on a server owned or leased for use by clients

Open Standards

- **Open Standards**
- Introduction to open standards and its advantage in development of inter-operable environment.

Open Source Concepts

Proprietary
Privately owned or controlled
Source Code is generally kept secret
A compiled version is given to the user
Such products are legal
User does not have the ability to study and modify
Cannot be copied & provided to 3rd parties
User cannot make and release improvements

Open Source Software

Freeware

- IS distributed free by the author
- Although it is available for free but the author retains the copyright
- It cannot be altered or sold

Shareware

- Shareware is distributed freely but with certain conditions
- It is distributed free on trial basis with the understanding that the user may have to pay later

FLOSS/FOSS

- Free/Liberal/Open/Source/Software
- The term is used for free software and open source where free means cost free software.
- Liberal means liberty to change
- Code or patch files are available openly to fix the bugs and for further development

GNU

- It is a computer operating system composed entirely of free software. It's name is a recursive acronym for GNU's Not Unix which was chosen because it resembled Unix code.

FSF

- Free Software Foundation was established in 1985 to promote the development of free software with full rights to use, study, copy, modify and redistribute computer program.

OSI

- Open Source Initiative
- Is a non- profit organisation dedicated to managing and promoting Open Source Definition for good of the community

- Linux, Firfox, Apache HTTP Server, MYSQL, POSTGRESQL, PANGO,PHP. PHYTHON, TOMCAT, OPENOFFICE are examples of Open Source Software

W3C

- W3C Stands for the **World Wide Web Consortium**
- W3C was created in **October 1994**
- W3C was created by **Tim Berners-Lee**
- W3C is working to **Standardize the Web**
- W3C creates and maintains **WWW Standards**
- W3C Standards are called **W3C Recommendations**

W3C

Some well known members are:

- IBM
- Microsoft
- America Online
- Apple
- Adobe
- Macromedia
- Sun Microsystems

W3C

- Does development of Web specifications (called "Recommendations") that describe communication protocols (like HTML and XML)

Cloud Computing

- **Cloud Computing**
- Characteristics, layers-client, Application, platform and infrastructure, Deployment models-Private cloud, Public cloud, Community cloud and hybrid cloud, Issues-Privacy, Compliance, Security,
- Sustainability and abuse.

Cloud Computing

- Cloud computing is internet based development and use of computer technology in which IT related capabilities are provided as services

Cloud Computing

- Users of cloud computing do not need to buy additional computer or software instead make subscription to a computing service.
- Eg. Flicker & Dropbox

