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Implementation of VoIP using Panasonic IP gateway card: A case study of ISHO Nigeria Limited

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With today economic situation. A company is searching, on how to make another technology leap in the future by sought for solutions to reduce their telephone bills and monitoring calls.

The primary objective of this project is to design and implement a VoIP system using a Panasonic IP gateway card. The client name for this project thesis is ISHO Nigeria Limited; this service will drastically reduce their cost of running long distance calls, local calls, improve workflow, and assigning (PIN), to a user for preventing an unauthorized user from access the central office line. The uses of this service will be considered to be free, for the fact that company does not have to pay for a call within branches. All offices calls will be routed through a network; firm only needs to pay for internet service provider for bandwidth then VoIP is considering to be free.

Keywords, Panasonic IP gateway card, Panasonic Unified Communication, Bandwidth, IP assign, PBX Configuration, Cost, Monitoring.

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1 Introduction

Companies are searching for every opportunity to reduce costs and gain profitable advanced on competitors. Information technology play a significant role, in every companies spending about 10% or more of companies' budget goes to information technology. And it impacts on organization revenue or profit 's is hard to assess. Which make many organizations to squeeze or reduce their information technology costs. But it has never been easy to sustainable savings.

Nevertheless, an additional reduction and efficient are possible if the companies take a board look on how to manage the Information technology as a whole. Telecommunication bills are fast becoming one of the largest expenses and most difficult area to manage in today business; companies are facing a tremendous challenge on how to control outbound and inbound calls. "Over 500 company processes more than 15,000 telecoms related bill per year and average mid-market -approximately 3,00 per years" (Aberdeen group leading Information technology marketing analysis firm). Moreover, using the company line to make personal call cost companies huge amount, stay on office line than require, engage official line which makes it more difficult for a customer to get through, cost organization lot of additional cost. And for not making official line available when needed due to engaging by an employee, the needs of VoIP for an organization to save cost have increase tremendous in the past few years. Figure 1 below illustrates the statistics of the research. Implementation of VOIP using Panasonic IP gateway card to reduce cost, monitor right of user and enhances business productivity. Organization that switch to VoIP often report saving between 50-70% of telecommunication cost (Bryce Payne 2015,). This project will be implemented to solve the above-mention challenge and monitoring.

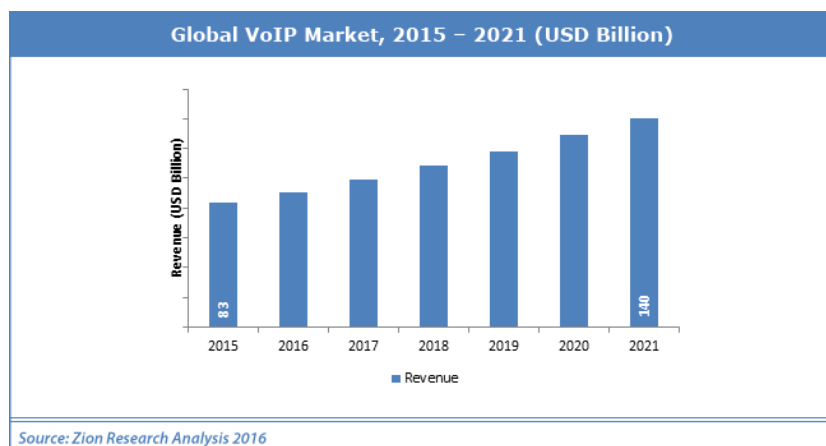


Figure 1: Global VoIP Market

1.1 Background

With today Economic situation in Nigeria, a large sized company. ISHO Nigeria Limited needed to reduce its phones costs locally and internationally, as we all know that effective communication is a key to a successful business. This project is based on finding solution the challenge's raised by the organization. The task is to overturn a solution to their problems by design, implement and installing a Panasonic IP gateway card since the firm already have an existing Panasonic PBX systems in their annex which will reduce the cost of local calls drastically.

The VoIP systems using Panasonic IP gateway card will deliver a better communication and support their existing PBX systems, also meet customer satisfaction.

1.2 Organization profile

ISHO Nigeria Limited is an indigenous owned office automation company with over six annex across Nigeria, the company head office is located in Kaduna state, Nigeria. The company have over 120 employees, and it has been in existence for the past five years, the company have four difference Department which are listed below;

- I. Management team.
- II. Human Resource.
- III. Sales.
- IV. Accounting
- V. Technical Team.

