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A MODERN PUBLIC TELECOM PLATFORM

A Unified Payphone and Internet Access Solution

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Panel

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IN EMERGING AND TRANSITION ECONOMIES**

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A Unified Payphone and Internet Access Solution

This presentation describes the technological challenge of rebuilding the Brazilian payphone system to offer a modern low-cost and easy-to-use solution. This solution has to be, at the same time, attractive for the low-income population – more than 100 million people in Brazil – to access telephony services, keeping tariffs around one cent of USD per minute, and allowing profitability for the Telcos.

Firstly, we will present the public payphone technology developed by CPqD used in Brazil since early 90's that comprises the **inductive card technology**, the payphone itself, and the remote management software system **SSR**. With contributions of local manufacturers and working with Brazilian Telcos for system specifications and field trials, a brand new payphone system, based on inductive technology and prepaid method of usage, was developed, produced and deployed. Nowadays, the Brazilian payphone plant figures are 1,5 million payphone terminals installed and a consumption of about 60 million cards per month. This system is secure and offers the possibility of central clearing in a multi-operator environment.

Secondly, we will present a planning and design system for outside plant network – **SAGRE/TUP** – developed by CPqD to help the Brazilian Telcos make sure they are compliant with the Anatel (Brazilian regulatory agency) rules concerning public payphones location. These rules require that users should not have to walk more than a certain distance to find a payphone terminal, and also to find a reseller of payphone cards. **SAGRE/TUP** is an integrated module that accesses **SAGRE** system and processes the data stored in databases to find the best placement for the payphones. **SAGRE** is a set of applications, developed by CPqD to manage the outside plant and automate the network planning process based on market analysis, with a complete inventory of network elements. This system also designs the network and its construction phases, and supports the network operation and maintenance.

Finally, we will show an **Internet Public Access System** recently developed by CPqD, which is currently in a field trial phase. This system provides Internet access in a massive and more extensive way through a multiservice **inductive card technology** terminal or simply “kiosks”. These “kiosks” are basically composed by microcomputers with specific software that controls an inductive card reader. Based on a prepaid inductive card usage, Internet services are controlled and supervised by remote management software system **dotIP**. **dotIP** is a distributed and scalable system, which gives Telecom Operators all conditions to manage IP access to

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valued-added services (authorization and authentication). This **Internet Public Access System** is now in operation in Telemar, the largest Telecom Operating Company in Brazil.

In conclusion, the **inductive card technology** is the live proof that specific problems related to low-income population can be solved and integrated with other Brazilian technologies like **SAGRE** and **dotIP** and compete in the global market.



Low-Cost Payphone System – Inductive Technology Platform

The main aspect related to the Brazilian payphone system in the end of 80s was the challenge of rebuilding the national payphone structure that is facing several problems. At that time, all payphones were token-operated, having a low technological content. The token operated plant didn't have remote supervision and was facing heavy vandalism – it was considered a social burden for the Operating Companies.

An additional degree of difficulty was added due to the fact that payphones in Brazil are a very important doorway for the low-income layer of the population to access the telecommunications infrastructure and consequently tariffs should be kept low.

Field trials and specific tests were made on other technologies available at that time, and in general they were not appropriate for the specific environment in Brazil, always bringing one or another negative aspect.

After evaluating those technologies and due to the peculiarities of the targeted market, it was decided to adopt a local solution based on the so-called **Inductive Technology**, developed in CPqD. A challenge was placed for CPqD: to materialize the inductive technology, until then restricted to its lab benches, and develop a low-cost and easy-to-use system that could easily replace the old one.

From the point of view of system specifications, the main objectives to be reached were:

- Suitable for the low-income layer of the population
- Easy to operate
- Low cost, both payphone and card
- Compatibility with the existing network
- Service and maintenance facilities
- High immunity against forgery
- Reduction of vandalism



- Local and long-distance calls
- Provision for international calls
- Reliability and quality
- High technological content

Although the system development hasn't addressed specifically this issue, we couldn't forget the social aspect of a payphone system in Brazil and this is stressed on the first three topics above.

The fourth to fifth objectives are interrelated and their importance relies on the fact that the system cost should be kept low and the sixth and seventh had a clear intention of modifying the paradigm existing until then.

An interesting philosophical point, concerning topic number seven, was that we always believed that a considerable amount of vandalism is a retribution for a poor service. In other words, if you respect users offering a good system, they will naturally respect the system.

