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USE OF VPN TECHNOLOGY TO ENSURE INFORMATION SECURITY

Yeltay Ainur
yeltay.ainur@gmail.com
L.N. Gumilyov Eurasian National University,
Department of Computing,Nur-Sultan, Kazakhstan
Research supervisor-Abduraimova B.K.
abduraimova_bk@enu.kz

Abstract

This article explores the virtual private network (VPN): - its scope, purpose, advantages and disadvantages. Further, we also compare the resources that establishes the VPN services and determine the most effective and high-quality VPN service. In addition, we demonstrate how companies in Kazakhstan can operate their branches in other cities and countries with the help of VPN services. (Fig. 1). The main purpose is to prove the company with a private VPN service can save time and money and work more efficiently. (Table 1). The main security criteria should be the anonymity of the VPN, which ensures the security of files and documents. Lastly, we discuss ways to use VPN services to a provide a single corprate network.

Keywords.

Virtual private network, VPN service comparison, security, network security.

Introduction

Virtual Private Network is a tool that performs security services on the Internet. It allows users connected to a private network to connect to the Internet. The Internet offers the highest level of encryption and anonymity of communication. Another common reason for using VPN technology is that it has "limited" access to information and can be connected from anywhere in the world. That is, through this technology, the practice of "work from home" is now widely used. Kazakhstan's companies are also using this experience. [1]
For instance, IT companies are looking for qualified IT personnel not only in Kazakhstan, but also abroad, and we have met with IT personnel from India and Uzbekistan. They are highly qualified, but their salaries are similar to those of an ordinary IT personnel in Kazakhstan. Therefore, it is financially advantageous for the companies to hire these highly skilled personnel. In order this to work for the companies, there are no obstacles as long as the VPN works smoothly. And the network administrator who configurations the VPN is responsible for the speed and security of the Internet.
In this article we will explain the general concept and settings of VPN, how to use it, the most common types of VPN in Kazakhstan, their tariffs in tabular form, the advantages and other features of VPN for the company.

VPN technology is used by individuals and companies for various purposes. Individuals may hide their footprints on the Internet or allow others to monitor them in order to access sites that are banned in their country. When used for reasons, companies use it for its most important features of security, reliability and remote control.

The main purpose of a VPN is to differentiate the data flow of a particular organization from all other data flows as much as possible. [2] This means that this package is faster than others and the security of the information exchanged.

There are three important steps in using a VPN service:

Intranet: To organize global communication between the company and its divisions [3]

Extranet: Connecting the company's personal network to its business partners and customers

Remote access: Connecting corporate and private mobile network users or home-based employees.

The company is faced with the question: Create your own VPN channel or rent a physical channel for providers to combine the company's offices.

To rent a physical channel provider proves costly. In terms of economy, it is not profitable even for large companies. The physical channel does not always work stable. Therefore, it is better to create your own VPN. Nowadays, the internet is widely available and to create your own VPN the Internet is a necessity. The most important aspect is the cost free and always available for customization or changes. [4] And the added security from the provider never gives a guarantee of a safe data transmission channel and it is not clear which route the rented traffic routed. Every organization or individual has the ability to create a VPN channel. If a company builds its own VPN channel, it buys routers for the head office and number of branches. (Fig. 1) Also requires other technical means to complete readiness of the service. By using the inhouse VPN service, the companies can save cost and resources compared to using the other service providers. It is shown in tables below. (Tables 1,2,3).

