Strategic Management Using VoIP Technology: a Case Study in a Call Center Company

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Abstract: - The ability of voice transmission over TCP/IP package, also called Voice over IP or VoIP, allows voice integration and data in just one structure; this enables a very cheap communication among remote locations. The main goal of this article is to analyze and demonstrate VOIP applications in the corporate market networks, their advantages and applications on the feasibility of tooling use in the corporate world. The method applied in this article is qualitative, semi-structured as a unique case study. The studied company is called KONTAK, a Brazilian organization of the call center segment located in the east region of "São Paulo". Intrinsic to the business, the major operation costs are related to telephony management. The results show a reduction in the calling costs among branches, customers and suppliers obtained after the implementation of this technology, as well as a better control of operational processes and organization management strategy in terms of the voice and data technology management. The business feasibility is evidenced by the return on investment (ROI) reached by the company due to this technology.

Key-Words: Voice over IP, Connection, Protocol, Transmission, Telephony

1 Introduction

The main limitation of the traditional telephone traffic systems is perhaps just their inadequacy to data transmission. The data communication increased so much, becoming representative of the "Information Era" and being led by the Internet growth, eventually surpassing the traditional voice traffic in volume.

Despite there is a number of strengths - as established standardization, transparency on interoperability among their elements of hardware/software, capillarity, stability and acceptance – there is no doubt that PSTN (*Public Switched Telephone Network*) and its distinctive technology and circuit's commutation, was not designed to transport data effectively.

While voice traffic is considered more predictable and stable with an average calling of 3 to 4 minutes, data traffic is unpredictable and occurs like bursts, having average callings of more than 4 minutes [1].

The circuit's commutation is based on the bandwidth reserved by the calling duration (64 kbps). This shows advantages and disadvantages: if by one hand it improves the quality of telephone interactions. On the other hand it represents a waste of network resources – because this bandwidth remains reserved during all the calling in course.

In contrast, a network of data package transmission permits the optimized use of the available bandwidth (through facilities such as statistical multiplexing, for example), making possible a higher utilization degree of the network assets without compromising the voice traffic signals enveloped in data packets.

The ability for make callings trough the Internet has been demonstrated and commercialized since 1995. However, supplying this kind of service with quality and satisfying the needs of customers it is another matter.

In order to implement the system of voice packets, it must satisfy the same customer

expectations that public telephone system has been doing for decades [2].

The general objective of this paper is to evaluate how much economic value the technology or VoIP solution aggregates regarding to the company voice transmission. The specific goal is to evaluate how much VoIP technology can reduce the spent on communication among sites and staff aiming the zero cost.

The study contributes filling a gap in the related literature since it shows a real solution using VoIP technology applied to a relevant communication problem in a multinational company.

The methodology used in this research is based on the collection of semi-structured quantitative data from a case study that is supposed to provide sustainability to data collection [3]. Results generated were compared and analyzed in order to direct the best way to extract the information as well as the method for in situ development

2 Basic Concepts of VoIP technology

The voice is an analogical signal produced by the vibration of an acoustic tube with 17 cm in length, called vocalic channel or device. It starts into glottis and finishes on the lips.

When one desires to transmit voice through a telephone net he has to change it into an electrical signal, also analogical. In conventional telephony this function is performed by the receiver device. But if one uses conventional telephone and wants to transmit voice through a computer network, that has a digital transmission, then it is necessary firstly to change it into a digital signal.

Voice over Internet Protocol (VoIP) is a technology that enables to make callings and to send faxes over an IP data network, like if using a *Conventional Public Telephone Network (CPTN)* [4].

The IP telephony is defined by the concept of using an IP network to the transport of telecommunication services. It is still a world away to the incumbents who have invested billions of dollars in traditional networks and do not think about changing them into IP until such investments are fully amortized.

However, all those have already joined the Voice over IP based on Frame Relay or ATM®, and they say that this is a definitive trend that tends to systematically offer new applications to the market – like a product (IP PBX, for example) or like solutions adding value to the business [5, 6, 7].

With these new applications, they hope to compensate the loss of income when a corporate customer chooses VoIP services instead of the voice over circuit. "It's inevitable: VoIP takes part of the income and adds in data, but it doesn't compensate the loss of income with traditional voice. The value added is the solution to the telecom companies. It is necessary to put more applications over IP", resumes Minoli [6].

When it is treated about VoIP, the service is related to the loss by concessionaire, because it changes the telephone traffic, especially long distances (considerable income), on internal traffic of data network, which it is not paid in the same way.

"The question of loss has to be relativized, because the customer who uses VoIP has to pay the good quality link connection, so there is a redirection of this income to other services," ponder Koodli and Perkins [8].

According to Gross [9], "In the future this gain will be in applications". Talking on phone will become commodity (goods) and it will get money who offers the transport of VoIP with quality and value-added applications, such as IP PBX.

There is a big interest from companies by IP services and in the future two interfaces will dominate: the voice and a browser software that lets to navigate in Web or sites FTP. Therefore, everything will be through Internet or a voice portal", complete Koodli and Perkins [8]. According to the authors, since 2000, Embratel's customers traffic voice over Internet.

3 Case Study

In the end of January 2007, Kontak, a travelling company which is part of L'Alianxa Travel Network®, a Latin American group which operates in the tourism sector in several countries including the oriental market, has contacted the company Digiserver.

