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## UNITY AND DISCIPLINE



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# INRODUCTION TO COMMUNICATION AND LATEST TRENDS

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# COMMUNICATION

# Chapter C1

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## UNITY AND DISCIPLINE

Communication is the easy transmission of thoughts and ideas from one individual to another and vice-a-versa and reception and understanding of others ideas in the original form. Various forms of communications are sign language, voice, written script, line transmission, radio wave, space wave and highly complex digital communication.

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In modern battlefield, activities of the army have become very complex and require frequent communication between commanders and troops to achieve the desired results. Importance of communications is becoming a major ingredient of modern warfare.

## Line Communication

The invention of telephone by Graham Bell revolutionized the world of communications as individuals were able to speak directly to each other. This is the basic means of signal communications for a force which is static. A telephone is by far the best means of signal communication between individuals following are advantages and disadvantages given below:

(a) **Advantages**

(i) Reliable and practically free from electrical interference.

(ii) Relatively secure.

(iii) Number of circuits and message carrying capacity is more but limited only by availability of material and manpower.

(b) **Disadvantages**

(i) Vulnerable to physical interference and enemy interception along the entire length of the route.

(ii) Takes time to construct.

(iii) Inflexible once it is laid.

(iv) Expensive in men and material

# RADIO COMMUNICATION

## Radio Communication

Radio is the technology of using radio waves to carry information such as sound, by systematically modulating properties of electromagnetic energy waves. The information in the waves can be extracted when radio waves strike an electrical conductor and transformed back into its original form. Radio communication requires the use of both transmitting and receiving equipment.

The transmitting equipment, which includes a radio transmitter and transmitting antenna, is installed at the point from which messages are transmitted. The receiving equipment, which includes a radio receiver and receiving antenna, is installed at the point at which messages are received.

## Wave

A wave can be described as a disturbance that travels through a medium from one location to another location. Types of waves can broadly be divided in two parts:

## Mechanical Waves

A mechanical wave is a wave that is an oscillation of matter, and therefore transfers energy through a medium.

## Electromagnetic Waves

Electromagnetic waves are waves which can travel through the vacuum of outer space.

## Propagation of Wave

The mode of propagation of electromagnetic waves (EMW) from transmitter to receiver depends upon the frequency employed. These can be of following types:

(i) Sky Wave Propagation

(ii) Space Wave Propagation

(iii) Ground Wave Propagation

(iv) Tropospheric Scatter

Radio Communication involves Net Radio and Radio Relay.

## Net Radio

Net radio is the basic means of signal communication for any mobile force. Efficiency of net radio communication is appreciably affected by factors such as weather, terrain, power output of the set, state of training of operators and equipment maintenance.

It provides facilities for the following:

(a) **Radio Telephony**

Simple one way voice communication, depending on the type of equipment available.

(b) **Radio telegraphy** for transmission of message and key conversations.

(c) **Tele printers** over radio transmission.

## Advantages

(a) Vulnerable only at terminal and is therefore reasonably protected from enemy action except by a direct hit.

(b) Flexible hence can be rapidly re-arranged in the event of regrouping.

(c) Rapid in establishing communication.

(d) Works on the move although range obtained will be much less than when stationary.

(e) Economical in personnel and equipment.

## Disadvantages

(a) Inherently insecure and susceptible to enemy interception which necessitates the use of codes and ciphers with a consequent delay in clearing traffic and overall increase in operating personnel.

(b) Net radio being inherently insecure demands a considerable degree of security consciousness on the part of the users. This means adherence to standard procedure and security codes.

## Radio Relay

Radio relay implies that a series of radio transmitters and receivers normally spaced between 20-35 Kms apart and are used to provide point signal communication.

## Advantages

(a) Replace line with considerable economy of manpower and stores.

(b) It can be operated over area where for reasons of ground or enemy activity use of line may not be possible.

(c) Provides greater flexibility than line.

(d) Quick to set up and move except in mountainous country.

(e) By its ability to employ multichannel equipment radio relay provides more tele-printer circuits over one link than can normally be provided over the average field cable. Thus it has much greater traffic handling capacity.