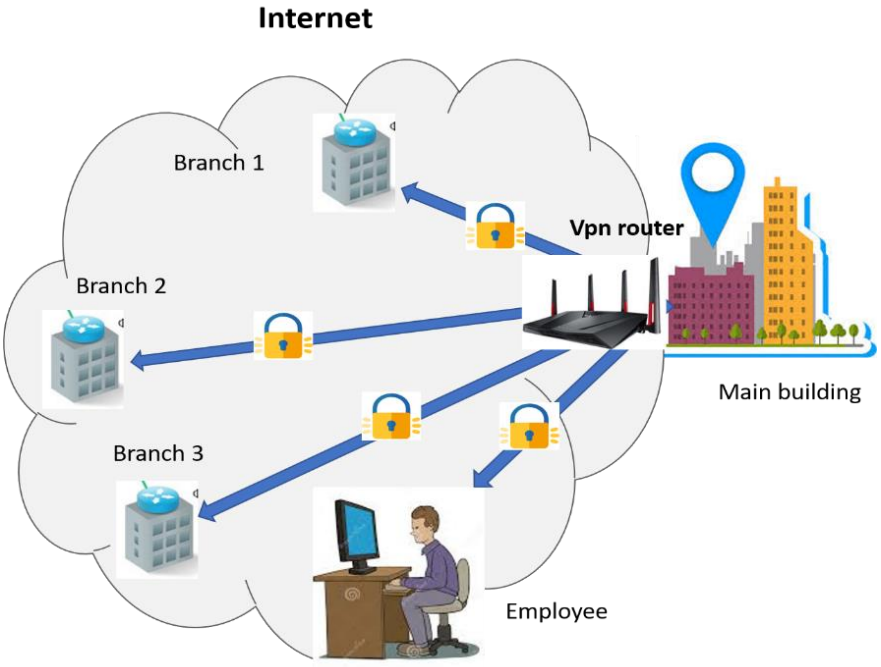


Fig. 1 Creating a VPN channel

We described how the main building and the three units connect the home-based employee. The main building will be located in Almaty, the remaining units will be connected in Nur-Sultan, Karaganda, Tashkent, and the Employee will be connected from India. The main building and other departments can be connected to each other via routers, and an individual employee can connect without a router. All you have to do is give permission to the employee from the main building. These processes are carried out through settings, in addition to the purchased technical equipment.

Tools for creating a VPN. Table 1.

	Main building	Router 1 (VPN server)	IP 10.0.1.10	Mask 255.255.255.0
1.	branch 1	Router 2	10.0.0.10	255.255.255.0
2.	branch 2	Router 3	10.0.0.11	255.255.255.0
3.	branch 3	Router 4	10.0.0.12	255.255.255.0
4.	employee	-	10.0.0.13	255.255.255.0

Names and tariffs of technical means necessary for the company to create the above-mentioned VPN service.

Router. Table 2.

	Device name	The number of	Price	Total cost
1	Router Mikrotik RB4011iGS	4	79 000 tg	376 000 tg
2.	Public IP address	4	15 000 tg	

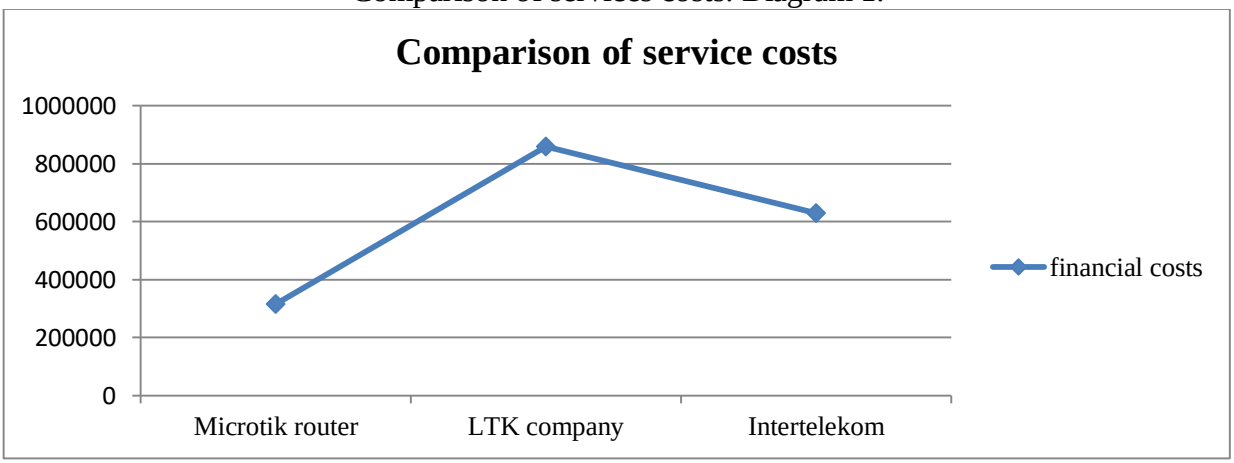
Monthly tariffs paid by the company when applying for paid services of providers. Their internet speeds.