Digiserver is a company specialized in providing solutions for Voice and Data which operates into telecommunications market in São Paulo, Brazil. Kontak was looking for solutions which could save money on voice transmission. The authors of this paper have worked as consultants for Digiserver in this project. Then, it was possible to focus the work in both practical and academic investigation way, looking for the investigation as a case study with participant intervention.

As Kontak possesses sites in different sites like Tokyo (Japan), São Paulo (Brazil) and Buenos Aires (Argentine) and two offices in Campinas (Brazil) and Osaka (Japan), the amounts spent on callings

among sites represented a significant loss in the income of the company.

3.1 Data collection and information before VoIP technology implementation

To start the project, it was firstly necessary to get information and data from the customer. The procedures used were in general meetings, conferences and documentation requested.

The first step was to understand how it ran or how it was established the company's communication with remote sites, employees, customers and suppliers. This information was obtained through a general meeting with managers. In this meeting, the communication process among sites was understood.

As shown in Figure 1 all links among sites were received and sourced (bi-directional) through digital lines (link E1) provided by phone operator. Since all remote sites are located outside of the São Paulo city, all calls were billed as DDD.

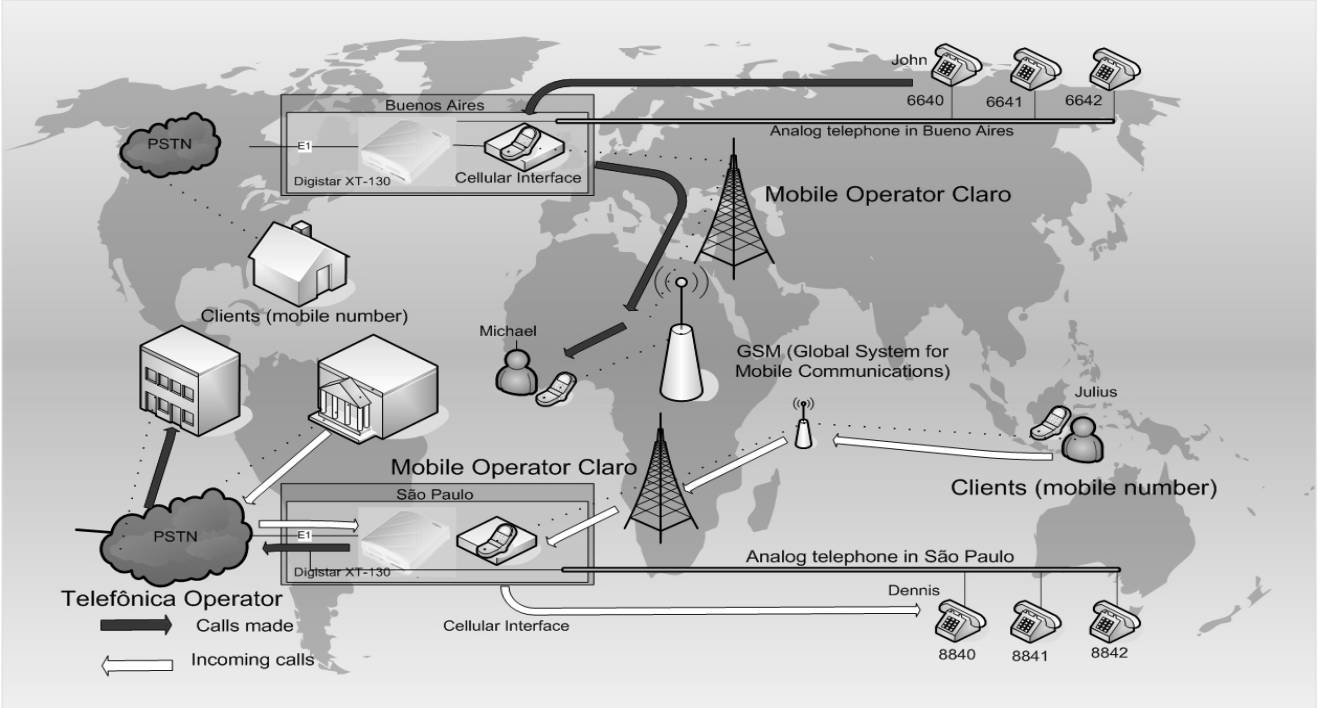

Fig. 1 Communication among sites “before” VoIP implementation

The communication among external and internal employees was established through cellular phones and interfaces. As shown in Figure 2, due to a corporate plan of a service operator (Claro), the taxes among cell phones were much lower compared to other operators, but still significant.

For communicating with customers and suppliers, the users used a digital link E1 (fixed numbers) from the central and cellular interfaces (mobile numbers), as shown in Figure 3

In the meeting, the customer also commented about customer Call Centers in Campinas and Buenos Aires sites that were deactivated due to the high costs.

The São Paulo site was the only one, which had a customer service group. As shown in Figure 4 each site possessed a structure of local service or customer service group.

It was explained to the customer the need for a VoIP dedicated link in each site. An IT Company team informed about the structure of existing data. The customer already possessed an MPLS data network connecting all the sites.

After understanding all Kontak communication process among remote sites it was asked a document containing tax information.

