INNOVATIVE MULTIPLE IT&C LOW COST SYSTEMS USED IN SECURE COMMUNICATIONS

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The purpose of this article is to point out the main aspects regarding the use of VoIP (Voice over Internet Protocol) to discover and locate the source of information, but also to create a data base with the information gathered this period. The user can not only access the files, but he can also use other types of Internet services at the same time. The applications refer to multiplex system, but a low cost solution will diminish the trust of the decision-makers in implementing and using these innovative solutions.

Key words: *network of organizations, VoIP, partnership, multiplex or multiple accesses, inspiration from Virtual Enterprises (VE).*

1. INTRODUCTION

Communications in collaborative organization networks are realized today through a diversity of methods at lower costs which limits the benefits of networking and partnership. Looking at the recent financial turbulence (global crisis, the debt of some countries in the EU) with an impact on companies' survival, finding business opportunities is essential, but we also must take into account the initial costs [1]. Starting from these contradictory conditions people will always look for new solutions to make collaborative networks more efficient at acceptable prices.

The main parameters belonging to a military communication system are:

- quick adaptability in various conditions and in unsorted conflict zones;
- high reliability;
- special endurance for controlled or uncontrolled disturbance in case of optimal redundancies;
- flexibility;
- high security yield for infrastructures, networks, network nods and other various elements;
- maximum security regarding information;
- high capacity for data transmissions on broadband;
- the insurance of communications in real time;
- modulation and short time for deployment;
- retranslation (retransmission) function.

2. INNOVATIVE SOLUTIONS FOR ELECTRONICAL AND MOBILE PHONE MULTIPLEX SYSTEM

A method of network multiplex used today by various companies is VoIP. Voice over Internet Protocol (in short VoIP) or Mobile IP or Mobile Internet. This is the process of transmitting vocal conversions through data points or networks using this protocol. VoIP is characterized through human voice conversion in packet data which is transmitted from the source to its destination using IP networks, and then the packed data is introduced in the same order and converted directly into acoustic signals [2].

C. E. Shannon establishes informational entropy starting from an experiment called X in which we can realize finite number of independent elementary events (x1, x2,...,xk,...xn). Likewise we take in consideration the probability of the appearance of these events (p1, p2,...,pk,...pn). The undetermined measure for the X experiment is a probability function of the elemental events and is equal with the medium quantity of information provided by realizing or creating an event/element:

$$H = \sum_{k=1}^{n} pk \cdot \log pk \qquad (1)$$

In which:

H - Information entropy;

p - The probability of realizing or the existents of a event called k from the system.

Because we do not know the priori results from the X experiment we can only conclude that it contains a specific undetermined grade which we can affirm that:

- After realizing the experiment we will receive a information, only and if only this result will clear any undermined grade;

-The information and indetermination are direct proportional measures, only there variation ways being opposed;

- The information will replace the indetermination [3].

Figure 1. VoIP system

Today the most used network is the World Wide Web, in other words the Internet, which connects millions of users from all over the globe. Still there are private networks that belong to private companies, private networks and institutions.

The biggest advantage of VoIP compared to the old voice transmission network is the low price for resources and materials. This connection can be achieved quickly, efficiently and with little money thanks to technology.

Still this isn't the only advantage; the IP network can use other services simultaneously, for instance web navigation, e-mail and many others. This service can be used anywhere in the world, no matter the country as long
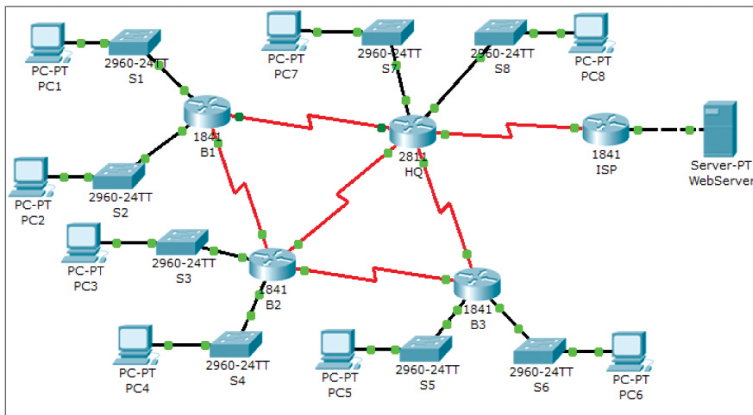
Figure 2. VoIP in a campus (scheme designed in Packet Tracer CISCO)

as it is connected to the Internet. Such a network is presented in figure 2.1.