Paid VPN. Table 3.

	Service company	1 monthly subscription fee for 100 Mbit / s VPN connection	Total cost for 1 year
1.	LTK company [7]	71 500 tg	858 000 tg
2.	Intertelekom company [8]	52500 tg	630 000 tg

The chart below shows the cost of using a VPN service, which is the most expensive LTK company, and the cost of setting up a personal VPN service costs twice as much as the cost of LTK, and in the next line only 60,000 tenge per year for an external IP address.

Comparison of services costs. Diagram 1.

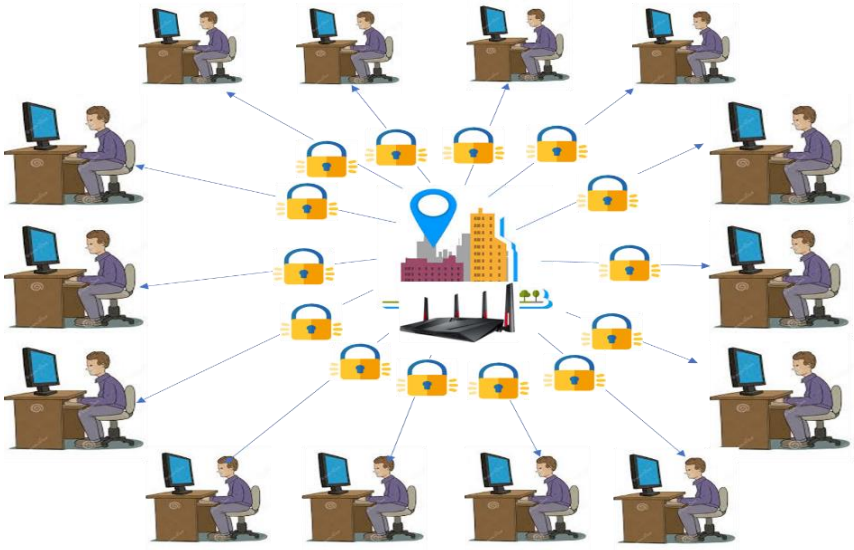


In addition, in the event of a mass epidemic or a state of emergency, important government agencies, such as companies, educational institutions, and public services, can use this VPN service to allow their employees to work from home. The table below shows that the company had a total of 50 employees. A total of 16 employees leave the units, and the system administrator adjusts the remaining 34 employees to work from home. To do this, the employee only needs a personal computer or laptop, and the Internet, and the institution must have a VPN router and an external IP address and the Internet.
Only if the server is not connected due to a power outage, one of the employees on duty will have to go to the office to connect. However, this situation poses less of a risk than dismissing all employees. The configuration here is the same as the usual configuration, except that a separate VPN is opened for each employee. The company does not spend money on the purchase of special equipment.

Remote operation. Table 4.