Finally, the eighth to eleventh aimed the creation of a future-proof system, from a technological point of view, allowing the system to evolve to a point where it could fulfill the needs of any tier of the population and compete, in the future, with other technologies.

Counting on the contribution of local manufacturers and working together with the Brazilian Operating Companies, concerning system specifications and field trials, a brand new payphone system was developed, produced and deployed.

Nowadays about 1,5 million inductive card-based payphones installed all over the country and 60 million cards being used monthly are the living proof that daring is allowed and that there is no reason why emergent economies couldn't solve successfully specific problems instead of using developed countries products, sometimes not totally suitable as a solution for local difficulties.



1 Inductive Card Technology

In 1992 a field trial was developed and that first payphone system experienced a great success, being a very important Brazilian landmark in the payphone business for users, CPqD, industries and operating companies.

The **Inductive Payphone System**, called as **TP-Card System**, was (and still is) composed of three main building blocks: Supervision (**SSR**), Payphone and Card. It has been based on the Inductive Technology, an innovative contactless, non-polarized card/reader system, extremely friendly from the user point of view.

2 Inductive Technology

Reading and the collection of credits from the inductive card is based on the magnetic induction principle, hence the name "inductive card".

Telephone card has a series of spirals and microfuse sets distributed along its back. Each set corresponds to a credit unit. The inductive reader, by induction, is able to detect if there is credit or not in the card, as well as to command the destruction of a unit, which corresponds to a use of a credit from the card.

Each card can have up to 100 credit units which is equivalent to 100 two-minute local calls.

The telephone exchange commands the frequency of credit collection, sending pulse charges to the telephone in intervals which vary according to the distance of the number called. In some cases, the telephone set itself determines the frequency changed, based on a billing table stored in its memory. In this case, the device is called an "auto-billing" telephone.

With national technology, CPqD inductive card technology has awakened the interest of telecommunication companies of other countries.

2.1 Inductive Card Basic Characteristics

- Low production cost – making possible the production of cards with few credit units, which is essential for low income population.
- High resistance to fraud – the complex manufacturing process is viable only in large scale, making domestic fraud difficult. False cards are recognized by the inductive reader.



- Fine and flexible – only 0.4 mm thick. The other dimensions are International Standard Organization standard – ISO.
- Immune to external factors – The card isn't affected by the presence of electromagnetic fields, dust, humidity, heat, ocean air, ultraviolet light and X-rays.
- Disposable – it can't be recorded over. The material is recyclable.
- Easy to use – does not require a specific position to be inserted in the reader.
- Simplicity – doesn't need mechanical contact between the reader and the card or internal movement in order to be read.
- Convenience – they're presently available in cards with 90, 75, 50, 35 and 20 credit units.

3 Terminals and Card Systems

The TP-Card System includes the payphone card terminal, a computer based supervising system, as well as the cards themselves.

Although the payphone cards use a very sophisticated technology, they are as easy to use as payphones which use tokens.

Working behind the scenes of telephone sets, there is a supervision system that monitors, remote and automatically, the group of payphones installed in a certain region. Through this supervision system it is possible to know, for instance, how many calls were made from each piece of equipment, which equipment may be having problems, as well as any information about the equipment, which is presented by reports.

3.1 TP-Card Terminal

The TP-Card Terminal is a modern equipment unit, totally electronic, with a microprocessor. Due to the need to reduce maintenance costs, and improved communication quality, all the electro-mechanical parts of the token telephones were replaced in the TP-Card with lighter, cheaper, and more efficient electronic circuits.

A call can be monitored through a LCD screen which supplies information such as: the number of credit units in the card, the number being called, the need to insert or to change the card, the operational condition of the device, as well as other information.



3.2 Characteristics

- Totally electronic – due to inductive card characteristics, static reading, there are no moving mechanical parts inside the equipment. The maintenance is faster, easier, and less frequent.
- Uses telephone system voltage – due to its low energy consumption, the telephone set does not need batteries or energy through the power line.
- Light and reduced size.
- Remote supervision.
- Software implemented features.
- Download (remote load) of configurations and rate tables.
- Billing by line inversion or 12 kHz frequency.
- Decadic or multiple frequency dialing.
- Information about the current available on screen.
- Reception of calls.
- Easy installation in the network.
- Media messages on the screen, remotely configurable.

3.3 Remote Supervision

Daily, every public inductive card telephone installed communicates with its respective Remote supervision system – SSR through data sent via modem.