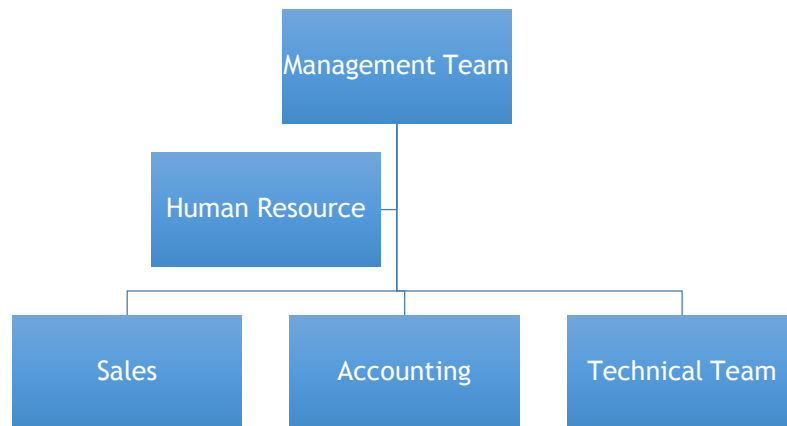


Figure 2: Organisation Chart

1.3 Objective, Limitation, and Scope

The primary object of this project is to design and implement a functional VoIP system using Panasonic IP-gateway card for ISHO Nigeria Limited. However, this new VoIP solution will yield the below benefits:

I. Cost Saving

One of the primary objectives of this project thesis is to design a functional VoIP system using Panasonic IP gateway card which will help the organization to save phone bills cost on a daily basis.

II. Monitoring and Control

The monitoring and controlling will help the organization ensure that employee is using the service as planned, this will ensure that only authorized user are using the service. Which will give the managements accurate data to planning for expansion of the service if the need arises. Also, it will help the managements to know those who adopt the services.

III. Pin Assign

That will ensure that each employee assigns with a PIN to lock and unlock phones, this feature will ensure that each employee is responsible for their extension phone.

IV. Access Giving to Employees

This will ensure that right access is giving to an employee, i.e. Limitation on where to call, some employees will have access to international call while other will only have access to local calls, that will help the organization to monitor the telecom bills at the end of every month.

V. Access to other Extension.

This feature will enable the management team to intrude to another employee extension, i.e. The management team for their extension can obtain another extension for instance, when an employee is using the line more than expected the management team can ask the employee to drop the calls from their desk if the call is unofficial.

1.3.1 Scope

The extent of this project are as follow:

1. To assess the existing ISHO Nigeria Limited communication tools and determine it weakness and suggest a VoIP systems using Panasonic IP gateway card as a solution on how to save cost from telecom companies.
2. To gather the relevant information and customer needs from ISHO Nigeria Limited, i.e. From the management team which will help to know how many number of gateway card to be used for this project thesis.
3. To design and configure a VoIP system using Panasonic IP gateway card that will meet customer needs, since the client already has Panasonic PBX systems in three of their branches.
4. Training employee of IHSO Nigeria Limited on how to use the device and educate employee on the implication of not follow the guideline of the service.

1.3.2 Limitation

The main limitation of the project was when ISHO Nigeria Limited, approached that, they will need a solution that will reduce their cost on telephone. Having basic understand about the Panasonic IP gateway card, if it will serve their purpose for the fact that the card only design for Panasonic PBX but after presenting some statement to the client we realized that the

Panasonic Gateway card would suit their need. Also, time constraint during the interview with the management team and employee of ISHO Nigeria Limited. Also, the configuration of the existing Panasonic PBX to suit the need of IP gateway card was another challenge's encounter towards successful implementation of this project. Some other limitation was meeting with the information technology personnel was cancel on several occasion. Finally, to exploit if the network can suit the purpose of the solution was a challenge in this project work.

1.4 Literature Review

This thesis comprises of five different chapter. Chapter one present the projects, project customer, main objective, scope and limitation of the project. Second chapter describe the research approach, methodology. The third chapter describe Panasonic Unified manager, Panasonic drivers, Panasonic shelf. The fourth chapter describe the implementation phase, configuration of the hardware used. The chapter five which is the last chapter include conclusion, training, return on investment, and further development.

2 Research Approach and Methodology

Research can define as the time for gathering information, documenting facts, figures and rummaging for information (Leedy & Ormrod 2001). Research is the process of collecting, analysing, and interpreting data to understand a phenomenon (Leedy & Ormrod). This thesis is project-based and involves configuration and installing Panasonic IP gateway for effective communication to solve real life problem. The research process is systematic in that defining the objective, managing the data, and communicating the findings occur within established frameworks and following existing guidelines. In this project thesis quantitative research approach will be used, then the representative experiment will be considering this is because the existing PBX of the firm will be examining. Quantitative research involves the collection of data so that information can be quantified and subjected to statistical treatment to support "alternative knowledge claims" (Creswell, 2003, 153). This thesis will solve real life problem, and meet client requirements.