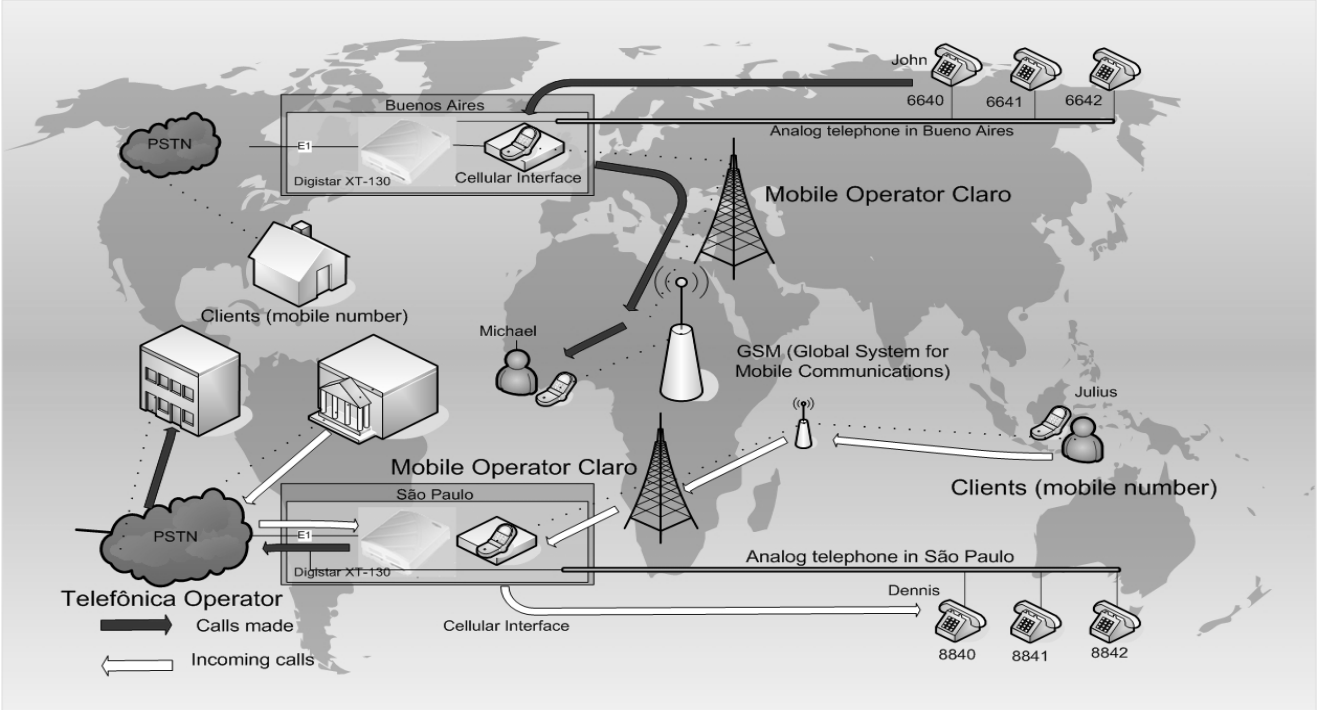

Fig. 2 Communication between employees "before" VoIP implementation

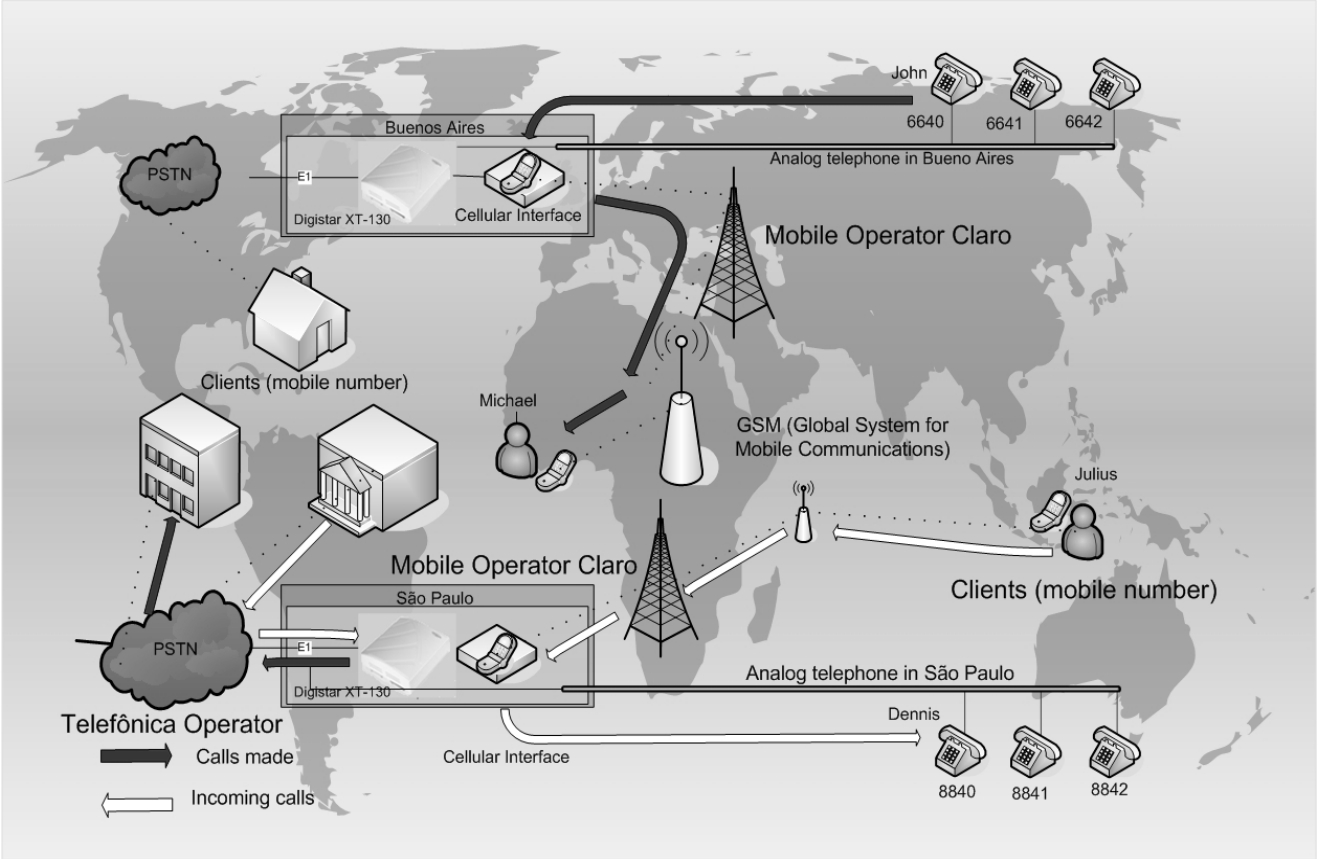

Fig. 3 Communication among customers “before” VoIP implementation

3.2 Data analysis and information during VoIP technology implementation

After taking the document which contained the company calling data with taxed value, all callings among sites were analyzed with their worth.

Table 1 was generated through data got during the meeting which shows the worth spent on linking among sites. It was also analyzed the callings of internal employees to external staff.

After filtering and getting the data analysis it was generated a document to be delivered and presented to the customer at the next meeting. In that meeting the amounts spent (simulation) after installation and activation of all system were discussed.

