

SER No	CONTENT
	<p style="text-align: center;"><b><u>COMMUNICATION-1: TYPES OF COMMUNICATION</u></b></p> <p>Code - C-1</p> <p>Period - 01</p> <p>Type - Lecture</p> <p>Term - I</p> <p><u>Training Aids</u></p> <p>1. OHP, Computer slides, pointer, screen, black board and chalk.</p> <p><u>Time Plan</u></p> <p>2. (a) Introduction. - 05 mins</p> <p>(b) Part I - Line Communication - 10mins</p> <p>(c) Part-II Radio Communication - 20 mins</p> <p>(d) Conclusion - 05 mins</p> <p style="text-align: center;"><b><u>INTRODUCTION</u></b></p> <p>3. <a href="#">Telecommunications</a> has greatly altered communication by providing new media for long distance communication. The <a href="#">first transatlantic two-way radio broadcast</a> occurred in 1906 and led to common communication via <a href="#">analogue</a> and digital media. <a href="#">Analog</a> telecommunications include traditional <a href="#">telephony</a>, <a href="#">radio</a>, and <a href="#">TV</a> broadcasts and <a href="#">Digital</a> telecommunications allow for <a href="#">computer-mediated communication</a>, <a href="#">telegraphy</a>, and <a href="#">computer networks</a>. There are two types of communications media i.e, Line and radiating media which are discussed in the following paras.</p> <p style="text-align: center;"><b><u>AIM</u></b></p> <p>4. The aim of this lecture is to teach the cadets the different types of communication that exists in Armed Forces.</p> <p style="text-align: center;"><b><u>PREVIEW</u></b></p> <p>5. The lecture will be covered as follows: -</p> <p>(a) Part I - Line Communication</p> <p>(b) Part-II Radio Communication</p> <p>(a) <b><u>PART I: LINE COMMUNICATION</u></b></p> <p>6. 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 individual officers, and data is the best means of clearing/passing messages. However, data is gaining importance and shall be most favoured type of communication in future. Line communication is provided using of field cable, permanent lines, underground or submarine cables and now optical fiber is being used extensively. Use of multiplexing/demultiplexing equipment provides multiple channels for voice, data and video.</p>

First and foremost, we shall discuss line communications which is now limited to local leads in today's environment.

7. Advantages

- (a) Reliable and practically free from electrical interference.
- (b) Relatively secure.
- (c) Number of circuits and message carrying capacity is more but limited only by availability of material and manpower.

8. Disadvantages

- (a) Vulnerable to physical interference and enemy interception along the entire length of the route.
- (b) Takes time to construct.
- (c) Inflexible once it is laid.<sup>1</sup>
- (d) Expensive in men and material.

(b)

**PART II: RADIO COMMUNICATION**

9. Radio is the wireless transmission of signals through free space by electromagnetic radiation of a frequency significantly below that of visible light, in the radio frequency range, from about 30 kHz to 300 GHz. These waves are called radio waves. Electromagnetic radiation travels by means of oscillating electromagnetic fields that pass through the air and the vacuum of space. Information, such as sound, is carried by systematically changing (modulating) some property of the radiated waves, such as their amplitude, frequency, phase, or pulse width. When radio waves strike an electrical conductor, the oscillating fields induce an alternating current in the conductor. The information in the waves can be extracted and transformed back into its original form.

10. 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:-

- (a) Ground Wave Propagation. Used for long and medium waves, limited range is 30 Kms.
- (b) Sky Wave Propagation. Used for HF range up to 30 MHz communication, range is 100 km to 1000 Kms. These make use of ionosphere layer existing to a height of 150 -200 kms from the surface of earth.
- (c) Space Wave Propagation. The propagation of VHF and UHF frequency takes place in straight lines. The range is limited by curvature of earth and so distance between two neighboring station is approx 50 Kms.
- (d) Tropospheric Scatter Propagation. Also known as tropo scatter or fwd scatter propagation, extended height up to 8-10 Kms from the surface of earth.

11. Radio communication involves Net Radio and Radio Relay.

**Net Radio.**

12. Net radio is the basic means of signal communication for any mobile force. It provides facilities for the following: -

- (a) Radio Telephony – Simplex, depending on the type of equipment available.
- (b) Radio telegraphy for transmission of message and key conversations.
- (c) Use of Tele printers over radio transmission.

13. 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. This can be operated in the High frequency (HF) or Very High frequency (VHF). VHF band is the most common form of field radio equipment in use with most of armies today.

14. **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.

15. **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**

16. 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. Radio relay transmission and reception at each terminal take place on separate frequencies and therefore no send/ receive switching is necessary. It is duplex link and can therefore be connected to link ordinary line circuits to telephone or telegraph exchanges.

17. **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) Physical vulnerable.

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

18. **Disadvantage**

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

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

(e) It can not work on the move.

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

(g) Needs critical siting.