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STATE AND PERSPECTIVES OF DEVELOPMENT OF INFORMATION SYSTEMS BASED ON CFL IN THE WORLD AND IN UZBEKISTAN

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Аннотация. Мақолада оптик толали алоқа линиялари базасидаги ахборот тизимларининг дунёда ва Ўзбекистондаги ривожланиш ҳолати ва истиқболлари баён қилинган. Шунингдек мақолада мавзуга оид адабиётлар тахлил қилинган бўлиб, оптик толали алоқа линияларининг дунёда ва Ўзбекистондаги ҳолати келтирилган. Мақоланинг ёритиш методикаси сифатида ривожланган мамлакатлардаги оптик толали алоқа линияларининг ишлатилишдаги ютуқларнинг шарҳи ва таҳлили кўриб чиқилган.

Калит сўзлар: Оптик тола, спектр, ОТАЛ, POF, DWDM, PMMA, IP-TV, HDTV, TCTN (TASHKENT CITY TELEPHONE NETWORK), интернет, телекоммуникация.

Аннотация. В данной работе авторами излагаются состояние и перспективы развития информационных систем на базе ВОЛС в мире и в Узбекистане. А также в статье проанализированы литературы о тематике и приведены состояние волоконно-оптических линий связи в мире и в Узбекистане. В качестве методике изложения рассмотрены обзор и анализ достижения волоконно-оптических линий связи в развитых странах мира.

Ключевые слова: Оптическое волокно, спектр, ВОЛС,POF, DWDM, PMMA, IP-TV, HDTV, ТГТС (ТАШКЕНТСКАЯ ГОРОДСКАЯ ТЕЛЕФОННАЯ СЕТЬ), интернет, телекоммуникация.

Abstract. In the given work as authors are stated a condition and prospects of development of information systems on the basis of ВОЛС in the world and in Uzbekistan. And also in article literatures on subjects are analysed and resulted a condition of fiber-optical communication lines in the world and in Uzbekistan. In quality to a statement technique the review and the analysis of achievement of fiber-optical communication lines in the developed countries of the world are considered.

Keywords: Optical fiber, spectrum, FOCL, POF, DWDM, PMMA, IP-TV, HDTV, TCTN (TASHKENTCITYTELEPHONENETWORK), internet, telecommunication.

Introduction. Fiber-optic information transmission systems are one of the main transmission media in digital broadband systems with integrated services that connect urban PBX, as well as for transatlantic and intercontinental information exchange. Modern high-speed transmission technologies are based primarily on the use of fiber-optic media, which currently provide the highest possible throughput. That is why the

technology of fiber-optic transmission media is currently rapidly developing throughout the world.

Literature review. Report of the II International Congress of UNESCO "Education and Informatics", held in Moscow in July 1996, Romanov V.P. et al. Use of precedent technology in strategic management // Bulletin of the Russian Economic Academy named after GV Plekhanov, Mardanov A.Z. The economic effects of the introduction of CRM. May 12, 2009, http://www.cfin.ru/itm/crm/effects.shtml, Albitov A., Solomatin E. CRM (Customer Relationship Management). http://www.cfin.ru/itm/crm-review.shtml, Palevich A. Risks of CRM implementation in banks. Journal "BDM. Banks and the business world ", № 133 for 2006. Publication date: 11/26/2007 http://www.cfin.ru/itm/crm/crm_bank.shtml

Research Methodology. The research methodology is the study and review of the prospects and development of fiber-optic communication lines in the world and in Uzbekistan Fiber-optical communication is a new technology for transmitting information over long distances without loss of signal quality. Due to its colossal bandwidth, fiber-optic communication lines are unique among other methods of transmitting large amounts of information. Research to improve the characteristics and parameters of FOCS and on the element, the base continues in all developed countries of the world. Nowadays, fiber-optic communication lines are being laid all over the world, which allow transmitting large amounts of information over considerable distances. This method became the basis of high-speed access to the Internet, significantly overtaking other popular methods of connection for key parameters.

For the next half a century incomplete, the construction of fiber-optic communication lines survived the present well-developed success:

In 1988, the construction of the first large-scale communication line between Japan and the USA was completed;

• In 2003, a signal transfer rate of about 11 Tbit/s was first achieved;

• In 2009, tests in the field of high-speed data transmission overcame a new frontier-scientists were able to broadcast a stream of 15.5Tbit/s without loss of speed over a distance of about 7,000 km.