## Disadvantages

(a) Liable to interception and hence insecure. Has relatively greater security than net radio, depending upon the sitting and direction of the beams.

(b) Liable to interference from enemy jamming although not as much as in the case of net radio.

(c) Terrain between stations must be reasonably suitable to get a 'quasi optical path', this presents difficulty in sitting.

(d) Location of terminal and intermediate stations may not suit tactical layout and may, therefore, create additional protection requirements.

(e) It cannot work on the move.

(f) Slightly more expensive in men and material than in the case of net radio.

(g) Needs critical sitting.

# CHARACTERISTICS OF WIRELESS TECHNOLOGY (MOBILE, WI-FI ETC.)

## Features of Wi-Fi Technology

Wireless operations permit services, such as a long-range communications, which are impossible or impractical to implement with the use of wires. Information is transferred in this manner over both short and long distances.

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The following list summarizes some of the benefits of a Wi-Fi network

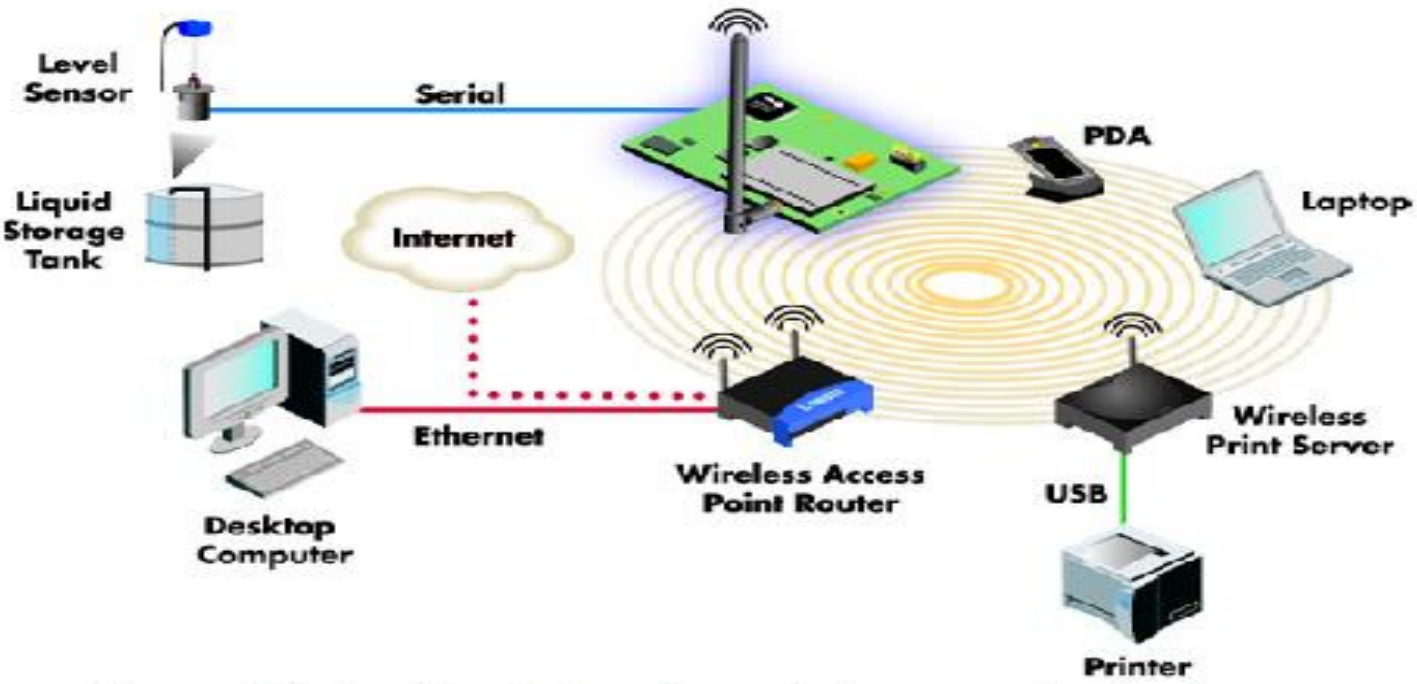


Figure: Wireless Local Area Network Connected to the Internet

The following list summarizes some of the benefits of a Wi-Fi network

(a) **Unmatched mobility and elasticity**

Wi-Fi, is allowing the new intensity of connectivity without giving up functions. Wi-Fi introduced various types of utilities such music streamers that transmit your music to speakers without any wire you can also play music from the remote computer or any other attached to the network. The most important now you can play online radio.

