MODERN METHODS OF ILLEGAL PASSAGE IN THE LINEAR CHANNEL FIBER-OPTICAL COMMUNICATION SYSTEMS

Nurdinova Roziya Abduxoliqovna
Dosent of Ferghana branch of Tashkent University of information technologies named after Mukhammad al-Khwarazmi Ferghana, Uzbekistan
Sobirova Kamola Abduvoxid qizi
Student of Ferghana branch of Tashkent University of information technologies named after Mukhammad al-Khwarazmi Ferghana, Uzbekistan
Akbarova Mohigul Asrorjon qizi
Student of Ferghana branch of Tashkent University of information technologies named after Mukhammad al-Khwarazmi Ferghana, Uzbekistan.

Annotation: *In this article it is investigated existing modern methods and the means, applied with a view of illegal access to the information in a line channel of fiber-optical communication systems, their principles of work. Also in this work the analysis of these methods are carried out. As a result of research and the analysis necessary conclusions for realization of measures on maintenance information security in fiber-optical communication systems becomes.*

Key words*: Optical communication, propagation of optical signals in optical fiber, information security, unauthorized access to information.*

As you know, today the development of communication networks is carried out through the introduction of fiber-optic communication lines. However, along with the development of the use of optical fiber in telecommunications systems, technical information intelligence systems are also developing, as a result of which there is a risk of obtaining information from optical fiber communication systems without permission. That is why the issue of studying the technical possibilities of unauthorized access to FOTS information is relevant, and as a result of such studies it will be possible to develop effective methods of protection against attacks carried out for unauthorized access to information transmitted to FOTS[1].

That is why, in order to develop effective methods of combating modern technical means that provide unauthorized access to information in FOTS, primarily optical radiation in FOTS without authorization

it is necessary to analyze possible extraction methods.

It is known that FOTS devices mainly consist of two parts, that is, station devices and line devices. Security in the station part of the FOCL is considered to be highly secured in terms of the fact that such sections are certified objects and a full cycle of organizational and technical measures to ensure information security is organized in such objects. Therefore, in this regard, it can be noted that the main weak point of the FOTS, where

unauthorized access to information can be carried out, is the FOTS linear path, that is, its wide cable section.

Therefore, in this article it is advisable to analyze and study the existing technical means and methods for unauthorized access to information in the path of optical cable lines FOTS.

Unauthorized access to information through the FOTS line path is mainly divided into the following two groups[2]:

- Unauthorized access to information without damaging the optical fiber. Thus, information is collected by leaking an imperceptible part of the energy of the optical signal flowing through the fiber from the fiber cladding and registering (receiving) this energy leak with the help of special devices.
- Methods of obtaining information without permission, violating the integrity of the optical fiber. Examples of such methods include connecting a fiber loss compensator and extracting some of the energy from the optical signal.

When making unauthorized connections, the methods of unauthorized access to information in the FOTS are divided into the following types:

- passive method;
- active _ method;
- compensation method .

Passive methods have a high level of secrecy, since with this method, with unauthorized access to information transmitted via optical fiber, no changes are made to the parameters of the optical signal transmitted via optical fiber. This ensures that unauthorized access to the line path is confidential. But this method has a relatively low efficiency. Therefore, to carry out unauthorized access to information in this way, as a rule, it is possible to allocate sections of the linear path of fiber-optic communication systems, where a significant part of the energy of the optical signal leaks. For example, cable glands that protect the connection points of optical cables, storage pits, sections of linear paths on which various passive network devices are located, etc[4].

The active method of unauthorized access to information is carried out by forcing a significant part of the energy of the optical signal transmitted over the fiber to leak, and therefore has a high efficiency. However, with such unauthorized access to information, the parameters of the optical signal (the power level in the channel, the mode structure of the radiation) change, which makes it easy to detect unauthorized access. Such methods include mechanical bending of an optical fiber, insertion of a probe into the optical fiber sheath, non-contact connection with an optical fiber, grinding and melting of an optical fiber, connection of a photoreceptor device through an oriented strip of an optical fiber, introduction of deformation into an optical fiber. geometric parameters of the optical fiber using temperature and the creation of inhomogeneities in the optical fiber, for example, unauthorized connections.

The compensation method practically combines the advantages of both of the above methods (secrecy and efficiency), but the implementation of unauthorized access to information in this way is problematic due to its technical complexity. Because it is necessary to extract part of the radiation energy from the optical fiber, process it and re-introduce it into the optical fiber with a transmittance that is almost equal to one. That is, these processes should be carried out at a speed close to the speed of propagation of the optical signal in the fiber.

The method of obtaining information without permission without damaging the optical fiber is carried out without causing any damage to the optical fiber. Here, devices are used that register some imperceptible part of the radiation scattered in the optical fiber.