Fiber-optic communication systems are now widely spread throughout the world, gradually crowding out other wired data transmission methods due to its features and unique characteristics. At present, communication lines based on fiber-optic connections are very popular all over the world. The demand for high-speed telecommunication technologies became apparent when mobile data consumption with 6 billion users is projected to grow to 40 trillion megabytes by 2016. As a result, today the telecommunications world operates with transmission networks at a speed of 100G (100Gbit/s). Therefore, progress does not stand still, and regularly there are messages about new technologies and achieved information transfer rates on telecommunication highways. Progress is mainly associated with the development of information transmission technology via modern fiber-optic cables. Hence, the basis of modern primary telecommunications networks has become an optical communication system. The creation of new-generation optical highways operating at multi-gigabit and terabit speeds required the development of a new network technology — compressed wave multiplexing (Dense Wave Division Multiplexing, DWDM). In this technology, the fiber-optical transmission system (FOTS) transmits information to the optical fiber at the same time by a large amount of light waves-lambda. In addition, each wave is a separate spectral channel and carries its own information. Of particular note is that only DWDM technology performs multiplexing and switching of light signals without converting them into electrical

form The creation of the FOTS DWDM required the development of fiber-optic amplifiers that directly amplify light signals in the third window of optical transparency in the range λ = 1528–1565nm, which corresponds to the frequency interval 192–196THz. The entire modern line of FOTS equipment is built according to a simple scheme 10G - 40G - 100G-400G-1T-.When transmitting a binary digital signal over an optical fiber with a speed of, for example, 10G or 10 Gbit/s. A bandwidth of ~ 30GHz is required, which is less than one percent of the 4 THz bandwidth. Therefore, a new principle of constructing FOTS-spectral separation (SP), called DWDM, appeared. The ITU-T standard establishes frequency plans that determine the values of the center frequencies of the spectral channels in the linear spectrum of FOTS-SP in increments of 100, 50, 25, 12.5GHz. Using wave (frequency) multiplexers based on optical multilayer amplifiers operating in the above frequency range, as well as reducing the step between waves, for example, to 50 GHz and 25 GHz, allows you to increase the number of simultaneously transmitted wavelengths to 80–160, i.e. It provides the transmission of traffic at speeds of 800Gbit/s – 1.6Tbit/s in one direction over one OF. The emergence of optical amplifiers operating in the above range, as well as the reduction of the step between the waves, allowed Huawei in 2012 to create the world's first 400G DWDM backbone transmission system with a bandwidth of up to 20Tbit/s. one fiber at a distance of up to 1000 km without intermediate electrical regeneration. The system has the highest efficiency since it used the minimum pitch of 12.5 GHz. According to the latest news, specialists from Eindhoven Institute of Technology (the Netherlands) and the University of Central Florida (USA) have developed a FOTS-SP with a throughput of up to 255 Tbit/s. At this speed, the information in 1GB will be transferred in 31 microseconds, and 1 terabyte in 0.03 seconds. In recent years, fiber made entirely from polymeric materials — plastic (polymer) optical fiber (POF — Plastic / Polymer Optical Fiber) has become increasingly popular. Although the

optical properties of polymeric materials do not allow plastic fiber to push quartz fiber out of the data transfer area, due to a number of distinctive features, it can compete with both quartz fiber and copper lines (twisted pair, coaxial cable) in some applications. Moreover, it is safe to say that POF has already taken a worthy place in the telecommunications market. The subsequent increase in the flow of transmitted information, the emergence of an increasing number of systems requiring the transmission of a digital signal over short distances, as well as the development of industrial automation, led to the fact that optical fiber was increasingly used in short communication lines, especially where copper lines do not provide high-quality transmission of information. In this case, the task was to create an environment for signal transmission, which has all the advantages of optical fiber, but at the same time has a competitive cost in comparison with copper lines. Plastic optical fiber is a multimode fiber of large diameter, the core, and sheath of which are made of polymeric materials IEC-60793-2-40 standard identifies eight types of plastic fiber, differing in their structure and, as a result, optical characteristics. However, the most widespread plastic fiber with a core and shell diameter of 980/1000 μm and a stepped refractive index. The outer containment usually has a diameter of 2.2 mm. Polymethyl methacrylate (PMMA) is used as the core material, which is also known as plexiglass, acrylic, plexiglass, etc. The outer shell is usually made of polyethylene. In a plastic optical fiber, whose diameter is much larger than the diameter of quartz fiber (standard multimode quartz fiber has a size of 50/125 μm), a huge number of spatial modes of optical radiation can simultaneously propagate. This number can reach several million. The numerical aperture of plastic fiber (NA) has a value of about 0.5. Single-mode plastic fiber is not produced. Due to the large aperture of the plastic fiber, radiation input into it is much easier than in the case of fibers with a small core. Therefore, instead of expensive narrow-focus lasers or special focusing optics, POF transmitters use cheap LEDs with a wide angle of divergence emitting in

the visible range. For POF, both standard connectors (ST, FC, SMA ...) and special design connectors (for example, the Versatile Link family from Avago Technologies) are manufactured. Since the polymer material is easier to process than quartz, working with it requires less skill and time. The process of terminating is reduced to removing the outer sheath of the cable, splitting the fiber, installing the connector and polishing the end. Crimping tools are also needed for mounting some connectors. All necessary fixtures have a significantly lower cost than in the case of quartz fiber. Epoxy glue is usually not used.