Wifi technology system is rather remarkable, you can download songs, send an email and transfer files expediently at sky-scraping speed and you can move your computer easily because your WiFi network has no cable to disrupt your work so we can say that it is quite easy, helpful and most of all expedient.

(b) **Fortress Technology**

Wi-Fi providing secure wireless solutions support the growth and release of a prototype mobile ad hoc wireless network for use in the wireless strategic skirmish.

(c) **Support an Entire Age Bracket**

Wi-Fi technology has several advantages, it supports an entire age bracket and create as connection between components on the same network and have the ability to transfer data between the devices and enable different kinds of devices such as game, MP3 player, PDA's & much more

(d) **Convenient and Available Everywhere**

Wi-Fi is a convenient technology and where the network range station exists you are online during travel; you can equip with a Wi-Fi network and get connected. You will automatically connect to the internet if you are near a hotspot. These days Wi-Fi exist everywhere with all its wonders.

(e) **Faster and Secure**

With Wi-Fi, you can get a high speed of internet because it is very fast than DSL and Cable connection you can establish a Wi-Fi network in small space now you don't need any professional installation just connect to a power outlet with an Ethernet cord, and start browsing. Wi-Fi security system for Threats makes it more renewable and its tool protect your VPN and secure web page. You can easily configure the device to take better performance. The standar d devices, embedded systems, and network security make it more powerful.

(f) **Wi-Fi with no limitation**

You can use a "Wi-Fi" network with no limitation because it can connect you worldwide. You can easily cater to your requirements with Wi-Fi networking applications because the power consumption is not very high as compared to another bandwidth networks. The future of wireless internet network communications is bright.

(g) **Extension of Wi-Fi Technology**

It is because of this wireless technology that so many other advancements could take place. Have you even thought of your TV to be supported by WI-FI? Well if you didn't, start thinking now. There are smart TV's in a market that connects to the internet. Having the internet on TV makes it possible to watch you tube videos, Net Flix and so much more. Read more about Wi-Fi TV technology on World Wide Web for more information

(h) **Cost Reduction**

As mentioned above, the absence of wires and cables brings down cost.

(i) **Flexibility**

Extended access, cost reductions, and mobility create opportunities for new applications as well as the possibility of creative new solutions for legacy applications.

## TERMINAL EQUIPMENT AND LIMITATIONS OF WI-FI

### Mobile Telephones

One of the best-known examples of wireless technology is the mobile phone, also known as a cellular phone, with more than 4.6 billion mobile cellular subscriptions worldwide as of the end of 2010.These wireless phones use radio waves from signal-transmission towers to enable their users to make phone calls from many locations worldwide.

## Wireless Data Communications

Wireless data communications are an essential component of mobile computing. The various available technologies differ in local availability, coverage range and performance, and in some circumstances, users must be able to employ multiple connection types and switch between them.

Wi-Fi technology is not perfect and has many flaws that limit its use as follows:

(a) **Security**

Because wireless transmissions can pass through walls, security is an issue.

(b) **Wireless Reception**

Varies from area to area, even within your own apartment. It's not always guaranteed that you will have a connection to the internet.

(c) **Interference**

Call quality is greatly influenced by the environment, is particularly sensitive to electromagnetic radiation generated by other household appliances.

(d) **Compatibility Issue**

Despite the global standardization, many devices from different manufacturers are not fully compatible, which in turn affects the speed of communication

# CHARACTERISTICS OF WALKIE / TALKIE

A Walkie/Talkie (formally known as a hand held transceiver) are a hand-held, portable, two-way radio transceiver. Its development during the Second World War is credited to Donald L. Hings, radio engineer Alfred J.Gross, and engineering teams at Motorola. Where a phone's ear piece is only loud enough to be heard by the user, a walkie-talkie's built-in speaker can be heard by the user and those in the user's immediate vicinity. Hand-held transceivers may be used to communicate between each other, or to vehicle-mounted or base station.

