ANALYSIS AND REVIEW OF OPTICAL FIBER

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Abstract- Since communication is an essential part of our day to day life and light waves are the component of communication system for carrier of transmission, optical fibre plays an important role as it carries the data from transmitter to the receiver. In this paper, an overview of fibre optic communication can be seen along with its pros cons and applications.

Index Terms- light waves, optical components, optical fiber, wireless communication

I. INTRODUCTION

Optical fibre is a type of cable that contains more than one fibre. All the fibres are individually covered with protective plastic covers. The use of optical fibre has grown tremendously. Optical fibre is used to transmit information, the data in the form of light between the two ends of the fibre. For different application different types of cables are used. Fibre optic technology is definitely growing rapidly, and is fast becoming an essential part of our everyday lives Fibre optic cables are used in internet, cable television, telephone, computer network, mechanical inspection, military and space application, transportation etc.

II. LITERATURE SURVEY

Fibre optic communication has been primarily used for a distribution automatic system due large bandwidth and dielectric immunity encounter in designing and implementing fibre optic cable. In the first half 20 century international company continued to expand through wireless communication and broadcasting technologies This paper presents a survey on optical fibre focusing on its concepts, applications and underlying issues one may encounter in designing and implementing fibre optic cable This article describes the needs and comparison with Optical Fibre technologies

III. OPTIC FIBER’S USES

Uses of optical fibres are:

3.1 COMMUNICATION:–

It is used in telephone transmission methods. Energy in the form of light pulses are emitted via optical fibres. The technology is quite similar to that of the coaxial cable, except that the optical fibres are designed in the manner that they can handle tens of thousands of conversations concurrently. Sometimes we face the problem that we are not able to communicate properly and cannot have clear voice. By using the fibre optic we can communicate easily and can have clear voice.

3.2 MEDICAL USES:–

Optical fibres are well made for medical use. They are made in extremely thin, flexible strands for insertion into the blood vessels, lungs, and other hollow parts of the body. A number of instruments use optical fibres that help doctors to diagnose disease without surgery, just by viewing internal body parts.

3.3 SIMPLE USES:–

Transmission of light to locations is the most frequent use of optical fibre otherwise hard to reach. Also, transmission of images is quite possible by the bundles of several very thin fibres amassed precisely beside and optically polished at both the ends.
3.4 MILITARY AND SPACE APPLICATION:
In military the demand of fibre optic is high. It provides more bandwidth and for signals they provide high security. They're strong, and more importantly lightweight, and can also be used outdoors in harsh environments.

3.5 TELEVISION:
In television optical fibre is used for transferring the digital video because they have greater bandwidth and speed which allow the cable television to transfer signal faster to their subscribers faster and they are not much costly as copper wire.

3.6 COMPUTER NETWORK:
Fibre optics helps to transfer the data information and finical information securely from one computer to another computer around the world and it is easy and faster to transfer the data or finical information.

3.7 TRANSPORTATION:
With the increase in traffic and demand for efficiency, the smart highways with intelligent traffic light, automated tollbooths also used fibre optics telemetry system.

3.8 LIGHTING AND DECORATION:
They are widely used in lighting decoration, including decorative lighting for Christmas trees, signs, and art. Showcases displayed in boutiques use optical fibres to illuminate from different angles using a single light source.

IV. COMPONENTS THAT DERIVES OPTICAL FIBRE

4.1 CORE:
It is a thin glass centre of the fibre from which the light travels.

4.2 CLADDING:
Outer optical material that surrounds the core. It is used to reflect the light back into the core.

4.3 BUFFER COATING:
It is a plastic coat used to protect the fibre from damage and moisture.

V. ADVANTAGES

5.1 LESS EXPENSIVE:
Optical cable of several miles can be made cheaper than as compared to equivalent lengths of copper wire.

5.2 HIGHER CARRYING CAPACITY:
Since optical fibres are thin, more fibres are bundled into a given-diameter cable than copper wires which allows more phone lines to pass through the same cable or more channels to arrive through the cable into one’s cable TV.

5.3 LESS SIGNAL DEGRADATION:
Signal loss is quite less in optical fibre in comparison to copper wire.

5.4 LIGHT SIGNALS:
Line signals of different fibres do not interfere in the same cable. This means phone conversations are clearer in the optical fibres.

5.5 DIGITAL SIGNALS:
Mostly optical fibres are the best suit to carry digital signals, useful in computer networks.

5.6 NON-FLAMMABLE:
Since optical fibre does not allow any current flow, hence no fire hazard is so far threatened.

5.7 LIGHTWEIGHT AND THIN:
Optical fibre is lighter than copper wire cable. They can be drawn to less diameters than copper wire cable and also they occupy less space in the ground.
VI. DISADVANTAGES

6.1 PRICE:-
Optical fibre is still more expensive than copper wire though the raw material, i.e., sand is quite cheaper in the market.

6.2 FRAGILITY:-
fibres are weaker on resisting strong pressure or attack, as compared to copper wires.

6.3 AFFECTED BY CHEMICALS:-
The glass of optical fibre can be easily affected by various chemicals including hydrogen gas (a problem in underwater cables, both in copper as well as optical fibres.)

6.4 OPAQUENESS:-
In spite of covering large physical areas in military use it is inferred the most fibres become opaque on exposed to radiation.

6.5 REQUIRES SPECIAL SKILLS:-
– It is not easy to join optical fibres together as in copper cable and additional training of personnel is required.

VII. SCOPE OF FIBRE OPTIC
The market for optical fibre and cables deals with the optical components. The installation of this is mostly labour intensive mainly for underground and undersea connections. Out of the total installation cost including the labour the optical fibre and cable costs only 10 percent of the total system installation. Corning and OFS are the first and second producers of optical fibre in the world and both these control the process of optical making which includes extrusion of glass from draw towers, doping it, cooling it, testing it, etc. It has been reported that the fibre optics production will increase from 147 million kilometers in 2011 to 204 million kilometers in 2017.

REFERENCE
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