Despite all these advantages, the unresolved question remains: what to do with the huge attenuation in polymer materials that is huge by the standards of fiber optic links? Indeed, POF has noticeable limitations on the speed and range of information transfer. Usually, plastic fiber-based lines have a length of the order of several tens of meters, and the maximum transfer rate is limited to about 200 Mbps (the transfer rate can reach several Gbit / s, but fibers with a different refractive index profile and multiplexing technology are used).

However, it is these restrictions and determines the scope of plastic fiber. In terms of the range and speed of transmission, POF will never be able to compete with quartz fiber. However, in non-extended networks, which, in addition, do not require high speeds, the advantages of plastic fiber, which have been written above, are manifested.

It is of particular interest to consider how things are in terms of the introduction of fiber-optic communication lines in the Republic of Uzbekistan. Now, namely, the introduction of new information delivery environments based on fiber optic links to improve the reliability of communication. In Uzbekistan. According to the instructions of the President of the Republic of Uzbekistan Islam Abduganievich

Karimov (according to Resolution No. 307 of 1995 on August 1 of the Cabinet), the implementation of the national program for the reconstruction and development of the telecommunications network of the Republic of Uzbekistan began. The goal of the program was to reconstruct the existing network and provide access to the global telecommunications network. This task was successfully completed. One of the timely resolved important issues was the task of constructing and commissioning the national Trans-Asia-Europe fiber optic link (TAE FOL) of the large-scale Trans-Asia-T Europe Optical Fabre Cable project. According to this project, it is planned to build cable communication lines in Europe and in Southeast Asia. It consists of representatives of all states through which the fiber optic cable line passes, namely the participation of this project by the participation of this international commission.

The construction of TAE FOCL led even more developed economic and cultural cooperation between the states of Asia and Europe. The network is stretched from Shanghai to Frankfurt-Main and passes through the territory of 18 states: China, the Republic of Central Asia, the Republic of the Transcaucasus, Turkey, Ukraine, Belarus, Poland, Hungary, Romania, Austria, Germany. The cable is laid under the water of the Caspian and the Black Sea. TAE FOCL (fiber optic communication line) is a high-quality telecommunication network built on the basis of fiber-optic lines. Without erroneous and distorted signal transmission is ensured by the use of digital transmission systems in it. The transmission speed of digital information signals is 622 Mbit/s and this makes it possible to organize all types of communication services. To reach the international network, the sale of information flows of the national segment to the neighboring state constitutes a sizeable part of the income that these lines give us and this will speed up the self-repayment of all expenses. The connection of the FOCL to the international network provided an opportunity for the republic to use new types of communication and led the modernization of the economic and political structure of society. For the first time in Uzbekistan, fiber

optic lines are laid from the border of Kazakhstan (Abai village) to the border of Turkmenistan (Alat city) through the switching points of the city of Tashkent, Gulistan, Dzhizak, Samarkand, Karshi, Bukhara. For the first time in the Bukhara-Nukus highway, the construction of a cable line was completed. And this made it possible to create a high-speed and high-quality communication line a thousand times, connecting them with the number of growing subscribers, and through this line, four television and four radio programs from the territory of Uzbekistan are transmitted via a separate channel. To date, the branch TSHTT laid 598.8 km of fiber-optic communication lines to 2,075 buildings. In 873 buildings in the city of Tashkent, an opportunity has been created to provide services to the public with a capacity of 22,344 ports based on FTTB technology.

Analysis and results. The development of telecommunications and information technologies is becoming an important and integral element of structural transformations and the rise of the country's economy, the growth of business and intellectual activity of society, the strengthening of the country's authority in the international community, the gradual formation of the information society. By the Decree of the President of the Republic of Uzbekistan of May 3, 22, UP-38 “On the Further Development of Computerization and Introduction of Information and Communication Technologies”, the most important priorities for the communications and informatization industry were identified: the widespread introduction of computer and information technologies in the real economy management, business, science and education; the creation of conditions for the wide access of various strata of the population to modern computer and information systems; organization of training highly qualified human resources in the field of information and communication technologies; development of ICT technical infrastructure throughout the country; stimulation of the development of domestic production of software products. In order to implement the state policy, determine and implement priority