Using internal sensors and automatic tests, the TP-Card terminal is able to detect electronic component failures, non-authorized opening of the equipment, rupture of the mono-phone cord, etc. These failures are immediately reported by SSR. Thus, it is possible to quickly identify the equipment which needs to be repaired even before the user may notice it.



The payphone usage data, such as number of local or long-distance calls and data related to the cards are stored in the memory, and are transmitted to SSR during low peak traffic phone hours.

3.4 SSR – Remote Supervision System

Payphones that use tokens have never been a good source of revenue for telephone companies. With the introduction of the TP-Card System, the situation has improved due to a reduction in maintenance and operation costs. In order to optimize profit the payphone plant should be managed well. For this, CPqD developed SSR – a remote supervision system for public payphones.

3.5 What is SSR?

SSR is a system that is able to remotely supervise up to 32,000 inductive card public payphones. It uses hardware and software platforms which are available in the market, updates the telephone configuration parameters, monitors failure situations, gathers information concerning revenues, and makes all this data available as configurable reports. The SSR has a very friendly operator interface, simplifying daily operations. It can be connected to the corporate network, working as an information provider.

SSR has a modular and flexible structure and the functional facilities can be configured according to customers' needs.

3.6 Benefits

- Supervision capacity, which may be expanded by a simple configuration
- Multi-user system
- Graphic interface
- Facilities expansion through addition of modules
- Relational database
- Client/Server system
- Accessible data through corporate network



- Tools for data exclusion

3.7 Features

- Supervision capacity, which may be expanded by a simple configuration
- Multi-user system
- Graphic interface
- Facilities expansion through addition of modules
- Relational database
- Client/Server system
- Accessible data through corporate network
- Tools for data exclusion

3.8 Functions

- Data exchange with payphones. Each multi-serial interface port is related to an independent software module, responsible for establishing communication between the payphone and SSR.
- Automatic programming of the multi-serial card.
- Guarantee a unity of the telephone identification number, not allowing the creation of identical identifiers.
- Does not allow the installation of equipment that is not registered in the SSR.
- Equipment installation blockage with a software version that is not recognized by the system.
- Access control for installation, communication and deactivation processes through identification of the repair technician.
- Supervises payphones with auto-rating.



- Support for new number plan.
- Automatic start of a new call to a payphone, or the possibility of a scheduled call by the operator.
- Detailed information storage on each call made from telephones.
- Communication imperfections of payphones, identifying the cause of the problems.
- Configuration of the telephones in order to display the credits of calling cards in credit units or currency.
- Remote update of the software, configuration, tariff information, valid cards lists and media message displayed by the telephones.
- Data security, established by data access policy.
- Users records with a differentiated access profile.
- Lines records.
- Tariff tables and valid cards list management.
- Media messages, technicians and software versions record.
- Failure reports.
- Reports on the lines records, calls tariff tables and pending changes.
- Operational follow up reports of payphones.
- Statistic reports of billing and card usage.

3.9 Support Platform

- PC machine.
- Pentium II - 350 MHz or above.



- Cache memory: 512 kbytes.
- RAM memory: 320 Mbytes.
- 3 hard disks of 4.5 GBs Ultra Wide SCSI (minimum requirement due to performance matters regarding the installation of MS SQL server). The disk capacity may be changed according to the volume of data to be stored.
- A PCI Ethernet 10/100 card.
- The multi-serial card may be expanded in modules of 16 logic ports.
- Modem UP 32 bits (slim standard). It can vary according to the number of logic ports available in multi-serial cards.
- MS Windows NT Server.
- MS SQL Server 7.0 or above.

4 Telephone card collecting

The collection of telephone cards has gained large popularity in Brazil and abroad. The growth in the number of collectors has increased the value of the cards. Many Brazilian collectors maintain contact with foreign collectors, making the CPqD product known throughout the world.

Some estimate that 30 to 50% of all the cards produced in the world end up in the hands of collectors. In the middle of 1995, there were estimated 5 million card collectors world-wide.

Telephone card collecting is not only an interesting hobby, it is also a way to learn interesting facts and culture about one's country accessible to everybody. Currently Brazil's telephone companies maintain many sales points for the card collector.



5 Final Remarks

This TP-Card payphone system is modern and matches the basic requirements placed for this kind of service around the world, but is especially suitable for countries with a population profile similar to Brazil.

This is due to the fact that, being a low-cost system the card can hold ten or twenty tokens, even when the local call is around five cents of dollars. Besides, it is a huge system, from the point of view of resistance to aggressive environments and has a friendly operation.