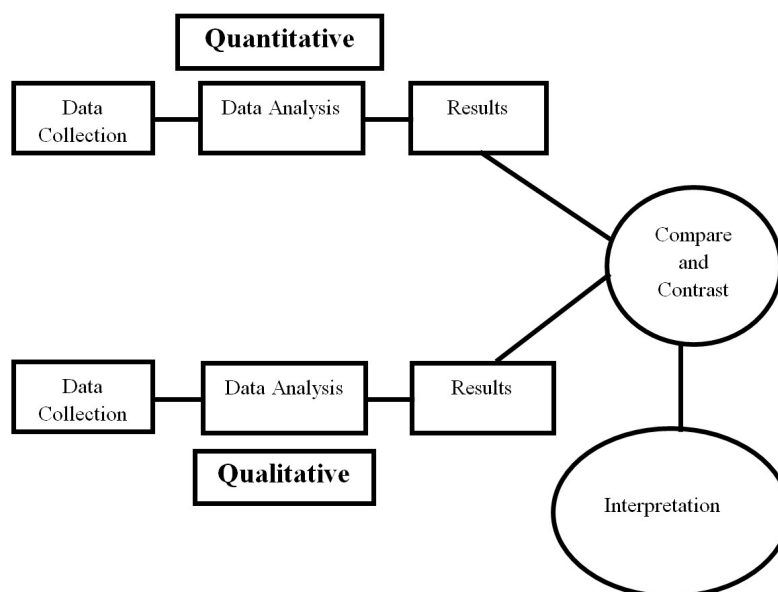


Figure 3: (Creswell, 2003).

2.1 Methodology

Research methodology is scientific aimed to learn new facts, testing ideas, etc. It is the systematic collection, analysis and interpretation of data to generate new knowledge, plan, and answer a specific question or solve real life problem. “The general approach the researcher takes in carrying out the research project” (Leedy & Ormrod 2000, 14). Random selection was ranging quantitative (Questionnaire), qualitative method (Interview), i.e. survey and interview will be used in this project thesis to gather relevant data from ISHO employee to know the exact tools that will help in achieving their purpose. A mixed method was added advantage for this thesis because it used to analyse data from quantitative and qualitative. The three major method for this project was listed below.

2.1.1 Interview

The interview can be describing as a verbal conversation between two people with the aims of collecting relevant information for the purpose of research. In one word it can be the face-to-face conversation. A perspective regarding knowledge as situated and contextual, requiring a researcher to ensure that relevant contexts are brought into focus so that the situated knowledge can be produced. Meanings and understandings are created in an interaction, which is effectively a co-production, involving the construction or reconstruction of knowledge. (Adapted from Mason 2002, 62). In the project thesis the author engaging in a one-to-one interview, phone conversation.

The interview was also carried out with the IT personnel to know the status of the firm networks; group meeting was held to discuss the implementation of VoIP using Panasonic IP gateway card. Also, the business network cable was examined before deploying the service. There are many reasons to use the interview for collecting data and for research instrument. (Gray 2004, 214) has given the following grounds:

- There is a need to attain highly personalized data.
- There are opportunities required for probing.
- A real return rate is significant.

2.1.2 Survey

A survey is used to answer questions that have raised, to solve problems that have been posed or observed. To assess needs and set goals, to determine whether or not specific objectives have been met, to establish baselines against which future comparisons can be made, to analyse trends across time, and generally, to describe what exist. In what amount, and in what context.” (Isaac & Michael 1997, 136). Surveys are a common form of data collection when gathering information from large groups of people, where standardization is necessary. Surveys can be carried out in many ways, but they two main elements are questions and responses. Review media include telephone and face-to-face interviews, as well as mailed surveys using either postal or electronic mail (Salant & Dillman 1994, 3). In this thesis project survey was carried out through the medium of an elite questionnaire about the potentials of VoIP using Panasonic IP gateway card. Here are some few question asked during survey phase.

1. How many PBX Panasonic system do you have in your branches? 1-10, 10-20, 20-30, or more.
2. How often do you call other branches? 1-5 times a day, 10-15 times a day, 15-20 times a day or more.
3. Who is the provider of the sim using to call other branches? Mtn, Globalcom, Airtel.
4. Are you on per seconds bill or minute bill? Seconds, minute statement.

5. what is, are the rate for per second or minute? 1-5 naira, 5-10 naira, 15-20 naira or more.
6. Are you on a prepaid or post-paid plan? Prepaid, post-paid.
7. On prepaid how much do you spend on airtime in a month? 100-200 naira, 300-400 naira or more.
8. On post-paid how many bills do you get in a month? 200-400 naira, 400-600 naira, 600-800 naira or more.

2.2 Theoretical background

This project will be executed using Panasonic IP gateway card, which is a device designed to convert telephone traffic into IP transmission over a router for VoIP communication. There are different types of VoIP gateway cards from various vendors, e.g. Avaya, Siemens, Cisco, etc. The device that was selected for this project thesis is the Panasonic IP gateway card since the firm already has three Panasonic PBXs in their branches. This will help the client to reduce the cost of acquiring a new communication device. Also, since the Panasonic IP gateway card only works with Panasonic PBX, the device will fit the particular need of ISHO Nigeria Limited, and it will enhance smooth integrations with the existing system.