As the customer already possessed a network of interconnected data, and the voice's packets traffic has no cost, the system would be paid in two months.

Table 1 Worth spent in callings "Kontak" [10]

Type of callings	Worth spent per month (R$)	Worth spent annually (R$)
Callings among sites	50.0000	600.0000
Callings among employees	10.0000	120.0000

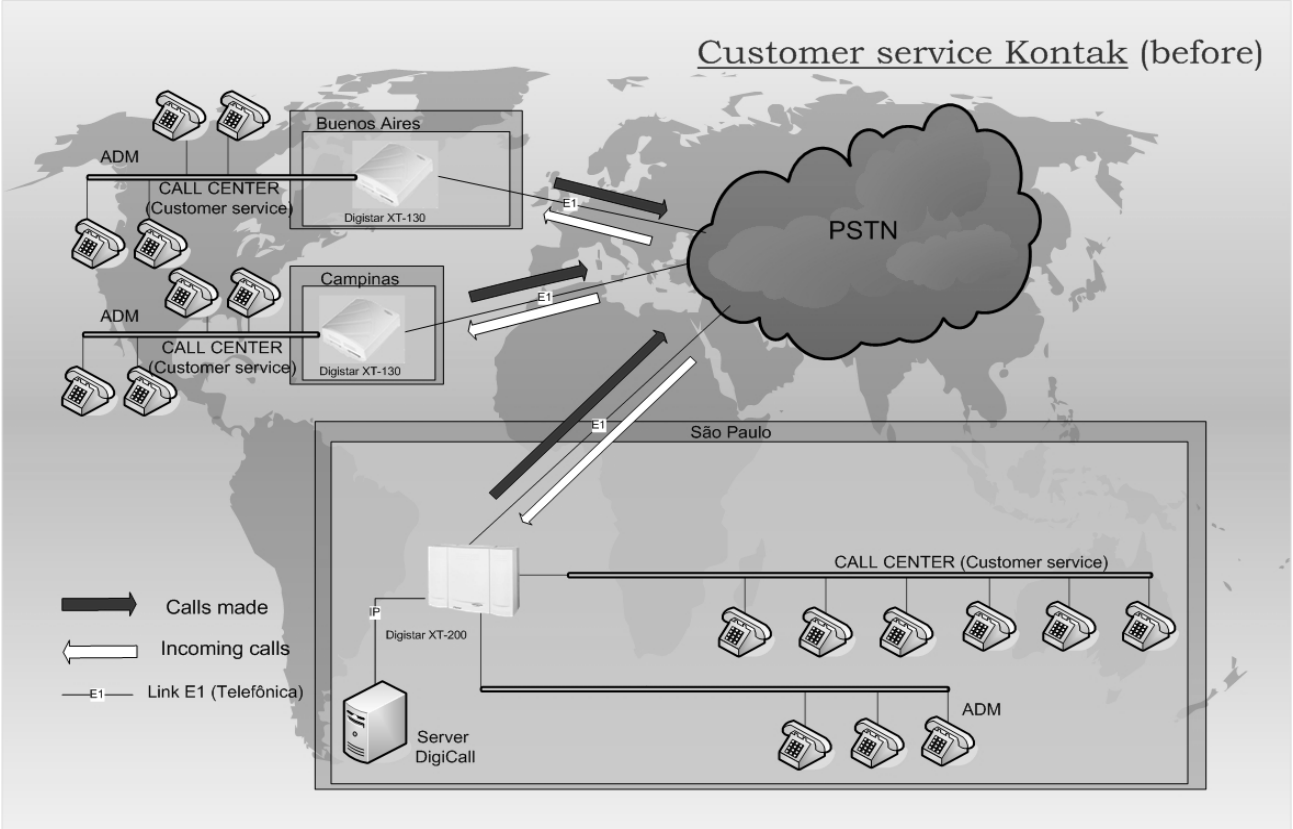

Fig. 4 Distribution of callings among sites "before" VOIP implementation

To provide a complete solution to Kontak's customer it is also presented a solution in partnership with Voitel Operator which focus on callings cost reduction to the customers and users who do not possess equipment or Voice over IP technology. Table 2 compares telephone taxes that were presented to the Kontak's customer during the meeting. The customer showed a great interest by the Voice over IP (VoIP) and its applications at the end of the meeting.