CPqD has encouraged the use of the technology in other countries, eventually through the establishment of joint ventures with the licensed Brazilian companies and this policy has already brought fruits.



Outside Plant Management: SAGRE

1 Introduction

SAGRE, based on GIS Vision* that uses Oracle DBMS, is an outside plant management system developed and supported by CPqD.

The functions offered by **SAGRE** include:

- Outside plant registration and urban mapping (corresponding to the insertion of data in the system and the respective georeference).
- Planning.
- Market research and demand.
- Engineering, deployment, facilities management and network maintenance projects.

1.1 System Benefits

- **Easiness in the planning processes:** decisions may be taken considering the existing telecommunications network, demand information, telecommunications policy and operation and engineering rules.
- **Project and costs estimation:** new projects are generated, reflecting the engineering rules and applicable restrictions, through the usage of automated project tools. The project process also uses the information about the construction model, allowing a costs estimate of both the equipment and workforce. This process enables an alternative project cost evaluation and an automatic generation of a list of necessary equipment and workforce.
- **Projects deployment:** **SAGRE** reduces the network project time, its construction and its deployment, making it available for operation in a short period of time. Work sheets are elaborated by automatic use of information regarding the project, the network and the existing assignments. Besides, the transformation of the project and work orders into **as built** is carried out in an automatic and continuous way.



- **Network assignment:** the facilities management process automation allows a more precise control of facilities assignment, the availability in the actuation sector of the operating company, the network saturation levels, assisting in the decision making for future expansions and in a more adequate planning. The use of the same database, for the movement of facilities, project and network maintenance eliminates most of the problems that may make the operational record of the company outdated from the one existing in the field.
- **Network corporate visibility and management:** the record, the project, the demand, the operation and **SAGRE** maintenance, guarantee the outside plant records to reflect with great precision the network that is out in the streets, covering all the life cycle and the outside network processes. In order to obtain this guarantee, the **SAGRE** database includes the urban mapping, customer localization, support structures and all network elements, demand and assignment information.

SAGRE is fundamental in the expansion, at a great scale, of telecommunications systems, with fast and improved quality of services.

1.2 Record Composition

In **SAGRE**, the outside network record (inventory) is composed by a graphic and alphanumeric database supported by Geographic Information System – GIS and a relational database in which both the network information and the urban mapping information are georeferenced.

The conversion from recorded data on paper to an electronic format of the database has always been a critical aspect in the outside network management systems, allowing, when badly transmitted, the unfeasibility during all the deployment process due to the cost and time involved for its execution.

In the case of **SAGRE**, aiming at speeding the process of conversion, making it more secure, less complex and with high quality, a methodology (with the respective deployment tools) has been developed based on a transfer format oriented for urban mapping objects and network elements. This methodology is independent from the internal format of conversion used in GIS, which motivates the participation of domestic companies regarding conversion tasks and also reduces the system deployment costs for the operating companies of telecommunications.



1.3 Functions

The functions assisted by **SAGRE** involve the record of outside network and urban mapping (corresponding to the insertion of data and the respective georeference in the system), planning, market research and demand, engineering project, deployment, facilities management and network maintenance. The main functions of **SAGRE** are concentrated in:

- **Record/Engineering**

This is a set of procedures for the record, maintenance, management, evolution of the existing network and the urban mapping. This function allows the maintenance of the network from the corporate databases.

- **Conversion**

This refers to the methodology and tools for conversion of data and maps from paper to the **SAGRE** database.

- **Management**

This is related to area control environment in projects or in deployment, users control, budget index configuration and workflow management. This function allows a cooperative work between operators and planners.

- **Project and planning**

This is related to the functions concerning the planning elaboration to improve and expand the outside network. These tasks include: plan new wire centers, delimit areas, Trunking and servicing large customers, define basic tariff area, canalize network projects, feeding, distribution and Trunking, with a forecast of equipment and workforce costs involved in the projects.

- **Operation**

This is related to the assignment, reservation, release and dedication of the facilities for the customer services, defects management in pairs, operation and work sheet or transfer.



- **Documents management**

SAGRE also offers a set of complete electronic management functions, acquired via scanners or through other means usually found in EDMS systems. **SAGRE** offers an additional advantage, which is to position geographically these documents that have been obtained from maps on paper. These functions may be used not only in the access network management, but also to all the company.