3 Panasonic IP Gateway Card

Panasonic IP Gateway Card is a device which converts telephone traffic into IP transmission over a router that enables calls to pass through (VoIP), voice over internet protocol which can be used to reduce phone costs by routing calls through the internet and connecting the device to a router using a cross internet cable for the device to transmit and receive. The Panasonic IP gateway card is described in figure 4 (copied from <http://www.voicesonic.com/image.php?type=T&id=22085>) below.



Figure 4: Panasonic IP Card

3.1.1 The two types of IP gateway card are listed below.

1. Analogy card Type

This device is used to connect traditional analog telephone system. The device can support about (2-24 line), the parallel device is limited to a particular number of a line which is not suitable for a larger firm.

2. Digital Card Type

This device is used to connect advanced telephone system. The device can be used to deploy either PRI/E1 card which supported more line for tie telephone communication together on

the same network. This method can be utilized for a larger firm it can accommodate about 128 line or more.

3.2 Component of Panasonic IP gateway

The main components Panasonic IP gateway card is both software's and hardware's, each of the components was considering before installing and configuring the card, which help to achieve the main aim of this project. Figure 5, illustrate various component for IP gateway card integration, and gives how the basic connection work.



Figure 5: IP Gateway Component

3.2.1 Panasonic Basic shelf

This a hardware device that is designed to accommodate both extension card and central office line card is a major component that power on all cards, and give the status of each card. It can be connected locally or network connected. Also, all configuration will be carried out through this shelf by connecting USB cable to the rack and a computer system; the tray came with only one card, (MRP). The MRP card shipped with a secure digital card where all data and configuration will be store and the card also serve as a system backup in case of power failure. The MRP card cannot be remove or replace, with extension card or trucking card, removal of the MRP card is possible when vital damage occurs on the shelf, and the removal of the card have to be done by Panasonic expert. The rack consists of about seven card slot, the Panasonic shelf slot is varying depend on the model of the shelf on this project thesis the shelf in which Panasonic IP card was install are KX-TDA 100, and KX-TDA 200. The first five card slots can only accommodate extension card, and the last two are for trucking card.



Figure 6: Panasonic Basic Shelf

3.3 Panasonic IP Gateway Card Status

Panasonic IP gateway card was designed with a LED light each of this light symbolizes a meaning for the card, it also gives expert idea to know if the card is working or not. The table 1, below illustrates the meaning of each LED.

Indication	Colour	Description
CARD STATUS	Green/Red	Card status indication <ul style="list-style-type: none"> • OFF: Power Off • Green ON: Normal (all ports are idle) • Green Flashing (60 times per minute): Normal (a port is in use) • Red ON: Fault (includes reset) • Red Flashing (60 times per minute): Out of Service
ONLINE	Green	On-line status indication <ul style="list-style-type: none"> • ON: On-line mode • OFF: Off-line mode • Flashing: Maintenance mode Note If the LINK indicator is OFF, the ONLINE indicator will also be OFF.
ALARM	Red	Alarm indication <ul style="list-style-type: none"> • ON: Alarm • OFF: Normal
VoIP BUSY	Green	VoIP (H.323) process indication <ul style="list-style-type: none"> • OFF: VoIP process inactive • ON: VoIP process active

Table 1: LED Table

3.3.1 Panasonic Unified Communication Manager

Panasonic software which is a construct for configuring Panasonic voice systems, the software is a Japanese software that's available only for authorize Panasonic PBX dealers, the software is a multifunctional software that can set up Panasonic voicemail, KX-TDA series, KX-TDE series, and tem. In this project thesis, this software adopted for configuration of Panasonic IP gateway card and Panasonic PBX. On login to the software, the author chooses KX-TDA 100, which was the ISHO PBX system, then access the software with a username and password for author authentication. Figure 7 below illustrate Panasonic Unified Communication Manager.