Table 2 Comparison of worth Voitel-Telefônica [11]

Types and callings package	Voitel	Telefônica
Consume of 2.000 min (fixed)	R$ 610	R$ 630
From local to fixed numbers	R$ 0.12	R$ 0.14
Distance Direct Dialing (fixed)	R$ 0.31	R$ 0.43

4 Applications of VoIP solution

In the study, the various solutions and applications used in the project which focus on the widespread use of VoIP solution will be treated. The positive results obtained from these implementations especially related to cost savings and flexibility in callings among sites will be shown. This study also reviews the parameters that seek to respond to the variables linked to the management of the operational costs. Additionally it helps in the understanding of the attributes that influence the mechanisms considered critical in the architecture of computer and telecommunication systems, serving as a model to companies that wish to deploy similar technology.

4.1 Communication among sites

Voice over IP equipment was installed in each one of the remote networks to provide communication and to make available callings among sites. As shown in Figure 5 there are three different models of equipment installed in the site of São Paulo.

The equipment XT-200 is a private center of telephonic commutation with technology CPA-T (Control by Archived Software - Temporal Commutation) relocated in the project as a Kontak's legacy. In this equipment there is a group of Call Center of Customer Service.

The equipment XIP-270 IP is a Hybrid central which provides all Kontak extensions in São Paulo with the exception of the Call Center extensions (which are provided by antique XT-200) and interconnection with the PSTN net (E1 Link from Telefônica operator).

The third equipment on the site of São Paulo is a device that performs protocol commutations among telecommunication networks using standard analogical (FXS and FXO), digital (E1 CAS R2) and converged systems (Voice over IP) called Media Gateway.

There is a central XT-130 on the Campinas office, a central private of telephonic commutation fully digital, which provides extensions to the office and interconnection to the PSTN network (E1 Link operator Telefônica) in the region. In the same office there is a gateway D'Link 8 - port FXO. An XIP-270 IP equipment is located in the site of Buenos Aires. This device also provides extensions to Buenos Aires as well as communication with the PSTN telephone network in the region.

There is a VoIP gateway D'Link® 8-port in Tokyo, but in this site the ports are FXS which are connected in the PanasonicTD-500 trunk in Tokyo. The Osaka office installed a device IP KT-200B. This device is a Pure IP device connected to a network point in Osaka. All sites are communicated over VoIP in the SIP protocol.

