SER No	CONTENT
	LESSON PLAN **COMMUNICATION-5: LATEST TRENDS AND DEVELOPMENT** Code - C-5 Period - One/two Type - Lecture Term - II/III _____ <u>Training Aids</u> 1. OHP, Computer slides, pointer, screen, black board and chalk. <u>Time Plan</u> 2. (a) Introduction. - 05 mins (b) Part I- Tropo scatter - 10 mins (c) Part II- Satellite - 15 mins (d) Part III- Fibre Optic Communication - 10 mins (e) Part IV- Computer System(Multimedia,Video- 20 mins conferencing (f) Part V- Information Technology - 15 (g) Conclusion - 05 mins **INTRODUCTION** 3. Control of the battle has always been the concern of commanders down the ages and whoever could exert better control over his own forces and impress his will on his men won. When the armies were small and the distances relatively small, messengers on foot or on horseback sufficed. However, as the battlefields stretched out and the size of the armies increased, such means no longer sufficed. The coming of the artillery also underscored the importance of communications. Necessity being the mother of invention, such changes in the battlefield drove the evolution and adoption of modern technologies. The field of communication has seen rapid growth during the last

century; beginning with the discovery of radiotelephony by Marconi and Graham Bells the development has been speedy. Various forms of communication media have been discovered. The medium of space has acquired special importance.

Troposcatter

4.   Troposcatter.   The lower layer of the atmosphere below the height of 15 Kms is called tropospheric region. Communication carried out in this layer use the principle of troposcatter. In this system microwaves are transmitted in the UHF and SHF Band to achieve radio communication over the horizon covering a range between 70 to 1000 KMs. The Corps of Signals have harnessed the potential of troposcatter communications basically to meet the requirements of mechanised formations operating in rapidly changing tactical environments and for responsive & quickly deployable mobile systems to provide cross linkages and integration with the communication networks in the tactical zones. The digital mobile troposcatter systems are operated by specialized signal groups.

Application of Troposcatter

5.   (a)   It is used for long range point to point communication.

        (b)   Ideal for rugged terrain of deserts, mountains, sea, etc.

        (c)   It has the following channel capacities:-

                (i)   Voice   - 24 channels

                (ii)   Telegraph/ Telex   - 32

                (iii)   Data   - 03

FAX

6.   Fax (short for facsimile), sometimes called telecopying, is the telephonic transmission of scanned printed material (both text and images), normally to a telephone number connected to a printer or other output device. The original document is scanned with a fax machine (or a Telecopier), which processes the contents (text or images) as a single fixed graphic image, converting it into a bitmap, and then transmitting it through the telephone system. The receiving fax machine reconverts the coded image, printing a paper copy. Before digital technology became widespread, for many decades, the scanned data was transmitted as analog. Some of the advantages of Fax are as under:-

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

        (b)   Reduce time and eliminates transmission error.

        (c)   Can transmit information in any vernacular language.

(d)   Use any transmission medium eg telephone, line, micro radio wave.

(e)   Can receive the document as such.

Satellite

7.   An object which revolves around another larger object whose motion is primarily and permanently determined by the force of attraction of the body is known as a satellite. Before the space age, planets and moons were the only known satellite. On 4th October 1957 the first man made satellite called the SPUTNIK was launched by the erstwhile USSR since then more complex and versatile satellites have brought about a revolution in the field of communications.

8.   **Type of Satellite.**

(a)   Weather Satellite.

(b)   Scientific Satellite.

(c)   Communication Satellite.

(d)   Navigational Satellite

(e)   Military Satellite.

9.   **Satellite Communication (SATCOM) in Army.** Conventional communication systems derived over field and permanent lines and radios could not be satisfactorily established over mountainous and snow-clad areas of borders in India. Hence the army has developed expertise and has already exploiting the latest facilities available by using INMARSAT, INSAT, Low Cost Terminals (LCTs) and Emergency Communication Terminals (ECTs) in the low-intensity conflict areas. INMARSAT has been used by our army units deputed for service in foreign land i.e, Somalia, Rwanda, Mozambique, Cambodia and Angola.