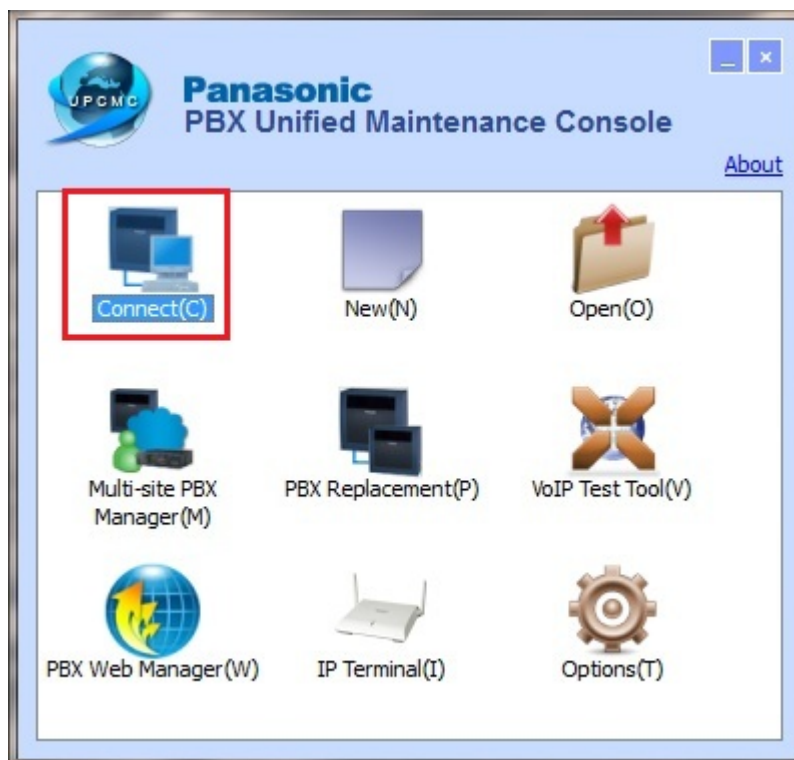


Figure 7: Panasonic Unified Manager

3.3.2 Panasonic Unified Communication driver

Is a software that interoperates between software and hardware, the driver has to be install locally or networked connected. In this project thesis the software driver for Panasonic Unified communication manager was install locally by connecting USB cable to PBX and other end to the computer system, the driver can only be install on window operate system desktop or laptop computer. Then click on computer hardware property the PBX copied the driver to the computer and the system is ready for use.

3.4 Network Architecture Overview

Is most crucial part of this project thesis before the author commence implementation phase several meets was held with client (IT), information technology manager to discuss and have a basic idea on the company network status. The author of this thesis carried out a line speed testing on ISHO network to determine the maximum upload and download stream of the network connection using a LAN connection. During this line speed testing, the author discovers that the upload system stream is smaller than upload network connection which is a limiting factor for using Panasonic IP gateway card. However, the IP address that will be assign to the card was giving, the author pings the IP address to ensure that both offices were sharing the same network infrastructure.

3.4.1 Bandwidth Require

Panasonic IP gateway card requires a certain amount of bandwidth to have a clear and smooth conversation. Bandwidth is the amount of internet connection a network can send and received in a particular period. However, table 7 below illustrates the amount of bandwidth require for Panasonic IP gateway card.

CODEC	Packet Sending Interval				
	20 ms	30 ms	40 ms	60 ms	90 ms
G.711	87.2 kbps	79.5 kbps	75.6 kbps	—	—
G.729A	31.2 kbps	23.5 kbps	19.6 kbps	—	—
G.723.1 5.3 kbps	—	20.8 kbps	—	13.1 kbps	10.5 kbps
G.723.1 6.3 kbps	—	21.9 kbps	—	14.1 kbps	11.6 kbps

Table 2: Bandwidth Require.

3.4.2 Panasonic IP Gateway Card Hardware Requirements

Panasonic IP gateway card requires some hardware device for effective communication, in most cases, this equipment determines the quality of service to be delivery after the implementation, the author of this thesis also put all this hardware into consideration before installation of the card. The device is listed below.

- i. Router: The Panasonic IP gateway card will be connected to a router after fully card installation is done, a high-quality router is requiring to keep communication flow flawlessly. In this project thesis, the author engages the (IT), information technology personnel to check the status of the client router, if the router has to be change or a new router will be dedicating for Panasonic IP gateway card. However, the author discovers that ISHO router can be a bridge into modern that will enable smooth installation of Panasonic IP gateway card.
- ii. CAT5 Ethernet Cable with RJ 45 Connector: The Panasonic IP gateway device will be connected locally with (CAD 5) Ethernet cable, straight cable to a switching hub and, with an Ethernet cross cable after a successful configuration of the card.

3.5 Benefit and Obstacles of Panasonic IP Gateway Card

There are various advantages and disadvantages match with Panasonic IP gateway card in an organization. Before deploying this VoIP service, the author discusses various of them with ISHO management team some of the pros and cons are listed below:

3.5.1 Advantage of Panasonic IP Gateway Card

- A. Capital and Expenses saving: Frequently a long distance call have a major challenge in every organization budget, long distance calls bill can be varying depend on the distance call. For Panasonic IP gateway card implementation, the network is IP and calling doesn't cost organization any amount, body only need to pay for internet service provider for bandwidth then VoIP is considering to be free.
- B. Long distance saving: Long distance calls rate have reduced dramatically same year that VoIP call was introduced. Panasonic IP gateway card can work in difference region, which helps organization to save cost on long distance calls bill, to access long

distance call rate is complicated because the different rate applies to different location drawing.