Cloud

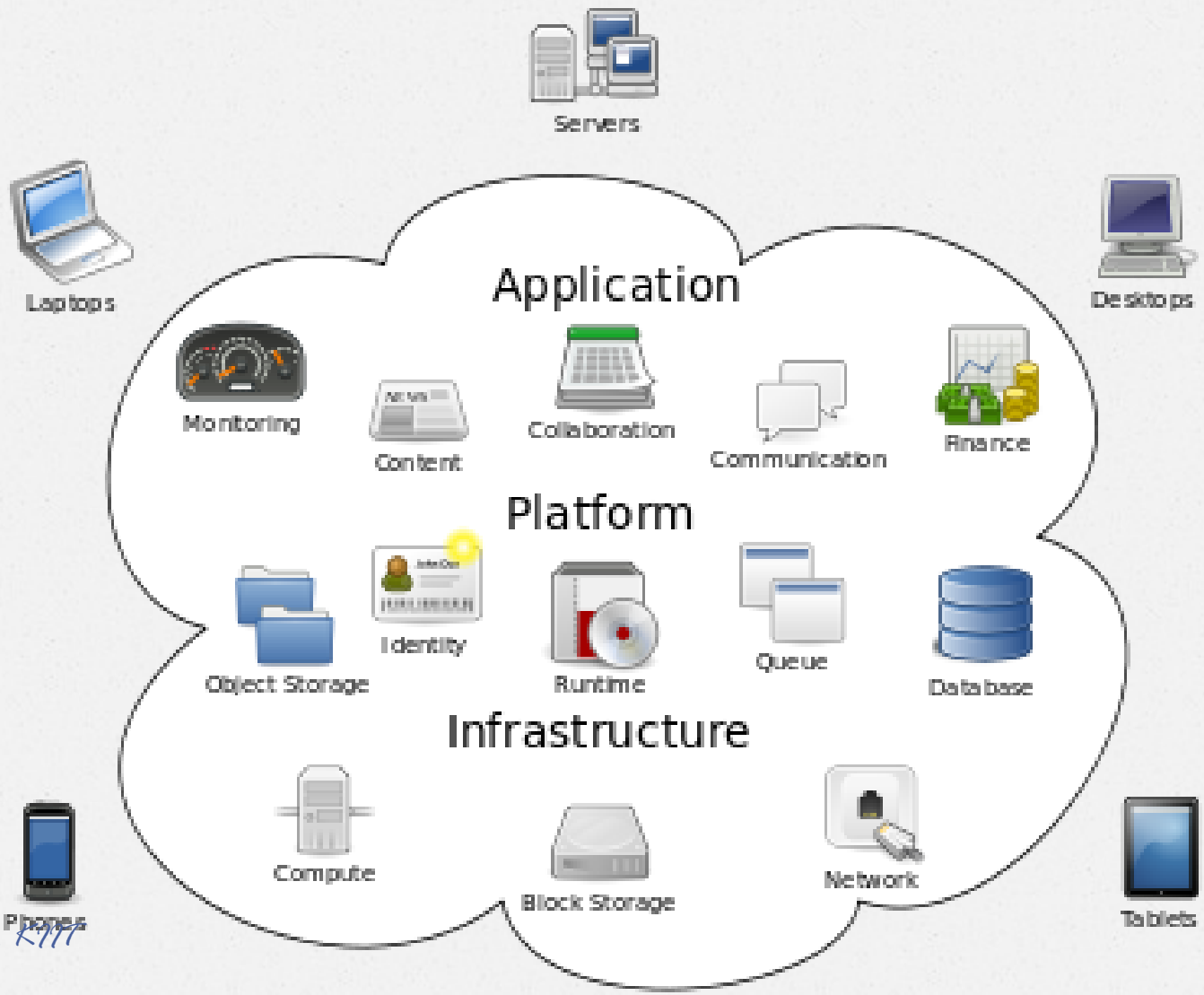
- Hotmail.com was launched in 1996 and is considered as the first cloud implementation.
- Twitter, myspace, Wikipedia, youtube, facebook, linkedin, google docs, blogger are examples of cloud computing

Characteristics of cloud computing

- On demand self service
- Broad network access
- Resource pooling

Advantages of cloud computing

- **Reduced cost:** Cloud computing can reduce both capital expense (CapEx) and operating expense (OpEx) costs because resources are only acquired when needed and are only paid for when used.
- **Refined usage of personnel:** Using cloud computing frees valuable personnel allowing them to focus on delivering value rather than maintaining hardware and software.



Richa Verma, RVIT

Cloud Computing

Layers

- Infrastructure cloud
- Content cloud
- Information cloud

Infrastructure cloud

- IaaS

It consists of the physical assets – servers, network devices, storage disks, etc.

Rather than purchasing servers, software, data center space or network equipment, clients instead buy those resources as a fully outsourced service.

. *Infrastructure as a Service* (IaaS) has providers such as the IBM® Cloud delivers computer infrastructure, typically a platform virtualization environment, as a service.

Content cloud

- It provides the application infrastructure. **Platform as a Service (PaaS)** provides access to operating systems and associated services. It provides a way to deploy applications to the cloud using programming languages and tools supported by the provider.

PaaS has providers such as Amazon's Elastic Compute Cloud (EC2).

Information cloud

- The top layer is the *application* layer, the layer most visualize as the cloud. Applications run here and are provided on demand to users. - SaaS (Software as a service)

Software as a Service (SaaS) has providers such as Google Pack. Google Pack includes Internet accessible applications, tools such as Calendar, Gmail, Google Talk, Docs, and many more.

Clients

Deployment models

- Private cloud,
- Public cloud,
- Community cloud and
- Hybrid cloud

Issues

- Privacy, Compliance, Security,
- Sustainability and abuse.