directions for the introduction and development of information and communication technologies, in 22 the Coordination Council was established under the Government of the Republic of Uzbekistan, and the Uzbek Agency of Post and Telecommunications was transformed into the Uzbek Agency of Communication and Information with additional tasks assigned to it. related to the creation and development of national information systems, information resources, information technologies, and services. As a result of these projects, digital long-distance stations were installed in all regional centers of the republic, analogs were replaced and digital exchanges with a capacity of 84 thousand numbers were installed, fiber optic cable was installed on intercity and intraregional communication lines with a total length of 62 km, and upgrades were made 95 television and 4 radio transmitters, cellular telephony is rapidly developing and the number of Internet users is increasing, a system of CDMA wired radio access in the regions of the republic. Currently, the local network of the Republic has more than two thousand PBXs with a total installed capacity of 1.974 million numbers, of which the share of digital is 46%. The number of main telephone sets is more than 1.715 million pieces, the telephone density of 6.85 telephones per 1 inhabitant. The level of coverage by digital telecommunication networks of cities of the republic is 96.4%, the district centers of the republic are 72.5%. The level of coverage of rural settlements with telecommunications networks is 77.2%, including 33.3% digital. In short, networks and telecommunications facilities of the Republic of Uzbekistan today are a developing network of networks. The telecommunications system of Uzbekistan has direct international channels in 28 directions with access to 18 countries of the world, using fiber-optic and satellite systems.

Conclusion. In order to develop (high-speed) broadband access to the Internet and back up existing networks, more than 1,800 km of fiber optic communication lines were built with the installation of channel-forming equipment, including the

development of a network using FTTB technology to over 4,000 administrative and residential facilities throughout the country bringing up to 105,116 ports.

The joint-stock company Uzbektelecom carried out work on the modernization of the IP / MPLS network of the TNTC branch, raising the speed at the trunk level to 100 Gbit/s based on the new DWDM transport network. The new network connected all districts of the city of Tashkent via high-speed optical channels. This project expanded dozens of times the capacity of the backbone data network, which ensured reliable and high-speed access for Tashkent city users to various services. This will contribute to the development of the provision of converged services such as the high-speed Internet, video telephony, IP-TV, Telecom TV, watching HDTV channels and others. A new DWDM line was commissioned at a speed of 100 Gbit/s in the Tashkent-Bukhara section. It should be noted that this is the first system operating at speeds up to 100 Gbit/s in the countries of Central Asia. In this system, the most advanced technologies of coherent reception and correction are applied, which significantly distinguishes the system from the traditional DWDM system operating at 10 Gbit/s.

Telecommunication networks of Uzbekistan today are experiencing a stage of the most active development and modernization. Full-scale and timely modernization of telecommunications networks is a necessary condition for the successful development of the country's economy. Based on the above, it follows that the large-scale implementation of fiber optic links in the Republic allows users to significantly reduce the need for a transmission medium for exchanging information of the necessary traffic. In light of the above, the problem of increasing the reliability of fiber optic links is relevant and timely in the Republic of Uzbekistan.

REFERENCES

[1] Portnov, EL. Optical communication cables and passive components of fiber-optic communication lines. - M .: Hotline - Telecom, 2007.

[2] Slepov N.N. Fiber-optical technology: current state and prospects. M .: Fiber-optic technology Ltd., 2005.

[3] Vorontsov A.S., Gurin OI. Reference book “Optical communication cables of Russian production”. - M .: - Eco-Trend ”, 2003.

[4] Semenov A. B. Design and calculation of structured cabling systems and their components. - Moscow: - IT, 2005.

[5] Iorgachev D. V., Bondarenko O. V. Fiber-optical communication cables. - M .: - Eco-Trenz 2002.

[6] Gusev S. Brief excursion into the history of industrial networks // STA. Number 4, 2000.

[7] HTTP: //wiki.mvtom.ru/index.php

[8] Romanov V.P. et al. Use of precedent technology in strategic management // Bulletin of the Russian Economic Academy named after G.V. Plekhanov. 2010. No.4

[9] Romanov V.P. and others. Intellectual analysis of the dynamics of business systems / Under scientific. ed. Doctor of Technical Sciences N.M. Abdikeeva, Doctor of Technical Sciences, Prof. L.P. Petrova, Doctor of Economics, Prof. N.P. Tikhomirova.- M .: Infra-M, 2010.

[10] Romanov V.P., Koryakovsky A.V., Varfolomeeva A.O.O. Main trends in the development of corporate information systems. // News of the Russian Economic University named after G.V. Plekhanov. 2011. No. 5, pp. 199-204.