№	Number of employee	Number of employees working remotely	Number of employees on indefinite leave
Main building	15	11	4

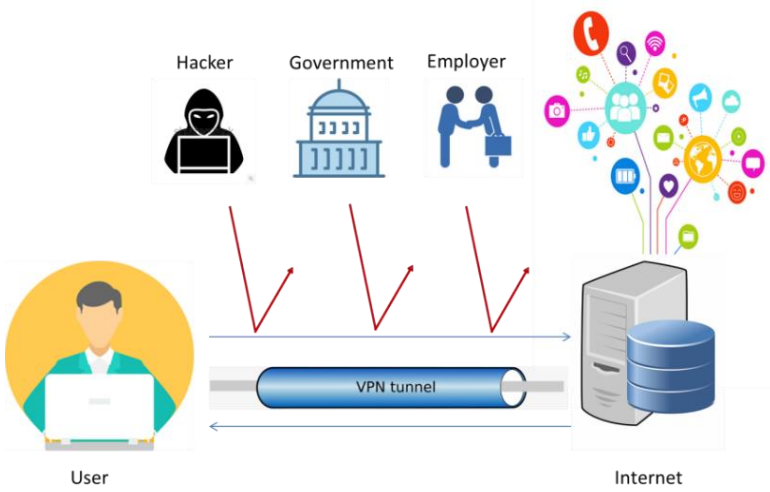
1-branch	12	7	5
2-branch	10	7	3
3-branch	13	9	4



Remote operation. Fig. 2

VPN service and how it works.

A VPN service is a virtual private network responsible for online security. It prevents hacker attacks, unauthorized external surveillance by the government and the employer. Also, VPN provides a high security of transmitted data. (Fig. 3).

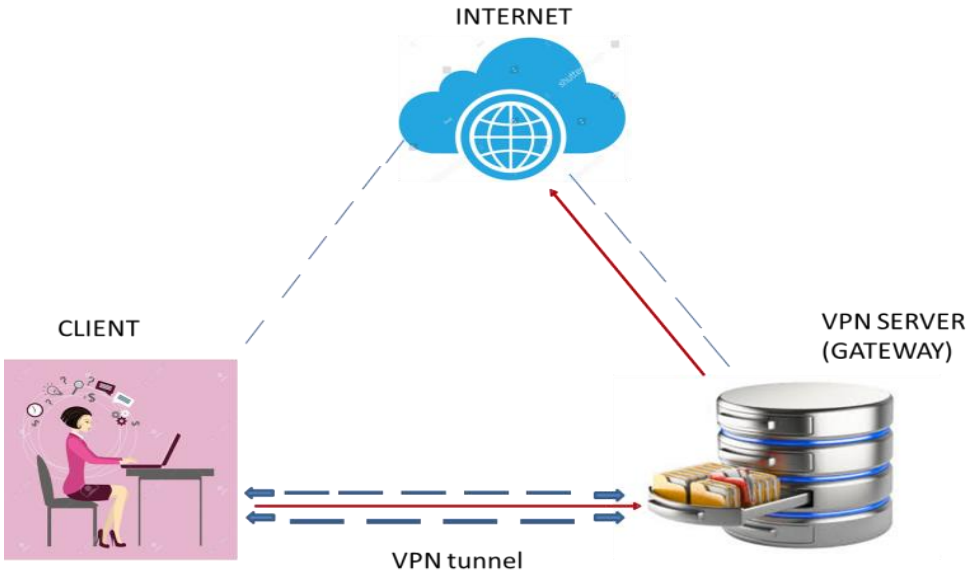


VPN. Fig. 3

Initially, VPN technology was used only by large companies to ensure information security. (Fig. 3) Employees had to provide a secure connection when they needed to connect to the company network from elsewhere. To prevent data from being stolen by hackers and lost for other reasons. Today, this service is widely used by individuals. This is because the ability to hide your location allows you to encrypt data and work online anonymously. Before getting acquainted with VPN technology, let's talk about how the Internet works. We have the names of social networking sites and other sites that we use every day. We call it a domain. And a domain is synonymous with an ip address. For the convenience of users, we use domain names, but

behind it is hidden the IP address of each site. When you access any site, you also send your ip address. [5] If you enter a domain name for a site in a browser such as Chrome, you also send your information to that browser's server. That is, they see who you are, and they process the requested information and return it to you. The problem at this point is that you are sending not only your ip address, but also other information about yourself, such as your name, location, credit card, and so on. and hackers can take this information. In addition to hackers, the sites you connect to also collect information about you. But their main goal is to gather accurate information about their audience. And VPN technology creates its own network within the general Internet and does not allow anyone to access it without external permission.