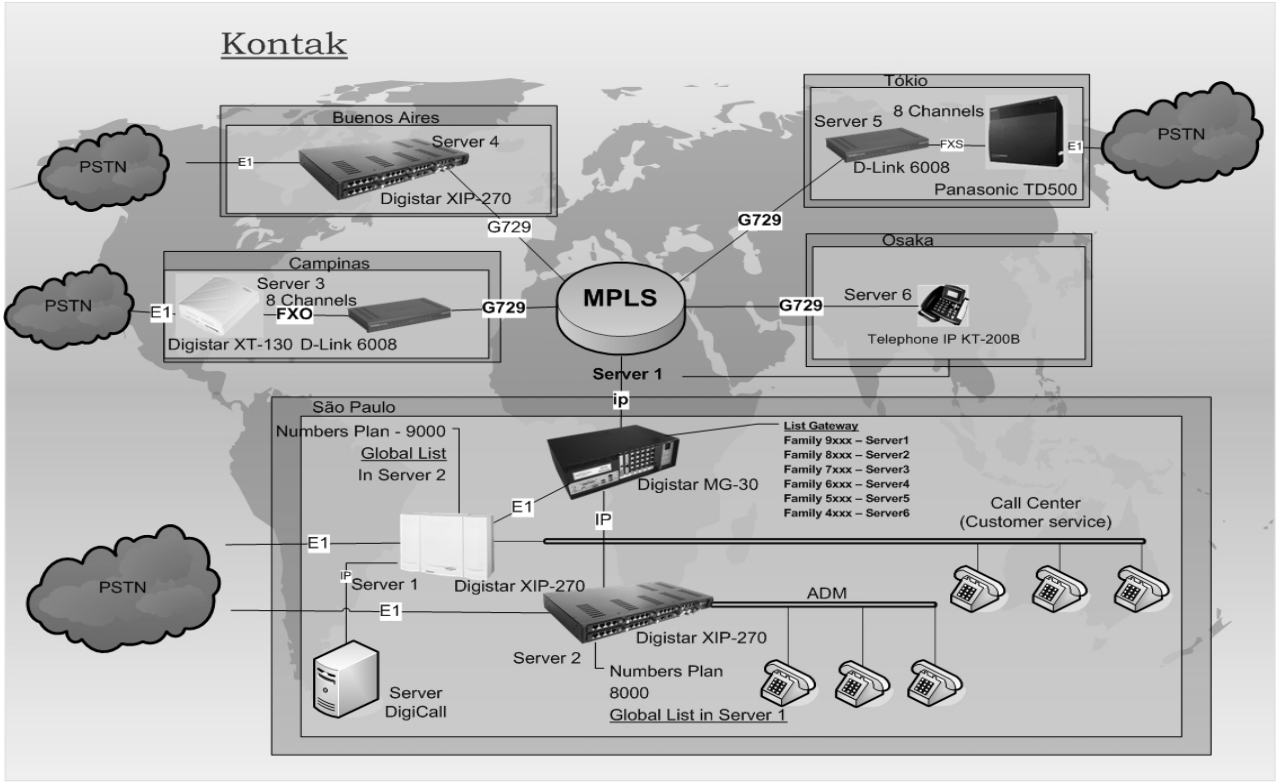

Fig. 5 Communication among sites

4.2 Communication among distributed extension (Extension IP)

The Kontak customer has representatives working outside visiting customers and suppliers in two sites: São Paulo and Buenos Aires. For these representatives distributed extensions were created, i.e., IP extensions.

These extensions were created and habilitated on XIP-270IP equipment. As shown in Figure 6, this equipment will make the role of a SIP server where all representatives will register using a softphone installed on Notebook (with 3G modem for Internet access) or devices that can support this technology (such as Smartphones).

Through these distributed extensions the representatives can make callings and receive them as an analogical extension.

He can call other company's extensions where it is registered and also to call extensions of other sites (thanks to the Media Gateway). Another advantage of using IP extensions is the perspective or possibility of generating connections by public telephone (PSTN) connected to the central XIP-270IP.

4.3 Distribution of calls among sites

As mentioned before, the central of customer service (*Call Center*) and ticket sales are located on the site of São Paulo. In São Paulo the callings came through the public telephone network or PSTN network through E1 link provided by "Telefônica" operator.

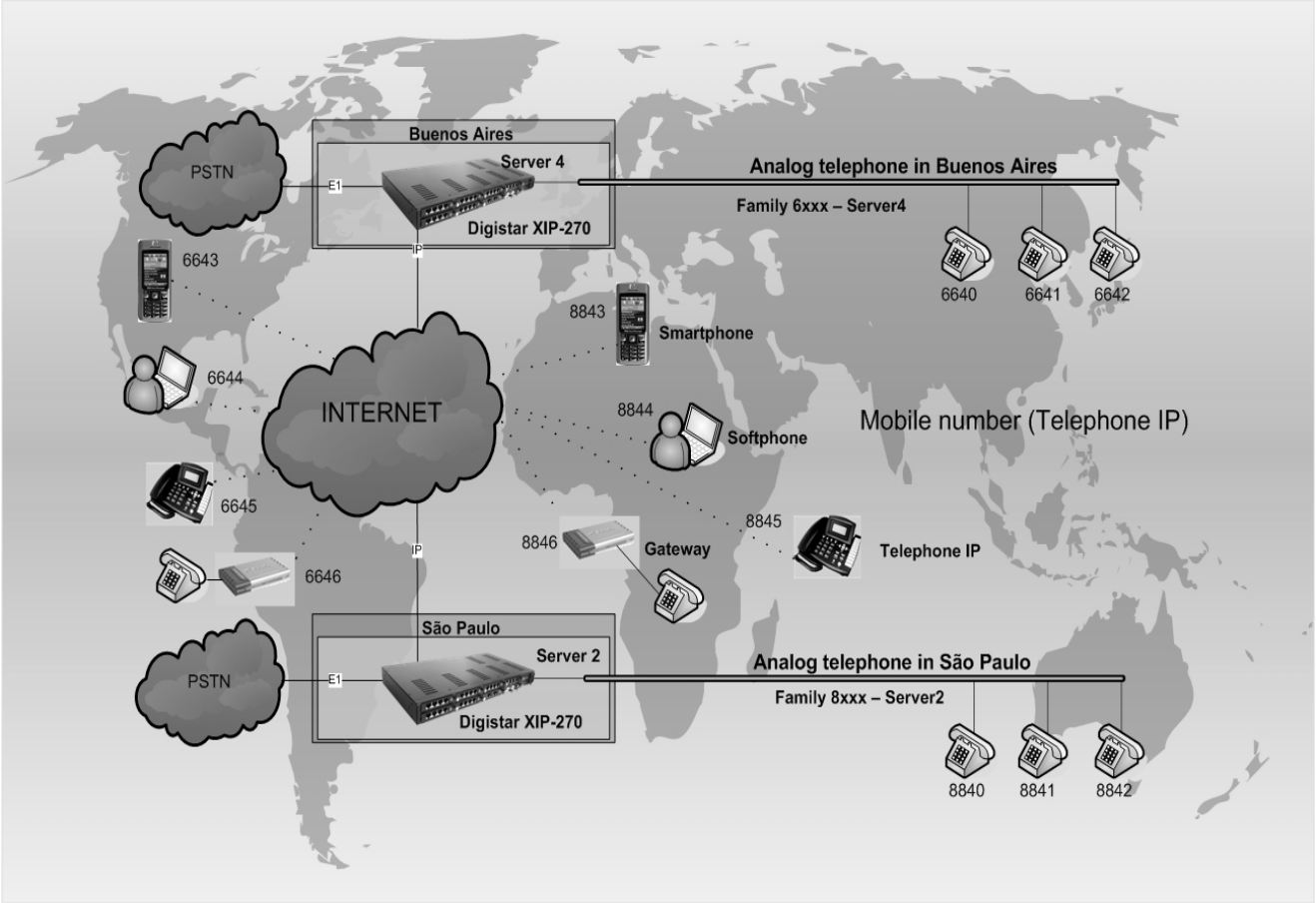

Fig. 6 Communication among distributed extensions

On the site of Campinas all incoming callings from public telephone network through the E1 digital link (the central XT-130) the number or trunk key released for customer service are addressed to one of the 8 extensions free connected to the gateway D'Link.