Optical tunneling method . The method of optical tunneling is a method of covert connection to information transmitted over an optical fiber, based on the registration of optical radiation leaking as a result of scattering from the surface of the fiber cladding.

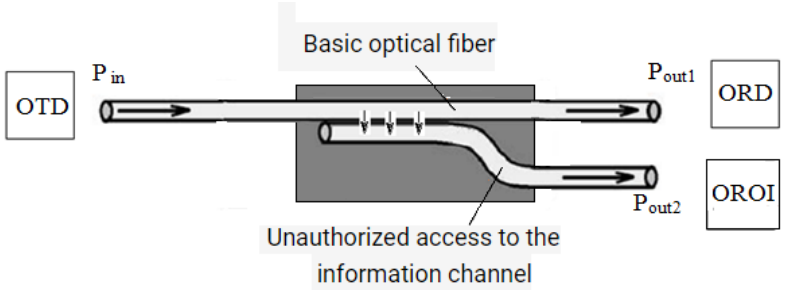

Figure 1. Block diagram of information collection based on registration of radiation scattered from the surface of the cladding of optical fibers of an optical communication line

OTD - optical transmitting device;

ORD - optical receiving device;

OROI- Optical receiver of the intruder;

P_{in}- Power of optical radiation at the input of the FOCL;

P_{out1} – Power of optical radiation at the output of FOCL;

P_{out2} - The power of the optical radiation emitted to the optical receiver of the intruder.

Thus, unauthorized access to information from an optical fiber is less effective than other methods, although the power of optical radiation emitted to an optical receiver by an unauthorized intruder is imperceptible.

This article examines the existing modern methods and tools used for the purpose of unauthorized access to information in fiber-optic communication systems, the principles of their operation and analyzes these methods.

As a result of the analysis, the necessary conclusions were made on the way of implementing measures to ensure information security in optical communication systems. As a result of the analysis, it is known that in parallel with optical communication systems,

methods of unauthorized access to communication channels of optical communication systems are also developing. Fiber-optic communication systems are a compensatory method of unauthorized access to communication channels, which is also more dangerous due to the confidentiality of access compared to other similar methods. But there are also methods that allow you to determine this method of connecting to the FOCL.

LITERATURE:

1. Turgunov, B., Juraev, N., Toshpulatov, S., Abdullajon, K., & Iskandarov, U. (2021, November). Researching Of The Degradation Process Of Laser Diodes Used In Optical Transport Networks. In 2021 International Conference on Information Science and Communications Technologies (ICISCT) (pp. 1-4). IEEE.

2. Отажонов С. М., Жураев Н., Алижанов Д. Д. Фотодетектор для регистрации рентгеновского и ультрафиолетового излучения //Интерэкспо Гео-Сибирь. – 2011. – Т. 5. – №. 1. – С. 107-111.

3. Абдурахмонов С. М., Жураев Н. О. Прием-передачи информации по интерфейсу RS-485 по беспроводном каналам в системах АСУ ТП //Научно-технический журнал ФерПИ. – 2016. – Т. 20. – №. 3. – С. 154-157.

4. Jurayev N. M., Xomidova N. Y. SAFETY EVALUATION OF CRYPTOGRAPHY MODULES WITHIN SAFETY RELATED CONTROL SYSTEMS FOR RAILWAY APPLICATIONS //CUTTING EDGE-SCIENCE. – 2020. – С. 197.

5. Juraev N. M., Iskandarov U. U., ugli Abdujabborov I. I. RESEARCH OF REAL EFFICIENCY OF THE INDICATOR 10_MT_20GY DUI //Scientific Bulletin of Namangan State University. – 2020. – Т. 2. – №. 1. – С. 132-137.

6. Жураев Н. и др. Фоточутливість і механізм протікання струму в гетероструктурах p-CdTe-SiO2-Si з глибокими домішковими рівнями //Журнал фізики та інженерії поверхні. – 2017. – Т. 2. – №. 1. – С. 26-29.

7. Нурдинова Р. А., Алимжонова А. Ш. Влияние способов легирования на свойства элементов с аномально фотовольтаическими эффектами //Сибирский физический журнал. – 2021. – Т. 15. – №. 2. – С. 92-96.

8. Касимахунова А. М. и др. Исследования некоторых явлений в АФН-структурах с изовалентными примесями для разработки приборов и устройств неразрушающего контроля и измерения //Computational nanotechnology. – 2018. – №. 2. – С. 72-75.

9. Nurdinova R. A. et al. NEW ASPECTS OF APPLICATION OF ELEMENTS WITH ANOMALOUS PHOTOVOLTIC VOLTAGE //Euroasian Journal of Semiconductors Science and Engineering. – 2019. – Т. 1. – №. 4. – С. 7.