- **Market information**

SAGRE allows an analysis of the socio-economic class and telecommunications products sales, by real estate, central line, block or urban zones. This analysis displays the essential information for network planning and telecommunications services, and the market penetration of these services in the company actuation sector.

1.4 Modules Description

The functions described above are grouped in the following modules of the **SAGRE** software:

SAGRE/Cad

This module keeps a record of the urban map and the telecommunications outside network.

SAGRE/Conv

This module allows the input of both file data and plants on paper to the **SAGRE** database, by using the open format of the system. It contains an acceptance methodology and mechanisms, and quality assurance.

SAGRE/Adm

This module manages the **SAGRE** work environment.

SAGRE/Proj

This module automates the external network processes in addition to the integration to planning tools.



SAGRE/Viewer

This module allows the graphic visualization of all the record stored in **SAGRE** executed in a native mode in a PC under MS Windows 95/98/NT platform. **SAGRE/Viewer** may be used either in an independent mode, i.e. without any connection with a server, or in a connected mode with a server. In the latter case, it is possible to view all objects attributes, including the possibility to generate reports in HTML format. In the former case – independent – the entire mapping process is available, as well as the function of: design, local storage, data transfer to work stations of office programs, etc.

SAGRE/Marketing

This module is responsible for the analysis of the socio-economic class and the telecommunications products sales. This analysis may be made by real estate, central line, block or urban zones.

SAGRE/Oper

This module automates the outside network operation processes such as facilities assignment. The functions of the operation implemented by **SAGRE** comprise the outside network facilities management of the operating company of telecommunications, and they are performed by the related applications as follow:

- **SAGRE/Oper: Converter**

This application is responsible for initial loading of the information of occupancy in the **SAGRE** database, through files in text format generated from cable books or from other operational systems.

- **SAGRE/Oper: Online**

This application is responsible for making available to the end-user all the functions related to facilities management, defect management and assignment of the network, operations, record changes and records, operations and management views/reports.

- **SAGRE/Oper: Queue**

This application is responsible for the interface with customer care services, providing all facilities management functions automatically and in a direct way.



– **SAGRE/Oper: FCT**

This application is responsible for providing the end-users with functions to elaborate work sheets or transfers, aiming at updating the network occupancy after the construction and to establish the changes of the outside network elaborated in a project. It uses automatically and in a direct way all the necessary information of the project elaborated by **SAGRE**. It establishes all types of work sheets necessary to deploy a project, including functions for facilities automatic assignment to irregular subscribers.

1.5 Platform and Technology Support

SAGRE was built over a three-layer architecture:

- User interface
- Application rules and
- GIS – Geographic Information System – database

Besides the generation of reports compatible with the Web, the system may be accessed through an interface with the Web in order to view and update the information.

Autodesk Design Server is a GIS developed by Autodesk. This is a spatial data management system projected to manage infrastructure data in a wide corporate system based on a Client/Server architecture. Autodesk Design Server provides **SAGRE** with the ability to shape, in a flexible and precise way, the OSP operational environment.

The GIS database has been developed using the Oracle relational database management system. RDBMS completely supports the spatial or non-spatial objects management, the object association to several project versions, and at the same time keeps the integrity of basic data of configuration. Oracle offers security for the support of several users, with a guarantee of the integrity of data.



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SAGRE can operate under several computer platforms, including:

- Solaris
- AIX
- HP-UX
- MS Windows 9X e NT

As **SAGRE** may be integrated to several user systems including CRM, ERP, planning and provisioning systems, it uses the standard Application Program Interface – APIs and it is supported by middleware products such as MQSeries, Vitria or Sockets.



Internet Access Through Multiservice Terminals (Kiosks)

1 Introduction

The competition in the IP-based services market is currently growing at an incredible accelerated rate and one of the most perceptible indicators is the Internet usage. At the same pace, new technologies and related products continue to be introduced to face the ever-changing variety of new challenges and opportunities.

As an immediate consequence of this market ebullition is the appearance of distinctive submarkets, each with its own characteristics and behavior. One of them which is currently in an embryonic phase is the provision of Internet access in a massive and more extensive way through multiservice terminal or simply kiosks.

Kiosks a wide range of creative applications can be addressed ranging from the provision of Public Internet Access to the deployment of virtual stores in shopping malls, airports and hotel, and many more.

1.1 The CPqD Internet Public Access Solution

This document describes a real case of Internet public access implementation based on a prepaid method of usage. The essential elements to provide this service are the **Multiservice Terminals** (kiosks) and the centralized **Service Access Manager**.