When the calling reaches the gateway D'link the same address these callings to the Media Gateway which analyses the routes and dialing plans created and redirects callings to the central XT-200 which is connected through an interface G.703 in Media Gateway.

The equipment XIP-270 possesses a digital message service called DISA (Direct Inward System Access) in the site of Buenos Aires. In this DISA message customer can digit 6 options. When customers digit option 1 or 2 in the DISA message the equipment directs this calling to the Media Gateway via VoIP.

The Media Gateway equipment will examine the routing tables and dialing plans and will redirect the calling to the Call Center Service. It follows the detailed structure shown in Figure 7.

4.4 Communication through an operator VoIP

In the sites of São Paulo and Buenos Aires all DDD or IDD callings made to fixed numbers (PSTN network) use a preferred route provided by Voitel Operator.

Looking at Figure 8, after the registration of the XIP-270IP equipment on the operator platform, all DDD and IDD callings to fixed numbers are addressed via VoIP to the platform of Voitel Operator and redirected via VoIP to the region or state of destination.

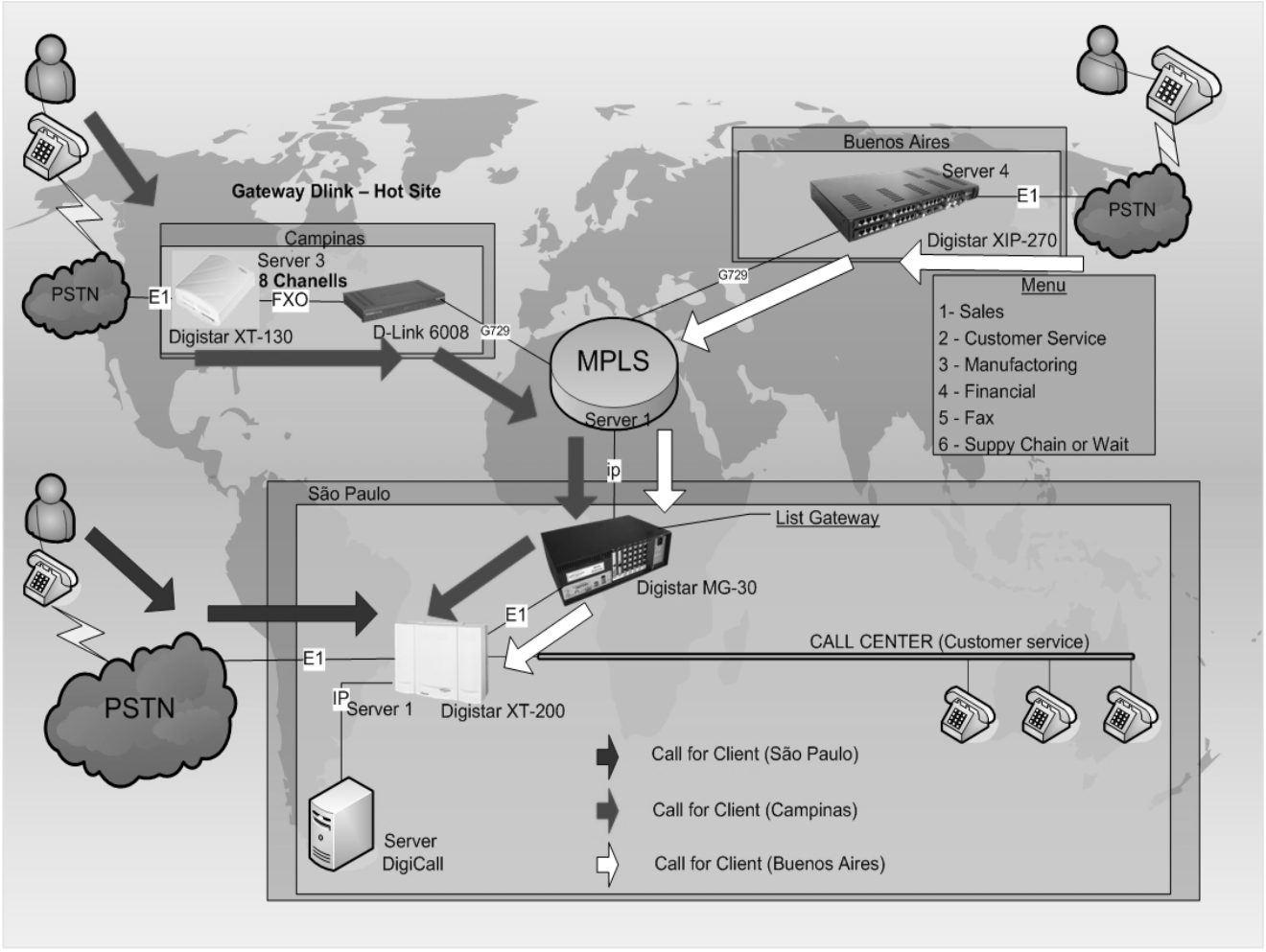

Fig. 7 Callings Distribution among sites

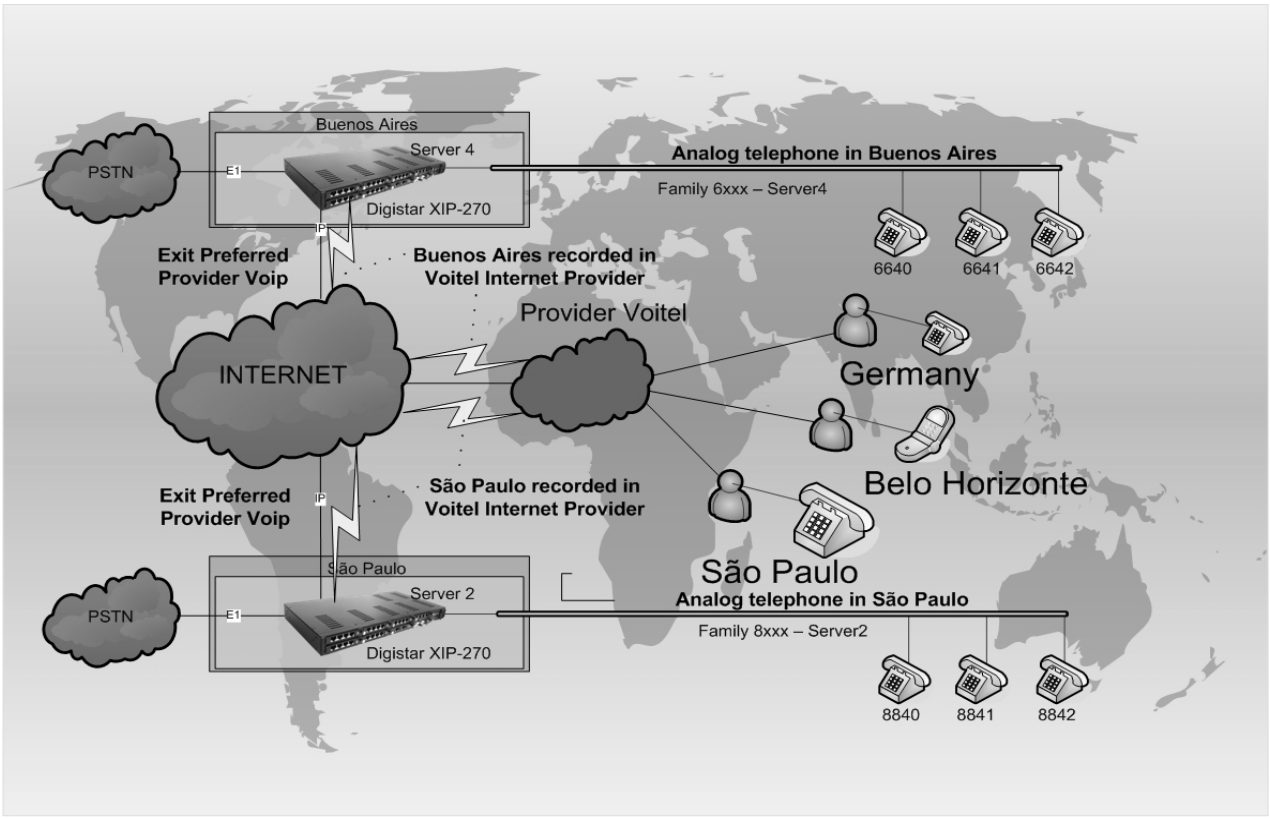

Fig 8. Communication through Operator VoIP

5 Conclusion

The VoIP technology is showed as an attractive alternative for voice transmission, mainly to companies and SOHO (*Small Office - Home Office*) that already have one or more networks installed and can use the existing infrastructure or to those ones which have subsidiaries in other countries and cities.

The contributing factor of this work is based on its practical relevancy since this research has allowed to the studied company greater control in the management of calling costs among sites as well as innovation on the use of VoIP technology in the studied segment in Brazil.