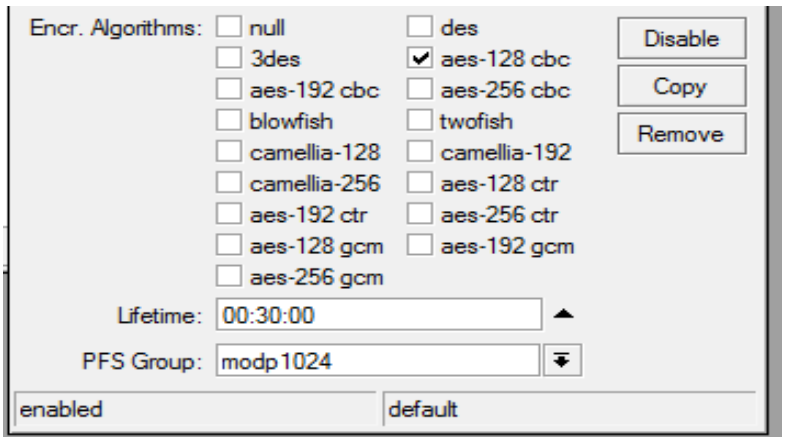
That is, a special tunnel will be created there and the information passing through this tunnel will be encrypted. And the recipient of the information can decrypt the received information only with the key given to him. It is very difficult to break into the tunnel, because the VPN service gives another server to the application when you connect. That is, as mentioned earlier, when you send a request to the site, if it is sent to the browser of the browser, it is first processed on the VPN-server and then sent to this server. (Fig. 4)



VPN tunnel. Fig. 4

Configuring a VPN server.

The most important step is to set up a VPN in the main building and connect with other departments and individuals. When setting up a VPN server, the router and external IP address required. To create a VPN service, you will initially need a router, depending on the number of headquarters and branches, and the Internet with one external IP address. PPTP, L2TP, SSTP, OpenVPN technologies are also used. [6] These technologies have individual tasks, creating a virtual tunnel via L2TP and encrypting IPsec traffic. An IPsec / L2TP based VPN is considered the most secure and reliable. This is because it uses the following 17 most powerful encryption models. We chose AES-128 cbc encryption depending on the scope of the company's work. (Fig. 5)