The **Multiservice Access Terminal** is basically composed by a microcomputer running MS Windows® with specific software application that controls an inductive card reader tightly coupled to the terminal. Both, the terminal software and the inductive card are part of the CPqD licensed technology .

The **Service Access Manager**, or simply **dotIP**, is an application software hosted by high-end Unix systems specially designed to effectively control and supervise all the users sessions initiated from the kiosks including the credit consumption.

The user starts the service by inserting the inductive card (in any position) into the terminal card reader. Each user card has an amount of factory defined credits which is periodically decreased as the user effectively uses the desired services (e.g. Internet navigation), i.e. according to the

user session elapsed time. The rhythm of credit consumption can be established and modified by the **dotIP** administrator in accordance to the services being offered.

This system is now in operation in one of the largest regional operating companies in Brazil. The picture below shows the general structure used to provide this service.

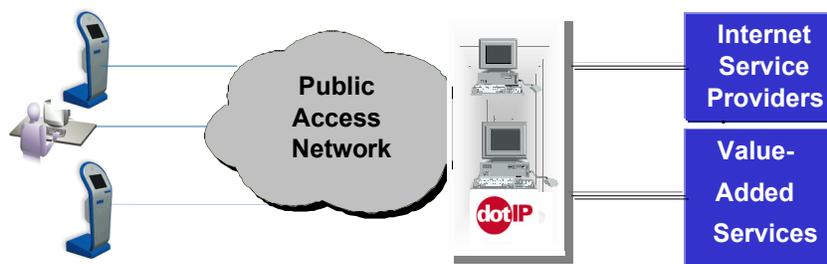


Figure 1 General structure

1.2 Components Technical Characteristics

1.2.1 The Multiservice Terminal

As already mentioned before, the terminal or Kiosk is a microcomputer-based access device equipped with a inductive card reader. The block diagram below shows the hardware architecture:

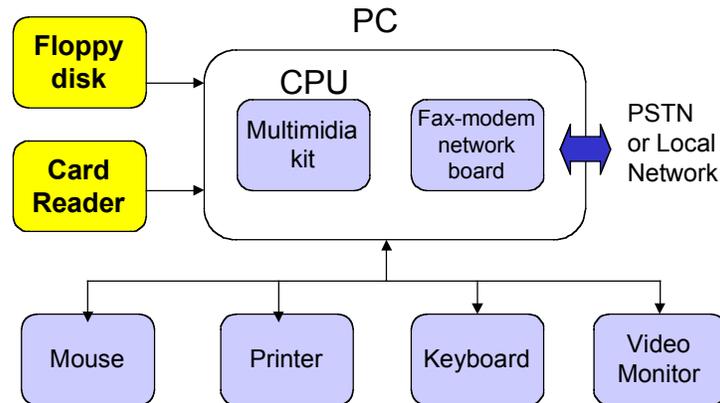


Figure 2 Multiservice Terminal Architecture

It is strongly recommended the adoption of a standard hardware or, in other words, to install the same brand of microcomputers, allowing easy terminal installation, configuration and maintenance.

Several technologies can be utilized to connect the terminals to the local access network, such as fax modem, ISDN or ADSL cards.

The terminal uses the Microsoft Internet Explorer 5.5 browser as the main user interface. The CPqD proprietary software intercepts all user generated events (keyboard or mouse activated) and controls the inductive card associated hardware.

As far as security is concerned, this events handler prevents any tampering actions, such as saving malicious executable files in the hard disk, formatting the disk, insertion of viruses, attempts to invade other computers etc. However, if the use of these machines is not dedicated to Internet access, these attacks could be carried out in an uncontrolled way.

The operational characteristics of the terminal are as follows:

- Inductive credits vanishing remotely programmed by **dotIP**.
- Reports concerning terminal use and cards consumption automatically generated in text format.



- Possibility of changing cards when the credits are over, likewise the payphones, without losing the connection.
- Browser reconfiguration when the user session ends – all data entered by the user, disk and memory caches, accessed addresses references, among others, are erased. Default settings are always loaded at each session initialization.

1.3 The dotIP

The **dotIP** is a distributed and scalable software-based solution, supported on standard commercial platform which gives the network operator all the conditions to manage IP access to value-added services.

Among the main functions of **dotIP** are the terminal authorization and authentication procedures based on the information sent by the kiosk at each session initialization.