Fibre Optic Communication

10.   Fiber optic communication is a method of transmitting information from one place to another by sending pulses of light through an optical fiber. The light forms an electromagnetic carrier wave that is modulated to carry information. First developed in the 1970s, fiber optic communication systems have revolutionized the telecommunications industry and have played a major role in the advent of the Information Age. Because of its advantages over electrical transmission, optical fibers have largely replaced copper wire communications in core networks in the developed world. Hollow tube made of corning glass with an outer protective coating of   rubber/ plastic etc are what constitutes optical fiber. These fibers are very delicate and small in diameter. In army fiber optics is extensively used for backbone networks and even for tactical communications as it provides huge bandwidths by use optimums.

11. **Advantages**

   (a)   It has wide band width carrying different types of info from low speed voice signal to high speed data channels for real time flow of streaming signals i.e., picture.

   (b)   Low power consumption.

   (c)   Small cable size.

   (d)   Repeater station at long ranges and can be unmanned.

   (e)   Not susceptible to electromagnetic interference.

   (f)   Provides inherent secrecy, as it is difficult to decipher bulk signals.

12. **Disadvantages**

   (a)   Jointing problem.

   (b)   Channel dropping not possible at will.

   (c)   More expensive.

Computer System

13.   Strictly speaking a computer   is a computing 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 computing machine having certain characteristics.

14. **Advantages**

   (a)   High speed of computation and multiple processing features.

   (b)   Accuracy of process and calculation once the programme is proved.

   (c)   Persistence - It will continue on the same job until the end, always working in the same way, each and every day.

   (d)   Mass storage of data along with auto backups.

   (e)   Ability to handle large volume of data.

15. **Disadvantages**

   (a)   Data loss if machine malfunctions because virus or cyber attacks.

   (b)   Back up of data still required to be maintained.

   (c)   Constant power source is required

   (d)   Manpower expertise is mandatory.

Internet

16.   Million of computers all over the world are interlinked through telephone lines, satellites, submarine cable and optical fiber network. This World Wide Web (www) is what is called the "Internet" it 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. The present form of the Internet evolved from early beginning made by the US Defence Department about 40-45 years ago. Electronic Mail, Web- Browsing and Voice Mail and reservoir of information are the main facility of internet. Internet is being used by defence forces but in standalone mode because of hacking and cyber attack on military networks which otherwise would be highly detrimental to military and national security.

Cell Phone

17.   A mobile phone (also known as a cellular phone, cell phone and a hand phone) is a device that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, GPS, Television, weather forecasts, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography. Mobile phones that offer these and more general computing capabilities are referred to as smartphones.

18.   **Advantages**

   (a)   High density of subscribers and large traffic handling capability.

   (b)   No perceptible difference between mobile and fixed subscribers.

   (c)   Better quality of service.

   (d)   Miniaturization using very large scale integration (VLSI) technology which enables ever-decreasing size and weight of the hand set.

   (e)   Higher speed of data exchange.

   (f)   Can be used in an integrated mode with computer network.

Multimedia

19.   Multimedia is media and content that uses a combination of different content forms. This contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material. Multimedia includes a combination of text, audio, still

images, animation, video, or interactivity content forms.

Multimedia is usually recorded and played, displayed, or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Multimedia devices are electronic media devices used to store and experience multimedia content. Multimedia is distinguished from mixed media in fine art; by including audio, for example, it has a broader scope. The term "rich media" is synonymous for interactive multimedia. Hypermedia can be considered one particular multimedia application. Multimedia communications are now being used in defence forces.

Video Conferencing

20.   Videoconferencing is the conduct of a videoconference (also known as a video conference or video teleconference) by a set of telecommunication technologies, which allow two or more locations to communicate by simultaneous two-way video and audio transmissions. Videoconferencing differs from videophone calls in that it's designed to serve a conference or multiple locations rather than individuals. It is an intermediate form of video telephony, first deployed commercially in the United States by AT&T Corporation during the early 1970s as part of their development of Picture phone technology.

21.   With the introduction of relatively low cost, high capacity broadband telecommunication services, coupled with powerful computing processors and video compression techniques, videoconferencing usage has made significant inroads in business, education, medicine, defence forces and media. Like all long distance communications technologies (such as phone and Internet), by reducing the need to travel to bring people together the technology also contributes to reductions in carbon emissions, thereby helping to reduce global warming.

Videophone

22.   It is terminal equipment that enables us to transmit an image via digital communication network, making visual contact possible over great distances, apart from transferring speech.

23.   **Facilities**

(a)   Can transmit speech as well as video.

(b)   Conduct of videoconferences.