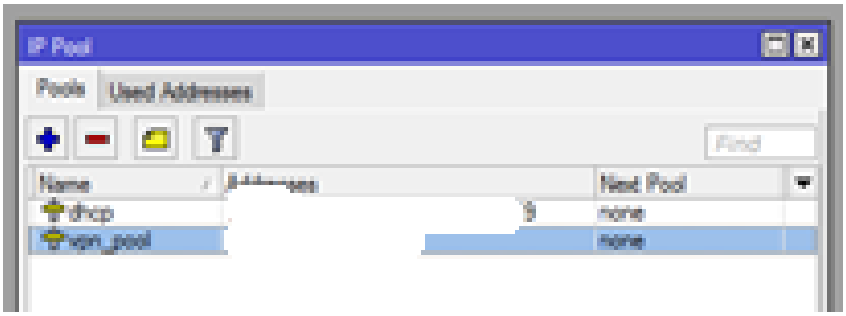


Encryption. Fig. 5

Features of IPsec / L2tp database. Simple and convenient tuning system

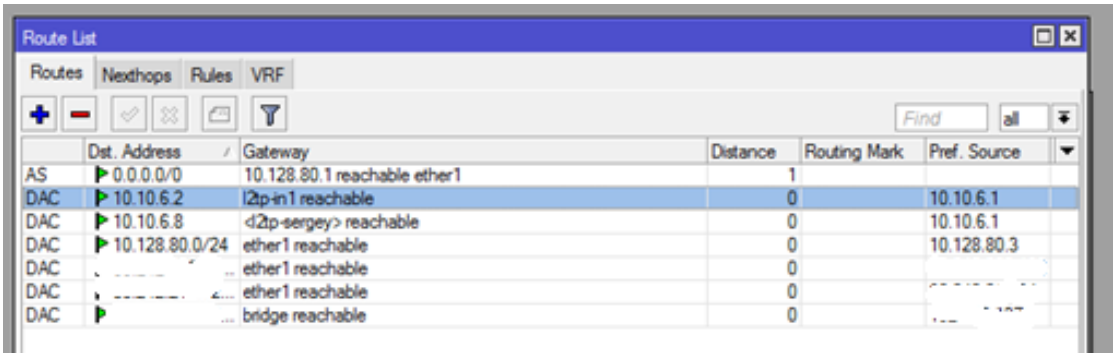
Trusted encryption (AES 256) Supports all latest devices and systems

Also suitable for office mergers and remote employees. Because each router must have a unique address, additional routers get an address from the main router through this pool.



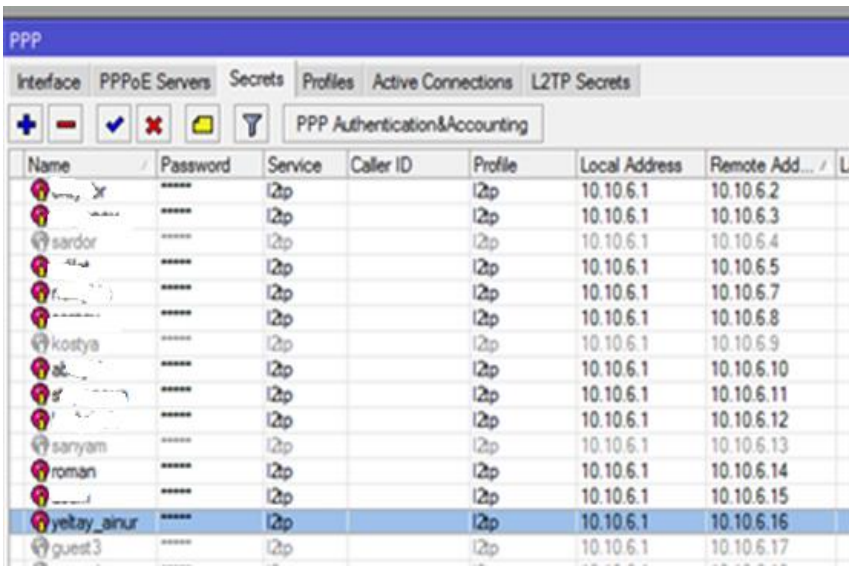
IP pool. Fig. 6

After the address was given, the remaining units were connected to each other through a router in the main building.



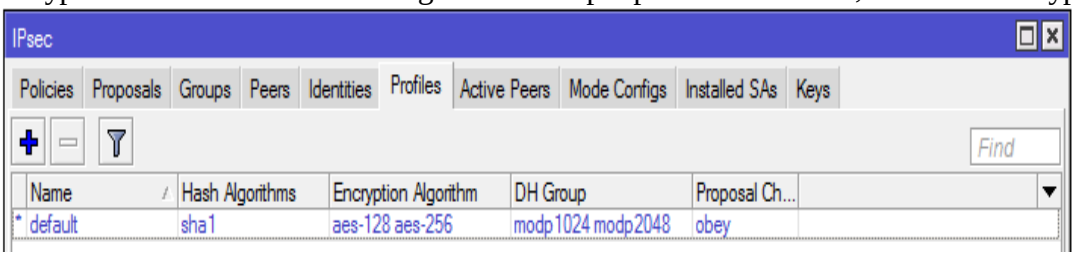
Common system. Fig. 7

List of external employees joining the company. Here, the local address is the address of the main building, while the remote address is the address of individual employees.