- C. Single network infrastructure keeping: Panasonic IP gateway card can be install on the same system that firm is using, this will save the firm cost of buying a new voice network infrastructure, the credit can be used to improve IP network for both voice and data traffic for advantages enhancements. That allow Panasonic device to provide low total cost of the systems.
- D. Wiring cost: The Panasonic IP gateway card can be deploying on existing network infrastructure a new wiring is not required to install the card.

3.5.2 Obstacle of Panasonic IP gateway card

- a. Cost and Capital intensive: The initial set up of Panasonic IP gateway card can be expensive if the client has to start a large firm, it may require that client has to buy a new network equipment, IP phones, management software. Also, a network infrastructure upgrading may be needed, for the fact that the current network infrastructure cannot handle Panasonic IP gateway card.
- b. Training: VoIP requires extensive training for employee, employee may have needed a whole series of costly training before acquitted with the service and features.
- c. Business Risk: The quality and reliability have been a potential obstacle for VoIP, the quality has always depended on network infrastructure when the organization system goes down the whole body business is at risk, has clients cannot reach group and organization might not able to reach their customers.

3.6 Panasonic IP Gateway Connection

This hardware device will connect using both straight and cross (CAT5) Ethernet cable with RJ 45 connector, when the device is connected to switch hub straight cable will be employed, and when connecting to a personal computer across cable will be used.

3.7 Planning and Analysis

Before the implementation phase of this project thesis, the author analysis on how to start the project and attain the primary aim of this project thesis, in order not to make a change that will overall reduce existing client quality of service, some of the things that the author put into consideration are listed below.

- I. What might happen to client application currently running?
- II. What might happen if the current network goes down?

4 Implementation

The implementation of Panasonic IP gateway card applied customer requirement and theoretical research as the main aim for successful execution of this project thesis, after implementation of Panasonic IP gateway card the following was achieved,

4.1 Customer Expectation.

The aim of this project thesis is to have knowledge of what customer are expecting in the final deliverable of this service. After series of the interview were held with ISHO Nigeria Limited (IT), personnel and management team the below description for the proposed installation and configuration of Panasonic IP gateway card were achieved.

- I. No bill: For ISHO calls within the organization, a new phone bill will no longer applicable to the client, for the fact that all employee can use VoIP to call other branches, and this will have a significant reduction in ISHO calls cost, has the primary reason for propose this service.
- II. Pin Assign: At the end of deploying this service Personal Identification Number (PIN) was allocated to all employee and management team this will enable each employee that have access to international to be responsible for their bills at the end of every month.

- III. Accessibility: At the end of the implementation of this project thesis, every employee was given access to user Panasonic IP gateway card for VoIP to calling order client within the companies, no employee was restricted for using this services.
- IV. International Access: At the end of installing and configuration of Panasonic IP gateway card the management team and head of logistics were given access to an international call, to allow then reach their clients abroad. Other employees were restricted to call international calls in order to reduce the company international calls bill, before deploying this service the author realize that every employee can call international officially or unofficial.
- V. Call limit Duration: After installing, and configuration of the service a calls limit was set for an employee that call outside the companies or call customer office the requested limit length that was set is (5minute maximum).

4.1.1 Personal computer preparation for configuration

For configuring Panasonic IP gateway card an IP address belong to the same network as compatible with the hardware device will be assign to the personal computer, to be using for programming the card, the default hardware IP address is (192.168.1.200), the similar IP address also assigned to the computer for configuration.