VoIP is the most used process in the 21 century dominating the cell phone market. In other words VoIP is the one which ensures communications in our days.

It has a big advantage compared to the old mobile network. Thanks to the connection to the Internet the cell phone number (user) receives an address, an IP, private or commercial. We can see the IP classes in Table 1.1.

Table 1. IP Classes

IP Class	No. of possible users	Possible addresses
Commercial A Class		0.0.0.1-127.255.255.255
Private A class	16.777.216	10.0.0.0. 10.255.255.255
Commercial B Class		128.0.0.0-191.255.255.255
Private B class	1.048.576	172.16.0.0 - 172.31.255.255
Commercial C Class		192.168.0.0-223.255.255.255
Private C class	65.536	192.168.0.0-192.168.255.255
Commercial D Class		224.0.0.0-239.255.255.255
Private D class		224.0.0.0-255.255.255.255

Due to the allocation of an IP address the user of the mobile phone can see the phone number from which someone is calling him even if the person is using a withheld code to hide his mobile phone number.

At the moment we use IPv4 addresses, but because the number of Internet users keeps growing we will be force to use IPv6 addresses. An example of IPv4 would be 128.1.2.3 which uses 32 bits while IPv6 has the address 2001:0db8:85a3:0042:0000: 8a2e:0370:7334 which uses 128 bits. IPv6 will use numbers and letters in IP allocation due to increasing number of network users.

VoIP decodes the hidden bite so that when a user receives a call you can see his phone number or e-mail address from which is he/she calling. The code for withheld numbers is #31#0748123456 or for withheld messages *RI# 0748123456 (the phone number is a random example). Today the withheld message service is no longer available due to the agreement between mobile phone companies which settled that the message service or how we call it

today, SMS (short message service) would be centralized in a VoIP server so that any SMS, MMS (multi media service) or any other type of message that receives help from the internet would be decoded and sent to the receiver with the phone number of the one sending the SMS. Still they have not yet succeeded in implementing this system because of the large data space and high speed transfer rate required for voice and video transmission in real time.

In better developed countries like U.S.A., Great Britain etc., people started to buy telephones with VoIP included in the motherboard of the phone, but with a bigger security when it comes to voice calls. These phones can register the calls in a data base where it will last a week or maybe more, this depending on the user of the telephone. Such telephones can be bought online and is represented in figure 2.2.

Figure 3. Telephone with VoIP motherboard

As we can see in the image above, these phones are equipped with video cameras for video calls, but also we can send images and photographs which were made using this widget. This type of telephone will replace in time house-hold telephones or maybe mobile phones thanks to the uprising popularity of the video calls [4].

For a person to implement the VoIP system for any mobile phone it is necessary to redirect the call to a digital phone number, more exactly to an IP address belonging to a company so that the phone calls your receive would be monitored.

For example if a withheld number calls you, you will reject the call and at the same moment the number will be redirected to the digitalized number. There the hidden bite will be decoded and will see the number. A normal phone number has 32 bits of data, while a withheld phone number has 31 bits of data, the last bite being the one coded [5].

To use redirection you need to possess a digitalized number. These can be easily found on the World Wide Web. In Figure 2.3 we can observe the web page start page of a VoIP website service.

You will create a online account, the user needing a e-mail address to create and use such an account. While creating the new account you will be asked which phone number would you like from their data base. This service is identical to the one offered by the mobile phone companies when a person buys a new phone number.

The next stage would be to activate the account by accessing the link received in the e-mail address. After creating and accessing the account, you will use the redirection system according the rules of the mobile phone company where you have a contract or from which you bought a phone number. You will call the information service from your phone number where you will receive information about redirecting a phone call. This service is also available online at the web page of

each mobile phone company or just by calling the information service.

After you finished fixing these settings the VoIP service will be available 24 hours a day, 7 days a week and if a person from a foreign country call you the number will be decoded and you will the country from which he/she is calling.

This service also includes localization on Google Earth or any satellite localization if the person calling you has a GPS module integrated in the phone and if it is reconcilable with 3G network even if the person has or not Internet. This will locate the person calling with an error of 9 till 30 feet [6].