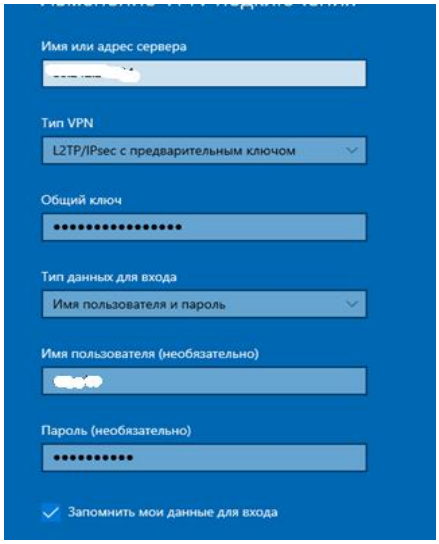


Remote connection. Fig. 8

Encryption of information exchanged between people and the office, and their encryption.

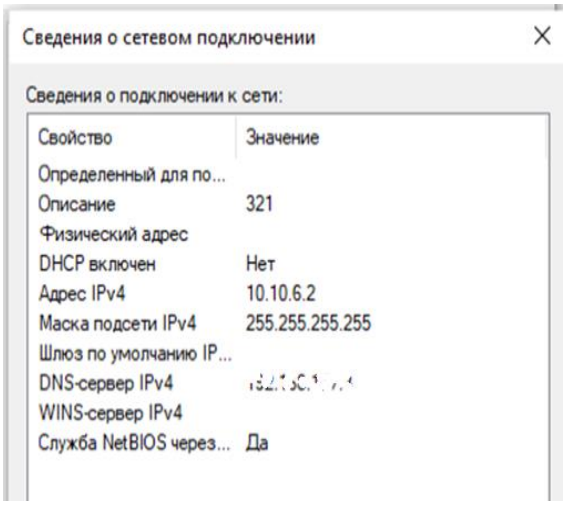


Type of encryption algorithm. Fig. 9



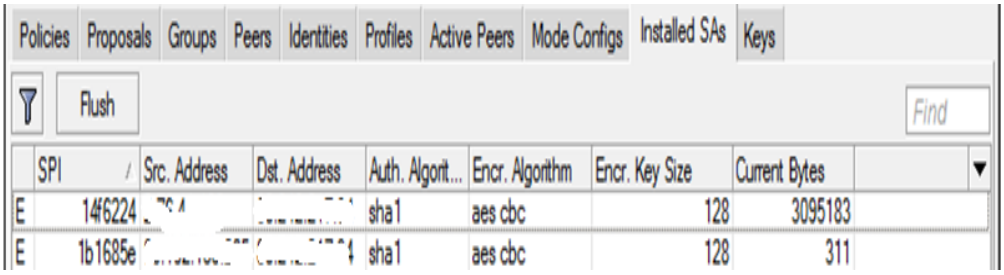
Settings for the client computer. Fig.-10

Client information after connecting to a VPN.