## Radio set GP338 Motorola

Defence organizations use hand held radios for a variety of purposes. Radio Set Gp338 Motorola can communicate on a variety of bands and modulation schemes.

## Facilities / Features

(a) **FACILITIES**.

(i) It is portable and light in weight.

(ii) Can be operated easily.

(iii) It can be operated in VHF/UHF and 2 way simplex mode.

(iv) 128 channel of this radio set can be preset into 8 zone.

(v) Option of selective call facilities available.

(vi) Call alert can be given to receiver station.

(vii) Can select required zone.

(viii) Start/stop facilities of scan operation available.

(ix) Add/Delete from scan list facilities available.

(b) **Weight and Measure**

Weight and measure of this radio set is as follows

(i) Dimension with Nickel Metal-Hydride high capacity battery-137x57.5x37.5mm.

(ii) Weight with Nickel Metal-Hydride high capacity battery-420gm.

(c) **Frequency Range**

Frequency of this radio set is as under

(i) 136 MHz to 174 MHz on VHF mode

(ii) 403 MHz to 470 MHz on UHF mode

(d) **Communication Range**

Communication range of this radio set is 4 to 5 Km and 20 to 40 Km with repeater.

(e) **Power Supply**

Power supply can be provided to this radio set by the high capacity 7.2 volt batteries.

(f) **Battery Charging Time**

1 hour for high capacity 7.2 volt batteries.

(i) Power output (HF) 1 to 5 Watt.

(ii) Power output (UHF) 1 to 4 Watt.

## WALKIE/TALKIE

This radio set has been divided into four portions.

(a) **Top Panel**

Contains On/Off Volume Knob, Channel Selector Knob, Top Button and Antenna

(b) **Side Button**

Name and functions of the large control on side panel is Press to Talk Switch and Right Side Accessory Mount.

**(c) Front Panel**

There are a total of six buttons i.e. Exit Key, Up Key, and Menu Select Key. Front Panel Key Pad. This is an alphanumeric keypad. There are 10 keys on this pad from 0 to 9. One key star and one extract key. LCD Display. This is a 14-character LCD display window and 14 types of indicators are displayed.

**(d) Back Panel**

The battery is fixed on this back panel of radio.

