OPTICAL COMMUNICATION NETWORK MANAGEMENT METHOD AND ALGORITHM

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Abstract *– This article presents scientific ideas about the optical communication network management method and its algorithm. Theoretical ideas about optical fibers and their means of communication are described.*

Key words *- Optical fiber, mass media, technology, experiment, lecture, optical tube, experiment, shell, nucleus, refraction.*

Despite the fact that optical fibers are a widespread and popular means of communication, the technology itself is simple and has been developed for a long time. The experiment of changing the direction of light rays by refraction was demonstrated in 1840 by Daniel Colladon and Jacques Babin. A few years later, John Tyndall used this experiment in his public lectures in London, and already in 1870 he published a work on the nature of light. The practical application of the technology was found only in the twentieth century. In the 1920s, experimenters Clarence Hasnell and John Byrd demonstrated the ability to transmit images through optical tubes. This principle was used by Heinrich Lamm for medical examination of patients. It wasn't until 1952 that Indian physicist Narinder Singh Kapani conducted a series of experiments that led to the invention of fiber. In fact, he created the same set of fiberglass, and the shell and core were made of fibers with different refractive indices. The shell actually served as a mirror, and the core was more transparent - this is how the problem of rapid diffusion was solved. If earlier the beam did not reach the end of the optical fiber and it was impossible to use such a means of transmission over long distances, now the problem has been solved. Narinder Kapani perfected the technology by 1956. A set of flexible glass rods transmitted the image with almost no loss or distortion.

The invention of optical fibers by Corning specialists in 1970, which made it possible to repeat the system of transmitting telephone signals without repeaters over the same distance through copper wire, is considered a turning point in the history of the development of optical fiber technologies. The developers were able to create a conductor capable of maintaining at least one percent of the optical signal strength at a distance of one kilometer. By today's standards, this is a very modest achievement, but almost 40 years ago, it was a necessary condition for the development of a new type of wired communication.

Originally, optical fiber was multiphase, meaning it could carry hundreds of phases of light simultaneously. In addition, the increase in the diameter of the fiber core allowed the use of inexpensive optical transmitters and connectors. Later, high-performance fiber, which can transmit only one phase, began to be used in the optical medium. With the introduction of single-phase fiber, signal integrity could be maintained over longer distances, facilitating the transmission of large amounts of data.

The most popular fiber today is single-phase, zero-wavelength. Since 1983, it has been a leader in the fiber optic industry and has proven its work over tens of millions of

kilometers. Broadband optical signals due to very high carrier frequencies. This means that data can be transmitted over an optical communication line at a speed of about 1 Terabit / s. In other words, one fiber can simultaneously carry 10 million phone calls and a million video signals. The speed of data transmission can be increased by simultaneous transmission in two directions, since light waves can propagate independently of each other in a single fiber. In addition, light signals of two different polarizations can be propagated in an optical fiber, which makes it possible to double the throughput of an optical communication channel. To date, the limit of data density transmitted through optical fibers has not been reached. And this means that until now, with such a heavy load on our Internet, there was not a lot of information that caused a decrease in the speed of the data stream transmitted with the simultaneous transmission. Very little (compared to other means) attenuation of the light signal in the fiber. In other words, signal loss due to the resistance of the conductor material. The best examples of Russian fiber are so weakened that it allows the construction of communication lines 100 km long without extending the transmission. In the optical laboratories of the United States, even "transparent" fibers, namely fluorozirconate fibers, are being developed. Laboratory studies have shown that communication lines with regeneration sections of up to 4,600 km based on such fibers can have a transmission speed of approximately 1 Gbit/s. The fiber is made of quartz, and its basis is silicon dioxide, which, unlike copper, is a common and therefore cheap material, so it has a relatively low price to respect and almost no cases of theft.

Optical fibers have a diameter of about 1 - 0.2 mm, which means they are very compact and light, making them promising for use in aviation, instrumentation and cable technology. Fiberglass is not metal, galvanic isolation of segments is automatically achieved during the construction of communication systems. Using extra strong plastic, cable factories produce indoor cables that contain no metal and are thus electrically safe. These cables can be installed on the poles of existing electric networks separately or mounted on a phase conductor, which allows to save large costs for laying cables through rivers and other obstacles.

Communication systems based on optical fibers are resistant to electromagnetic interference, and data transmitted through optical fibers is protected from unauthorized access. Fiber optic communication lines cannot be heard without damage. Any effect on the fiber can be noted by monitoring (constant control) the integrity of the line. In theory, there are ways to bypass surveillance protections, but the costs of implementing these methods are so high that they exceed the value of the intercepted data. For example, you still decided to do it. To detect the intercepted signal, you need a specially designed tunable Michelson interferometer. In addition, the appearance of the noise pattern can be weakened by many signals transmitted simultaneously through the optical communication system. The transmitted information can be spread over several signals or several noise signals can be transmitted, thereby worsening the conditions of data retention. Distorting an optical signal requires a significant amount of power in the fiber, and this interference can be easily detected by surveillance systems. (FOCL), optical communication lines, in which information is transmitted using optical fiber elements. FOCL consists of transmitter and receiver optical modules, fiber optic cables and fiber optic connectors. Optical fibers are the most perfect medium for transmitting large streams of information over long distances. It is made of silica-based silicon, a widely available and inexpensive material unlike the copper used in conventional wires. Optical fibers are very compact and light, with a diameter of only approx. 100 microns. Optical fibers - bundles of optical fibers, the ends of which are glued or sintered, protected by an opaque mask, and the ends of which have a polished surface. Fiberglass is a dielectric, so there is no need to separate individual optical

fibers when building a fiber optic communication system. The durability of optical fiber is up to 25. When creating fiber-optic communication lines, very reliable electronic elements that convert electrical signals into light, light into electrical signals, as well as optical connectors with low optical losses are needed. Therefore, expensive equipment is needed to install such lines. However, the advantages of using optical fiber communication lines are so great that despite the listed disadvantages of optical fibers, these communication lines are increasingly being used for information transmission. Data transmission speed can be increased by transmitting in two directions at the same time, because light waves can propagate independently of each other in a single optical fiber. This makes it possible to double the throughput of the optical communication channel.

Fiber optic communication lines are resistant to electromagnetic interference, and fiber optic transmission is protected from unauthorized access. It is not possible to connect to such communication lines without breaking the integrity of the line. For the first time, the transmission of signals through optical fibers was carried out in 1975. Today, intercity optical communication systems are developing rapidly over distances of thousands of kilometers. US - Europe, US Pacific line - Hawaii - Japan transatlantic communication lines are successfully operated. Work is underway to complete the construction of a global optical fiber communication line between Japan - Singapore - India - Saudi Arabia - Egypt - Italy. In Russia, TransTeleCom has created a fiber optic communication network with a length of more than 36,000 km. It is dubbed satellite communication channels. At the end of. In 2001, a single backbone digital communication network was created.

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