The **dotIP** works like a gateway controlling all user sessions and the multiservice terminals on one side and the service providers (e.g. ISPs) on the other side (see Figure 1). It is important to notice that the provider contents can be of any kind, meaning that the Internet access is just one of the services that could be provided by the service operator. This centralized server is also responsible for the database management functions.

dotIP is completely based on web technology, designed to use a commercial browser, the Internet Explorer 5.5, where the users have access to the services merely clicking on icons and links properly displayed on the terminal screen.

Hence, **dotIP** offers the operating company a collection of manageable resources, such as:

- Total terminal access management, including call detailed record (CDR) generation.
- Configuration of the connection with the Internet access provider.
- Presentation of a standard customer-defined log on screen, displaying all the available services to the users.
- Insertion of messages and advertisements.

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1.4 Other Features

The system has many other functionalities already implemented and features that is planned to be implemented according to the Operating Companies needs. For further information, please contact us at:

CPqD (+55 19 3705-7152)

Visit our site www.cpqd.com.br



IP access to value-added services: dotIP

1 Introduction

The offer of broadband value-added services has become one of the most attractive and profitable business to be conquered by network service providers. The evolution and innovation provided by technology have made room for the convergence of services, allowing, as a consequence, the opening of opportunities for the incumbents telecommunications companies but also for the new value-added service providers such as Pay TV operators.

The operators companies must consider the aspect of having a better correspondence between network usage and associated revenues, and the necessity of being flexible to define services packages for distinct user categories, not only to face the competition (ADSL, DTH and others) but also to better serve the end-users, once they have distinct profiles of use (bandwidth and elapsed time) and will certainly ask for a special treatment.

It must be also considered that the offer of value-added services, due to its intrinsic interaction characteristic, promotes a great opportunity of establishing (and exploring, in the good sense) a direct relationship between providers and their end-users, improving not only the associated image but also the revenues.

dotIP was developed not only as an access system manager for IP based networks, that can mediate the user connections to the chosen services in an open and reasonable fair environment, but also as the essence of a complementary solution to the networking, billing and customer care environment, comprising many service administration functions such as user profile registration, billing, connection registration and navigation help. Potentially, this product can also, on demand, be integrated to the billing and customer care corporate systems, bringing additional benefits, acting as an enhancement of the billing and Customer Relationship Management – CRM platforms.

1.1 Product Environment Context

dotIP is an application software that doesn't depend on the network access technology used to provide the services. Figure 3 shows a typical scenario of **dotIP** application to PAY-TV networks.

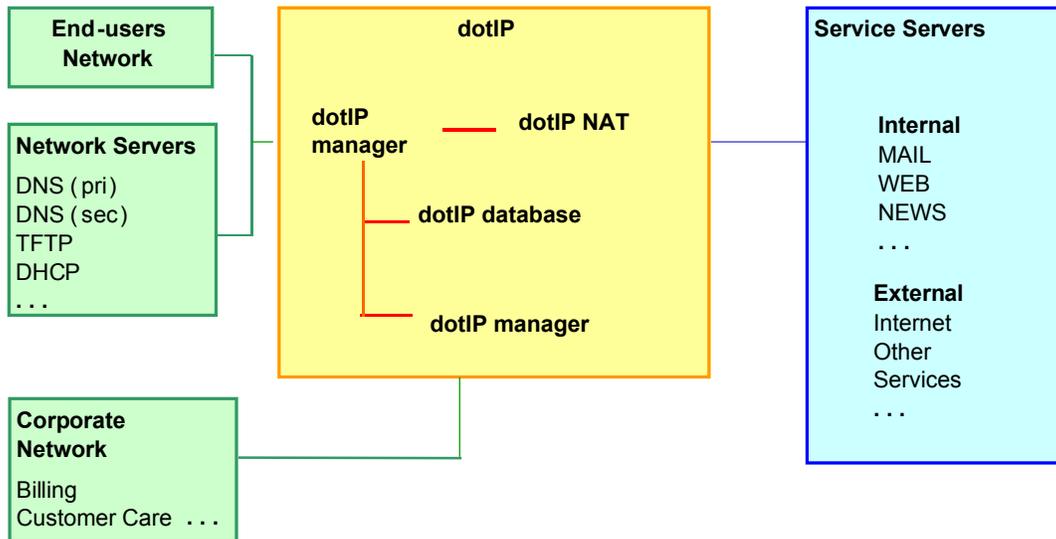


Figure 3 Example of dotIP in a Pay TV scenario

1.2 Characteristics

1.2.1 Technology

The **dotIP** engine is implemented in JAVA, assuring portability when running in operational platform systems Unix like. The user interface is a browser that uses Flash 4, a modern web design technology. The operator interface is implemented in HTML.