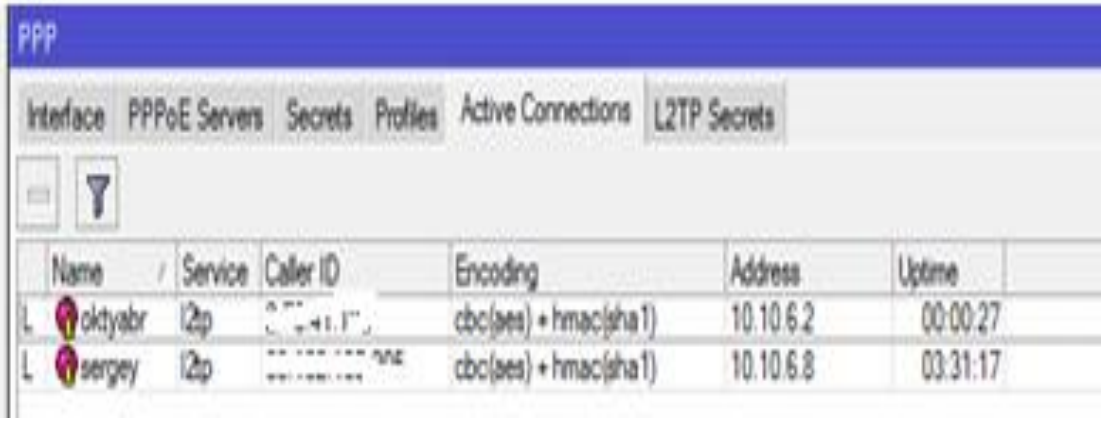
Customer information. Fig. 11

The system administrator can monitor the offices, monitor their progress, and determine if they are active or not. For example, if an office cannot connect to a VPN, you can see from this window.



Active offices. Fig. 12

Information of the sender and receiver. That is, the relationship between the server and the client.



List of active customers. Fig. 13

Conclusions -We examined what a VPN is, why it is needed, in which cases it is used, and how it can help safely and reliably not only combine the company's offices, but also from ordinary users to company managers can use it. A VPN can provide you security and access to your corporate network at anytime from anywhere in the world. And they saw that it's better to create your own VPN than to rent the provider's physical channel. For this, the main requirement is the availability of the Internet.

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ӘОЖ 004

АЛГОРИТМ БОЙЫНША БЕЙНЕНІ ТАНУ ЖҮЙЕСІН ТАЛДАУ, НЕЙРОНДЫҚ ЖЕЛІ

Абдулла Нұржан Бердіғалиұлы
nurjan_96_oyl@mail.ru
Л.Н.Гумилев атындағы ЕҰУ Ақпараттық технологиялар факультетінің
Есептеу техникасы кафедрасының
магистранты, Нұр-Сұлтан, Қазақстан
Ғылыми жетекшісі – ф.,м.ғ.д.,профессор Искаков К.Т.

Аннотация. Тұлға бейнесін тану бойынша сәйкестендіру әдісі тұлғаның үш өлшемді бет бейнесі және бұрылу немесе бастың көлемі, бет өрнегін өзгерту, бірақ жоғары өнімділікті талап етеді, есептеу құралдары мен жадының үлкен көлемі. Бұл мақалада нейрондық алгоритмді қолдану арқылы тұлғаны тану жүйесін талдау нәтижелері келтірілген. . Нейрондық желілер технологиясына негізделген параллельді есептеулерді пайдалану, көп адамдар шұғырланған жерді нақты уақыт режимінде, бейнені тану уақытын азайтуға арналған.

Түйінді сөздер: нейрондық желі; ақпараттық қауіпсіздік; қол жетімділік; ақпараттық инфрақұрылым.

Аннотация. Метод идентификации человека по форме лица позволяет построить трехмерное изображение лица и настроить множество опций в случае поворота или наклон головы, изменение мимики лица, но для этого требуются высокопроизводительные вычислительные средства и большой объем памяти. В данной статье представлены результаты анализа работы системы распознавания лиц использование алгоритма нейронной сети. Использование параллельных вычислений на основе технологии нейронных сетей предназначен для сокращения времени распознавания лиц в режиме реального времени при больших потоках людей.

Ключевые слова: нейронная сеть; информационная безопасность; доступность; информационная инфраструктура.

Annotation. The method of identifying a person by the shape of the face allows you to build three-dimensional image of the face and configure a variety of options in case of rotation or head tilt, facial expression changes, but requires high performance computing resources and a large amount of