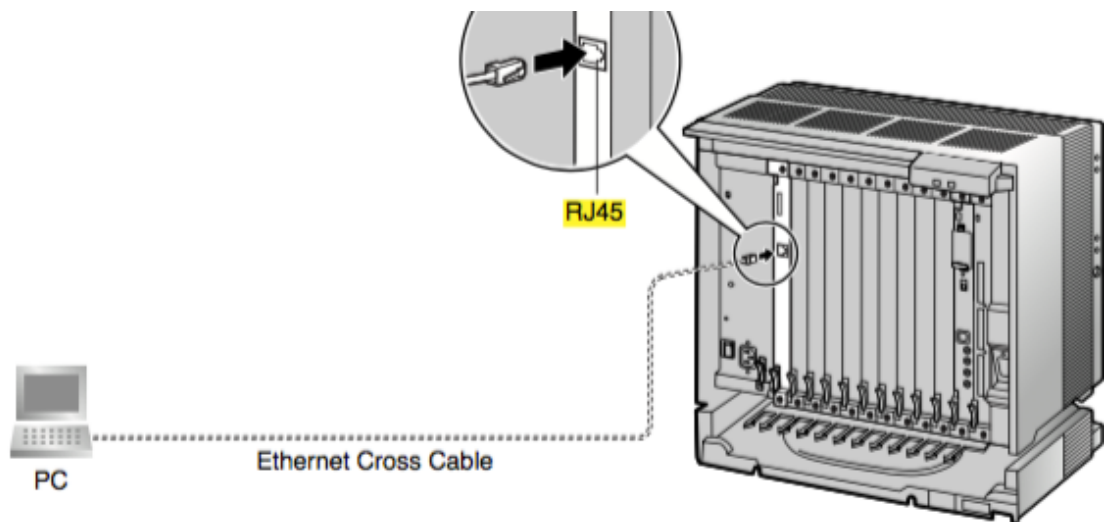


Figure 8: Personal Computer Connection

4.1.2 Panasonic IP gateway card configuration

At this stage, the hardware will be connected directly to computer using (CAT5). Ethernet cable cross cable. However, this thesis author ensure that the card is not network connected, then an internet explorer was double click which enable the author to type in the default IP address, then a username and password login screen appeal the username and password for Panasonic IP gateway card is (Administrator). Figure 9, below illustrates the login page.



Figure 9: Login Screen

4.1.3 Assigning IP Address

Panasonic IP gateway card required a new static IP address for the card to communicate with other cards over a network when the card is in-service status, from Panasonic IP gateway card menu the author select "Network Setting, General." And static IP address that was giving by (IT) personnel of ISHO Nigeria Limited was mapped to the card and ok. The above mention

setting for Panasonic IP gateway card was also carried out in the client annex with different IP address. Figure 10, below illustrate how IP address is assign to the device.



Figure 10: IP Assign

4.1.4 Hunt Pattern Assign

Panasonic IP gateway card hunt pattern determines how incoming calls will be a route to the hardware device (Panasonic IP gateway card), and to the PBX system. In achieving this the author clicks on hunt pattern from the main menu and type (1) in the receive leading number box, then (45) in PBX code, this is a code that employee dial that will give dial tone to other PBX systems then the extension number. Figure 11, below illustrates how hunt pattern is assign. The above mention hunting pattern was also carried out in another client office with different receiving leading number and PBX code.

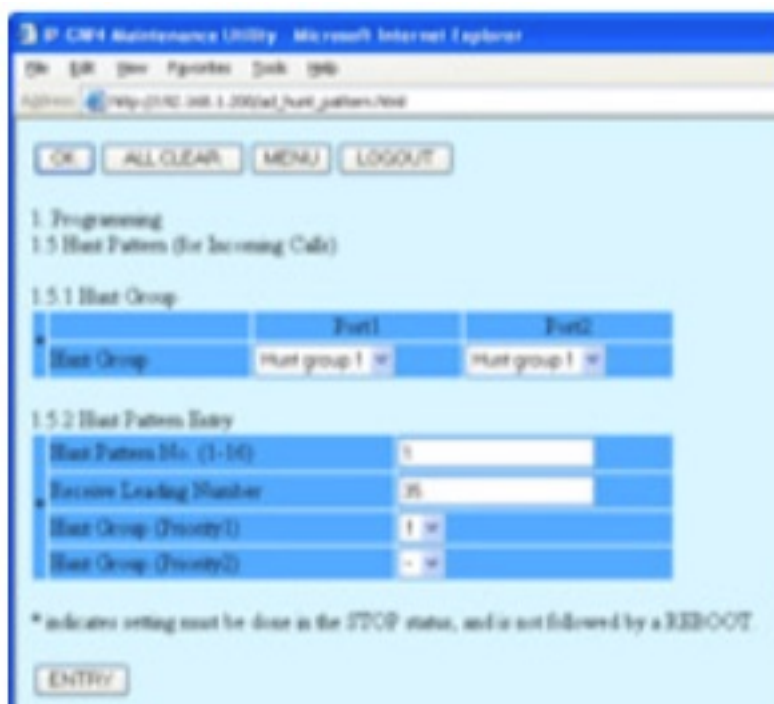


Figure 11: Assigning Hunt Patterns

4.2 PBX Configuration

The PBX system was configured using Panasonic maintenance console software with USB connection method from the home screen, and login page appeared with username and password, in this scenario, the username for the software is (INSTALLER) and password (1234). Then the card status was checked to know if the card is on-line or off-line by right click on the card and click card property, the author realizes that all the card (sixteen channels) are in-service then all the channels were assigned to employee i.e. Only eight users can make calls at the same time. However, all extensions were given access to use Panasonic IP gateway card for VoIP in the PBX system. Figure 12, illustrates how to connect into PBX system.