Results of this study can be viewed by two distinct ways: i) quantitative, when presenting financial economy with the implementation of VoIP technology, for the number of new businesses and chances that could be generated in the organization call center and for the technical detailing in the technological architecture of the VoIP; ii) qualitative, allowing a work of strategic mapping of the calling costs with the information generated by the implementation of the new technology in the studied organization.

As shown in the Kontak case, the cutback is evident and proportional to the need of public telephony utilization. The worth spent in callings among sites were about six hundred thousand "reais" annually. The worth spent in cellular phone calling were around one hundred and twenty thousand "reais" annually.

The reduction of the importance spent after installation and activation of the entire system is evident and it is proportional to the need for public telephony utilization. It was detected that there was a significant decrease in the values spent on local and long distance callings.

As the customer already possessed a data network interconnected and the voice packet traffic has no cost, the system would be paid in two months. With improvement of technology and new techniques and algorithms a voice quality comparable to that offered by public telephony operators can be obtained.

The differential of this study related to similar works is that this it not only deals with the application and the architecture of VoIP technology in the management of a call center organization but it also strengths the financial viability of the business for that segment.

Today the Voice over IP is no longer restricted to point-to-point telecommunication. Recently there were several operators providing voice services over

IP. Since the most part of the voice path of these carriers is the TCP/IP, the rates charged are lower compared to the conventional telephone operators. It is unlikely that the technology of voice over IP causes the end of conventional telephony in corporate environments but certainly it will be responsible for a significant portion of long distance and international calls.

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