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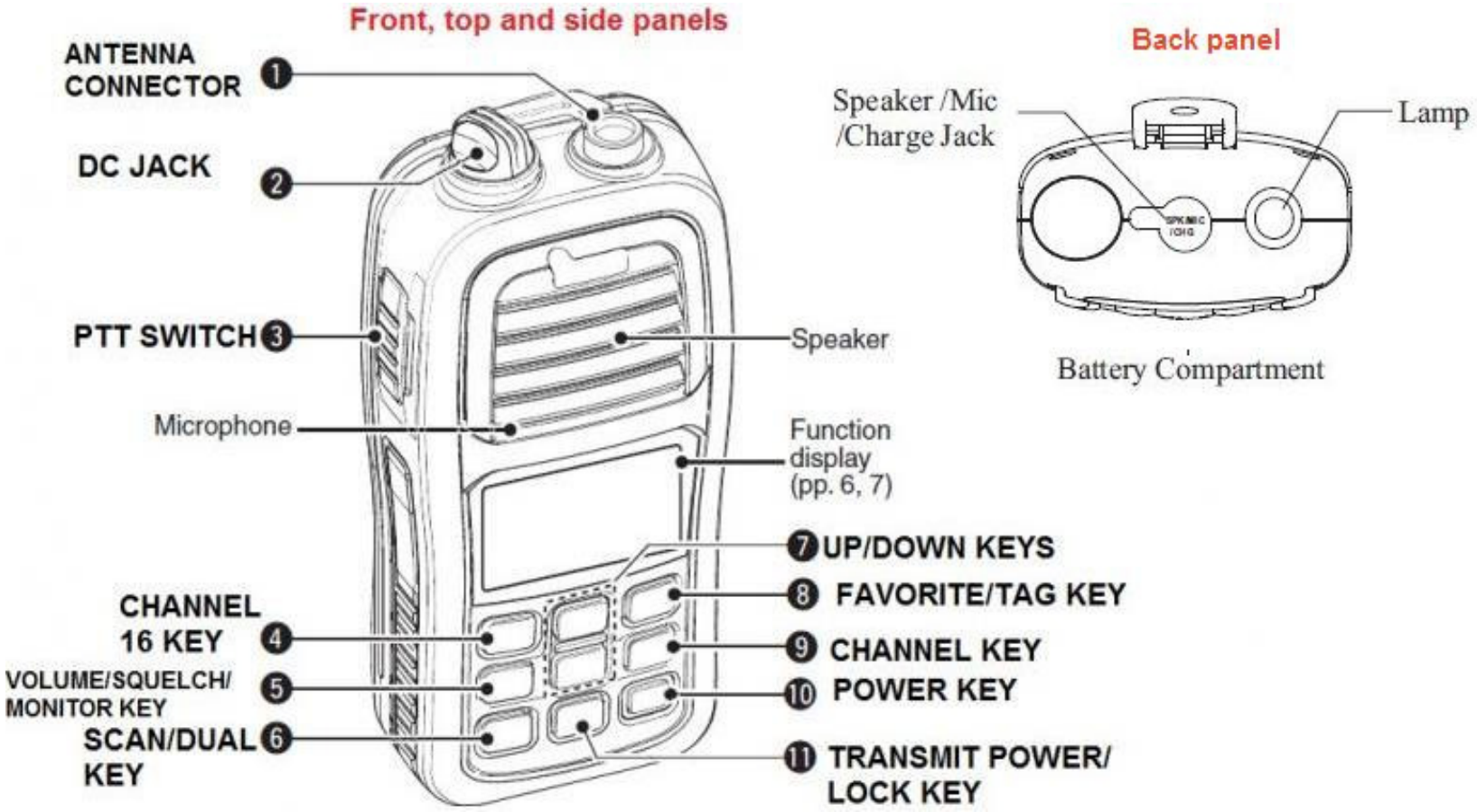



**Lt. Dr. A. Edward Samuel, Associate NCC Officer, 1 Coy, 8 TN BN NCC, GAC(A), Kumbakonam**

# LATEST TRENDS AND DEVELOPMENT IN COMMUNICATION

## Tropo Scatter, Modem, Fax, and Telex

## Tropo scatter

The lower layer of the atmosphere below 15Km height is called tropospheric region. Communication carried out in this layer use the principle of tropo scatter. In this system micro waves are transmitted in the Ultra High Frequency (UHF) and Super High Frequency (SHF) band to achieve Radio Communication over the horizon covering a range between 70 Km to 1000 Km.

## MODEM (Modular-Demodulator)

This device is used to convert computer generated output (Digital signals) that can be transmitted on a telephone line. Modems are required at both the sending and receiving computers.

## Fax

This is common short form of FACSIMILE which is one of the memory type electronic mail and message systems with the following advantages

(a) Can transmit graphics as well as Alpha numeric information (letters and numbers).

(b) Reduce time and eliminates transmission error.

(c) Use any transmission medium eg., Telephone, line, micro radio wave

**Telex** is the abbreviated form of TELE PRINTER EXCHANGE. As cable is used in this type of communication devices to connect two such instruments it restricts its range of operation.

(a) **Advantage**

(i) Re-generative repeaters in a network can increase range; however voice signal cannot be re-generated.

(ii) Can be used over a telephone network.

(iii) Can receive messages when unattended.