1.2.2 Connectivity

dotIP allows that end-users can access any service based on TCP/IP. These services can be based on a pay-per-use or subscription scheme, ranging from simple HTML documents to the security of home banking applications, as e-commerce, video signals transmission and so on. Hence, it provides access to a variety of ISPs (Internet Service Providers), ASP (Application Service Providers) and VAS (Value-added Service Providers)



1.2.3 Authentication

dotIP authenticates each user through the use of an username and a password and there is no need of terminal identification, meaning that the service can be accessed from any place – logs are generated individually.

The authentication procedure is carried out in accordance with the terms agreed between the user and the operating company or the service provider.

Many providers can be connected to the **dotIP** simultaneously, making use of specific authentication procedures. This can be the case when many ISPs offer services through **dotIP**. To be connected to one of them, the user must be previously registered. **dotIP** can be configured to carry out user authentication either on its own database and/or on a remote ISP database. Electronic certification in the authentication process can be provided also if required.

1.2.4 Security

Absolute privacy and security against intruders are assured through the use of a SSL (HTTPS) connection and through a firewall protection. Likewise, non-authorized access, via local network or Internet, to computer resources of end-users connected to the access provider are blocked by the firewall, as a default condition. Firewall functions can be provided either by a commercial firewall or high-end CPqD IP filter, depending on specific conditions.

1.2.5 Administration

Many management functions are implemented in the **dotIP** administrator workstation. An interface based on a browser and protected by a password permits a convenient way to deal with daily tasks:

- User database maintenance
- Service Provider database maintenance
- Manager registers maintenance: limiting, controlling and tracing from the system management side
- Advertisement management
- Subscriber and manager session reports: generation of reports



1.2.6 Use Registration

dotIP can record and restore many detailed information related to the sessions, like most frequently accessed service providers, elapsed time, number of transferred bytes and used services and traffic measurement (number of bytes: total or per user sessions).

1.2.7 Database

dotIP was developed to be integrated with Oracle DBMS, but actually any complementary SQL database using a JDBC driver can be used, due to the fact that it uses JDBC to get connected to its own database. JDBC also uses a connection broker to promote a load balance among the internal modules, achieving a optimization of simultaneous connections and increasing performance.

1.2.8 Technical Specifications

Features

- Web based user interface (Internet Explorer 5 or Netscape 4.7 or more recent releases)
- Flash 4 user interface, allowing customization
- Authentication based on user information (name and password), using SSL and allowing stand alone terminals
- Single authentication (either on local **dotIP** internal database or remote authentication, via RADIUS, to external databases belonging to Internet access providers)
- Double authentication (both, local **dotIP** internal database and remote authentication). Single password entry may be provided, even in this case
- Administration System, including the following features:
 - End-users records: inclusion, exclusion and access
 - Service Providers records: inclusion, exclusion and access
 - Operators records: inclusion, exclusion and access



- Services records: inclusion, exclusion, updating and access
- Managing services offered:
 - Inclusion, exclusion of Service Providers
 - Inclusion, exclusion services end-users
 - Inclusion, exclusion of system operators
 - Inclusion, exclusion of user messages, either individual or broadcast
 - Inclusion, exclusion of operator messages, either individual or broadcast
 - Database access through JDBC

1.2.9 Standards/Recommendations

dotIP is compliant to the following standards and recommendations:

- IETF RFC 2138 Remote Authentication Dial In User Service – RADIUS
- W3C Recommendation HTML 4.0 Hypertext Markup Language 4.0
- JDBC Java Database Connectivity
- ANSI SQL-92 Structured Query Language

dotIP runs on Unix platforms – the workstations configuration depends on the particular needs of each access provider. Typically, we recommend the use of four servers (manager, database, NAT function and gateway modules), which have to be properly configured to accept both the specific topological characteristics of each access provider and the amount of subscribers/end-users to be served.

All the modules are easily scalable, allowing agility, simplicity and reusability when upgrading to follow the growth of end-users or topological changes. Accurate requirements depend on design specifications.

For both platforms, the managing desk uses any HTML (release 4.0+) compliant browser.



CPqD PROFILE

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