At the GPRS system the moment you are called and redirected the phone call it will take a second to decode the number. You can see the phone number by accessing the VoIP account you have created, accessing history calls where you will see missed calls, received calls, dialed calls and others, visible in **Figure 2.4.**

Figure 4. Mobile VoIP

Figure 5. Calls received or missed on VoIP

Even this type of network cost money. For example for the VoIP accounts which are not recharged with credit will be available maximum 3 months, but you can create a new account after the old one expired using a different e-mail address. This law is available for all types of VoIP networks which exist on the World Wide Web.

For the moment the VoIP service is not available for all mobile phone networks due to the fact that not all of them implemented the call diverter system to all of it's users, only the one's that pay a monthly fee can benefit from this service. Still there are companies that implemented this diversion system to all of its users becoming the leader of the market without any competitor due to the advantages that the firm brings.

Even if it's not available for everyone, this service remains one the best in the world allowing the use of many applications in the same time and decoding and locating the addresses from which the user receives data. This way every person can control his/hers activity without being forced to remember with whom he/she spoke or what document was accessed in the last days, all of them being included in each person's data base. In other words a personal library for each person that holds an IP address.

The advantages of using such a network are enormous, the costs being low. There is only a need for a computer which most posses a hard-disk big enough to detain and work the data which are accessed by users, each file been secured and arranged by the users address(the IP address that each person holds) [7].

Nowadays, only multi national companies which were inspired from Virtual Enterprises applied this system which reduced the costs and raised the efficiency of the personnel which has permanent access to the data base and multiplication of the system which allowed them to access data bases simultaneously with other documents, web pages from a mobile phone, laptops etc. Using these widgets the companies created partnerships to detain a larger and more accessible data base becoming faster and faster in finding solutions for a problem or to find date in the companies' library [8].

The multiplication service of VoIP is being used more and more nowadays, due to the fact that it is cheap and the fast development of technology. If 20 years ago a computer was big as a house room and the main data of a company was held in files nowadays almost each child posses a personal computer (laptop) or any other type of smart widget that can use and access from anywhere the data base of the firm through Internet. Still there are many which confuse the VoIP multiplication service with multiplication or they simply associate it with the Internet. Many people don't understand the difference huge difference between these domains.

3. THE MULTIPLEX VOIP SYSTEM IMPLEMENTATION AND USE PRICE. SOME ASPECTS

The solution that is proposed has the role to dramatically reduce the cost for a firm, company or institution. Thus, inspiring from the Virtual Enterprise system, the people have proposed to simulate or to create a prototype of this network, the next step being the price/cost analysis for such a network and the maximum efficiency that it will produce at minimal capacity.

The price/cost analysis is sensible domain in which will take place various functional optimization processes without losing sight of the minimal performances of such a network/system. For example we will point out the minimal prices/costs according to the simplest VoIP network which is represented in Figure 2.1 and it will be detailed in Table 2.2.

Table 2. The cost of the cheapest VoIP network

Seq.	Equipment and services	Price (Euro)
1.	Adaptor Cisco	50
2.	VoIP Terminal (VoIP telephone)	65
3.	Voice Terminal (normal telephone)	35
4.	Router	30
5.	Data Terminal(Desktop)	200
6.	Data Terminal(Laptop)	300
7.	Internet provider	20
	Total	700

The prices from table 2.2 had target a functional network for minimal services and for maximum 2 users at the same time. These users/persons will work at high capacity as long as each one of them has access to desktop computer or laptop. In other

words the more computers or access point a company owns the more data or documents are worked, this way increasing the maxim capacity and efficiency of a company or institution. Let's not forget that such a system also guarantees maximum security at the same time in the network or if it is accessed by outside, with a module that locates and saves the data and addresses that are being accessed even if they are hidden.

4. CONCLUSIONS AND FURTHER RESEARCH

An innovative solution is important and urgent in the context of actual global crises in which there is reluctance for the implementation of new ICT technology. Because of this we consider that it is vital to use such multiplex networks in our days offering a considerable advantage due to the speed and sharing of information's for any user of the World Wide Web and for secured files each user owning a password or certificate to access the secured file.

Due to the global crisis, partnerships between companies or institutions become harder to realize because of the global market competitively for technology which searches for new innovative solutions at low price and maximum efficiency.

From the military point of view they are looking for solutions to create a database with a high speed and adaptability that would react instantaneously when someone transmits large data. It will react in real time and will have the highest security level. The only users that could access such a network will be the employees of the company or institution, each holding its own access code even if they work in the system or from home.

For the next phase in research, people will try analyzing the economical part of the system and point out the effects of using and integrating it for household, industrial users, but also for defense and security institutes, other then the army.

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