10. Тургунов Б. А., Халилов М. М. СОВРЕМЕННЫЕ СПОСОБЫ ЗАЩИТЫ ИНФОРМАЦИОННОГО СИГНАЛА ОТ НЕСАНКЦИОНИРОВАННОГО ДОСТУПА В ОПТИЧЕСКИХ СЕТЯХ //САПР и моделирование в современной электронике. – 2018. – С. 195-197.

11. Jurayev N. M. et al. REQUIREMENTS FOR TELECOMMUNICATION SYSTEMS IN THE DEVELOPMENT OF TELEMEDICINE IN UZBEKISTAN //Scientific Bulletin of Namangan State University. – 2020. – Т. 2. – №. 1. – С. 138-144.

12. Тургунов Б. А., Эргашев Ш., Орифжонова Д. В. Основные проблемы //Коммуникативные стратегии информационного общества. – 2019. – С. 179-181.

13. Umarovich I. U. et al. Methods of reducing the probability of signal loss on optical fiber communication lines //Наука, техника и образование. – 2020. – №. 6 (70). – С. 27-31.

14. Raimimonova O. S. et al. OVERVIEW OF THE EXPERIMENTAL REASARCHE OF OPEN OPTICAL SYSTEM FOR MONITORING OF DEVIATIONS OF THE BUILDINGS WITH CONCRETE PRODUCTS //Scientific Bulletin of Namangan State University. – 2020. – Т. 2. – №. 6. – С. 374-378.

15. Turgunov B. et al. Researching Of The Degradation Process Of Laser Diodes Used In Optical Transport Networks //2021 International Conference on Information Science and Communications Technologies (ICISCT). – IEEE, 2021. – С. 1-4.

16. Rayimjonova O. S. INVESTIGATION OF CLUSTER-TYPE INHOMOGENEITY IN SEMICONDUCTORS //American Journal of Applied Science and Technology. – 2022. – Т. 2. – №. 06. – С. 94-97.

17. Райимжонова О. С., Тажибаев И. Б., Тошпулатов Ш. М. ТЕЛЕВИЗИОН ТАСВИР СИГНАЛЛАРИ СПЕКТРИНИ ЗИЧЛАШ (СИҚИШ) УСУЛЛАРИ ТАҲЛИЛИ //Scientific progress. – 2021. – Т. 2. – №. 6. – С. 235-244.

18. Азимов Р. К., Шипулин Ю. Г., Райимжонова О. С. Устройство для измерения скорости и определения направления горизонтального ветра //Сведения об авторах Шухрат Юрьевич Шипулин. – 2013.

19. Rayimjonova O. S. et al. LR Dalibekov Photo Converter for Research of Characteristics Laser IR Radiation //International Journal of Advanced Research in Science, Engineering and Technology. – 2020. – Т. 7. – №. 2. – С. 12788-12791.

20. Отажонов, С. М., Ботиров, К. А., Халилов, М. М., & Юнусов, Н. (2013). ВЛИЯНИЕ ДЕФОРМАЦИИ НА МИГРАЦИЮ ДЕФЕКТОВ В ФОТОЧУВСТВИТЕЛЬНЫХ ТОНКИХ ПЛЕНКАХ CdTe: Ag И PbTe. SCIENCE AND WORLD, 11.

21. 20. Отажонов С. М. и др. Влияние деформации на миграцию дефектов в фоточувствительных тонких пленках CdTe: Ag и PbTe //Science and world. – 2021. – №. 6 (94). – С. 11.

22. 21. Отажонов С. М. и др. ВЛИЯНИЕ ВНУТРЕННЕГО НАПРЯЖЕНИЯ НА ДЕФОРМАЦИОННЫЕ ХАРАКТЕРИСТИКИ ПОЛИКРИСТАЛЛИЧЕСКИХ ПЛЕНОК PbTe С ИЗБЫТКОМ ТЕЛЛУРА И СВИНЦА //SCIENCE AND WORLD. – 2013. – С. 18.

23. 22. Отажонов С. М. и др. РАЗРАБОТКА ТЕХНОЛОГИИ ПОЛУЧЕНИЯ ПОЛИКРИСТАЛЛИЧЕСКИХ ПЛЕНОК PbTe С НАРУШЕННОЙ СТЕХИОМЕТРИЕЙ //Наука и мир. – 2021. – №. 7. – С. 8-14.

24. Комилов А. О., Эргашев С. С. СОВРЕМЕННОЕ СОСТОЯНИЕ И ПЕРСПЕКТИВЫ РАЗВИТИЯ ГЕОТЕРМАЛЬНОЙ ЭНЕРГЕТИКИ //Central Asian Academic Journal of Scientific Research. – 2022. – Т. 2. – №. 2. – С. 123-129.

25. Комилов А. О., Эргашев С. С. МИРОВЫЕ ТЕНДЕНЦИИ В РАЗВИТИИ ГЕОТЕРМАЛЬНОЙ ЭНЕРГЕТИКИ //Scientific progress. – 2022. – Т. 3. – №. 2. – С. 740-745.