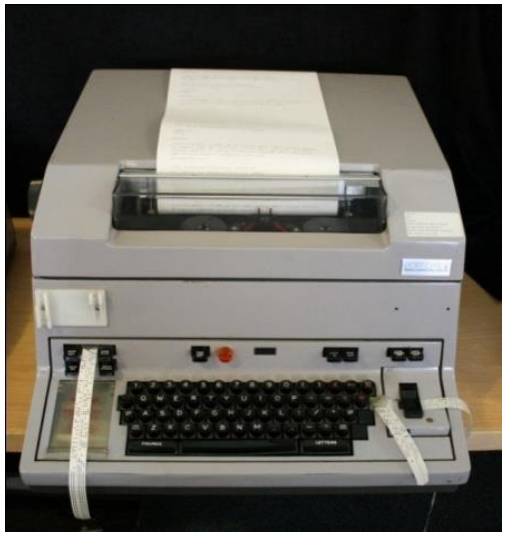
(iv) Message is recorded in a printer form.

(b) **Disadvantages**.

(i) The Equipment is costlier than a telephone set.

(ii) Key in error due to the need for a human operator to send-receive message.

(iii) Lack of privacy since any one can read the printed output.



## Satellite

Satellites are used for many purposes. Common types include military and civilian Earth observation satellites, communications satellites, navigation satellites, weather satellites, and space telescopes. Space stations and human spacecraft in orbit are also satellites. Satellite orbits vary greatly, depending on the purpose of the satellite, and are classified in a number of ways. Well-known (overlapping) classes include low Earth orbit, polar orbit, and geostationary orbit.

## Optical Fibre Communication Computer System

Hollow tubes made of corning glass with an outer protective coating of rubber/plastic etc. are what constitute optical fibers. These fibers are very delicate and small in diameter.

(a) **Advantages**.

(i) it has wide band width carrying different types of information from low speed voice signal to high speed computer data.

(ii) Less power requirement. (iii) Small cable size.

(iv) No electromagnetic interference.

(b) **Disadvantages**.

(i) Expensive in terms of equipment and manufacturing.

(ii) Requirement of experts to run the system

## Computer System

Strictly speaking a computer is any calculating device. The name is derived from a Latin word "Computer" meaning to reckon or compute. However, the term computer has come to mean a special type of calculating machine having certain characteristics.

**Internet** provides an instant, trouble free and cheap means of communications. Internet is therefore a collection of individual data networks connected together in such a way that data can be exchanged back and forth between networks widely separated.. Electronic Mail, Web- Browsing and Voice Mail are the main facilities of internet.

**Cell Phone**

Cellular radio network was first introduced in 1980. It provides a mobile subscriber access to the global telephone network. It is a rapidly expanding technology with high rates of obsolescence.

## Multimedia

It is a computer technology that displays information using a combination of full motion video animation, sound graphics and text with high degree of user interaction.

## Video-Conferencing Systems

These provide the full benefits of face to face communication with sound, graphics and simultaneous transmission of data. The system enables people widely separated geographically to inter- act without having to meet at one place.

**Videophone** is a system that enables us to transmit an image via digital tele network, making visual contact has been made possible over great distances, apart from transferring speech. Facilities provided by videophone are:

(a) Can transmit speech as well as colour video.

(b) Conduct of video conferences.

(c) Called subscriber is seen on the monitor.

(d) High quality of voice.

(e) Speed of sending/ receiving can be adjusted by the user.

(f) Map over-lays can be transmitted.

## Information Technology

Information Technology or IT for short, refers to the creation, gathering, processing, storage, presentation and dissemination of information, and also the processes and devices that enable all this to be done. IT stands firmly on the hardware and software of a computer and the telecommunications infrastructure.

What has made the big difference in recent years is not the fact that individual computers have dramatically improved in their capabilities, but that all those information islands are being connected by digital highways made possible through the use of the telecommunications infrastructure by the computers, which, largely explains why the internet and the WWW have begun to play such a significant role in our use of computers.

## CONCLUSION

Today the technology has advanced in all spheres of life. Even the defence forces are well poised to exploit the state-of-art modern communication technique for meeting the requirements of the Indian Army in the 21st century. Some of the areas where the army is already in the process of exploiting are the Cellular Radio (both GSM & CDMA), WLL, mobile trunked radio, mobile satellite systems, OFC and so on. Therefore, it is very important to be well versed with the latest trends in information technology to gain maximum advantage from the same

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THANK YOU


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