(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

24.   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 enables all this to be done. IT stands firmly on the hardware and software of a computer and the telecommunications infrastructure. Computers, as we all know have been in existence for over 50 years. For many of these years, these have been primarily used for information processing. It is well known that year-by-year, computers are becoming more and more powerful both in terms of their computational speeds and also their high capacities for storage of data. 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 daily life. Information technology is being used in education, business, agriculture, banking, hotel industry, marketing etc. In the thrust of the defence forces to usher into an era of acquiring maximum dividends from IT, the Corps of Signals is the torchbearer and facilitator. Fully automated offices with minimum paper work, improved response timings, fast information dissemination systems, hierarchical management information systems at all levels are some of the areas of thrust.

Long Term Evolution (LTE)

25.   LTE is a step towards the 4th generation (4G) of radio technologies designed to increase the capacity and speed of mobile telephone networks. LTE is commonly seen as a mobile telephone or common carrier development and is also endorsed by public safety agencies in the US as preferred technology for the new 700 MHz public safety radio band. The main advantage with LTE are high throughput, low latency, plug and play, an improved end-user experience and low operating cost. LTE also supports seamless passing to cell towers with older network technologies such as GSM, CDMA One, WCDA and CDMA 2000.

WiMAX

26.   WiMAX is commercially available technology, which can be exploited for tactical wireless communications. It primarily includes a tower/antenna giving coverage to a radius of 50 KMs. These antennas can be mobile if placed on a prime movers. Receiver unit will have a card on PDAs or a laptop. WiMAX is a second-generation protocol that allows for more efficient bandwidth use, interference avoidance, and is intended to allow higher data rates over long distances.

4G

27.   4G is a short term for fourth-generation wireless that will supersede the 3rd generation (3G). It is expected to be based on end-to-end IP and high-quality streaming video being distinguished

feature of 4G. 4G is likely to use a combination of WiMAX and WiFi. 4G technologies are sometimes referred to by acronym "MAGIC" which stands for Mobile Multimedia, Anytime/anywhere, Global mobility support, integrated wireless and customized personal service.

Networks of Indian Army.

28.   The Corps of Signals is well poised to exploit the state-of-art modern communication techniques for meeting the requirements of the Indian Army of the 21st Century. The ASTROIDS (Army Strategic Operational Information Dissemination System) and the DCN (Defence Communication Network) are other networks, which have been visualised to cover communication requirements of all three services at the strategic level. Some of the areas where the Corps is already in the process of exploiting are the cellular radios - in both GSM (Global Satellite for Mobile Communications) & CDMA (Code Division Multiple Access) modes, WLL (Wireless Local Loop), OFC (Optical Fibre Cable), mobile trunk radios, mobile satellite systems, etc. Advanced data transmission methods such as SDH (Synchronous Digital Hierarchy) and PDH (Plesiochronous Digital Hierarchy) are also being used.

29.   **Army Radio Engineered Network (AREN).** This indigenously conceived area grid radio communication system for the field formations launched more than a decade ago has since grown into a potent tool for the commanders to exercise command & control and automated interoperable information and decision support systems in their area of responsibility.

30.   **Army Static Switched Communication Network (ASCON).** The ASCON was evolved to integrate the telecommunication infrastructure of the hinterland with the tactical communication networks. It is a digital, fully automated, secure, reliable and survivable static communication system based on microwave radio, optical fibre cable, satellite and mili-metric wave communication equipment. Value added services such as Fax, Telex, data transfer and video are also available to the defence users on this network. The ASCON network is currently being expanded to include all army commands and areas in eastern India and also finalising plans for future expansion of the network. In addition, ASCON's existing microwave links are being replaced with optical fibre cable for increased reliability in communication.

31.   **Electronic Warfare**. This has become one of the most potent force multipliers and a technologically challenging field in which the Corps has developed tremendous expertise. EW has played a stellar role in anti-insurgency and low intensity conflict operations besides the conventional operations conducted earlier in Sri Lanka and recently in Kargil.

32.   **Automatic Message Switching / Handling Systems (AMSS).** The Corps is also using a computerised AMSS for handling the high volume message traffic of the Army. This is network connecting the hierarchical nodes where the army formations are deployed Modernisation of

Communications. AMSS has now been replaced by more versatile system AWAN. AWAN terminals are available with signal centre as well as appointments at HQs and units.

CONCLUSION

33.   Today, the defence forces are well poised to exploit the state-of-art modern communication techniques 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. Advanced data transmission techniques such as SDH and PDH are also being used to enhance our future requirements.