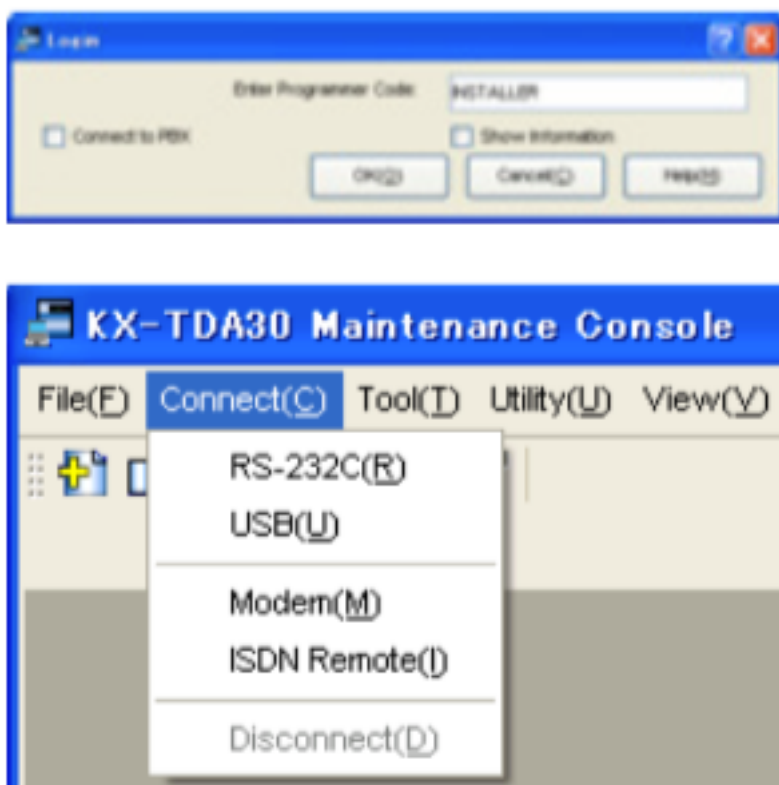


Figure 12: PBX Configuration

4.2.1 Central Office Line and Incoming Calls

From the main menu, the author selects central office line setting and assign the central office line that was not in use to VoIP gateway truck. On the numbering planning, a numbering plan number was allocated to the PBX and tie line access, the tie line will be used to tie with other branches PBX system with an extension number. Then the hardware was change from run to stop. For every parameter to be active. Figure 13, below illustrate how the calls will be routed through central office line.

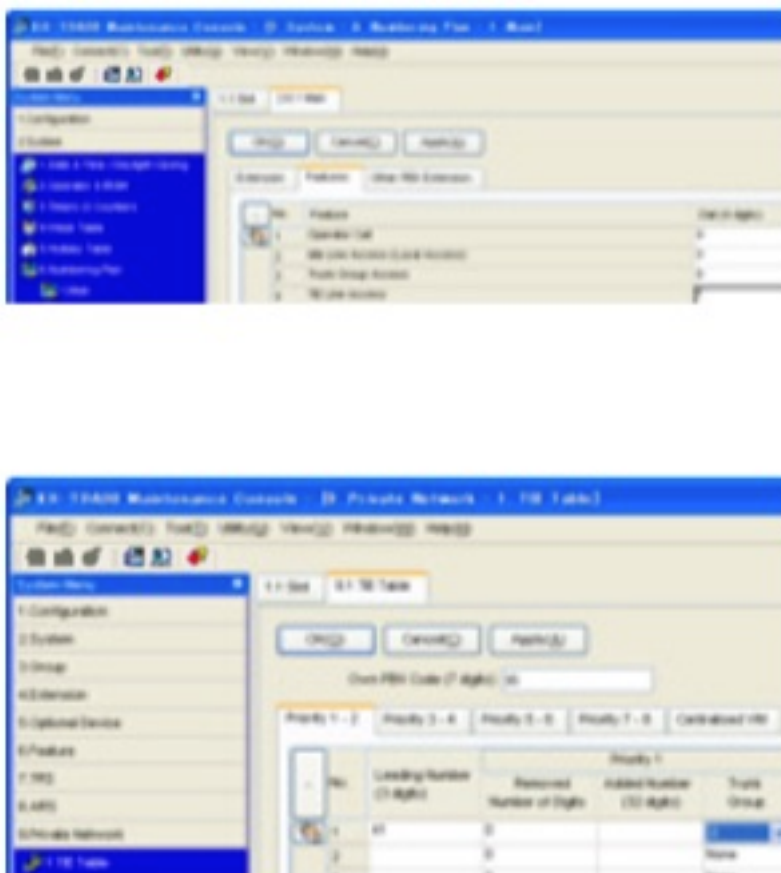


Figure 13: Call Route

4.2.2 Rebooting Panasonic IP gateway card

After all, the parameter has been assign to the card the author restarts the card in other to ensure that all parameter is effective. Figure 14, illustrate how to reboot the device after all parameter has been assign.

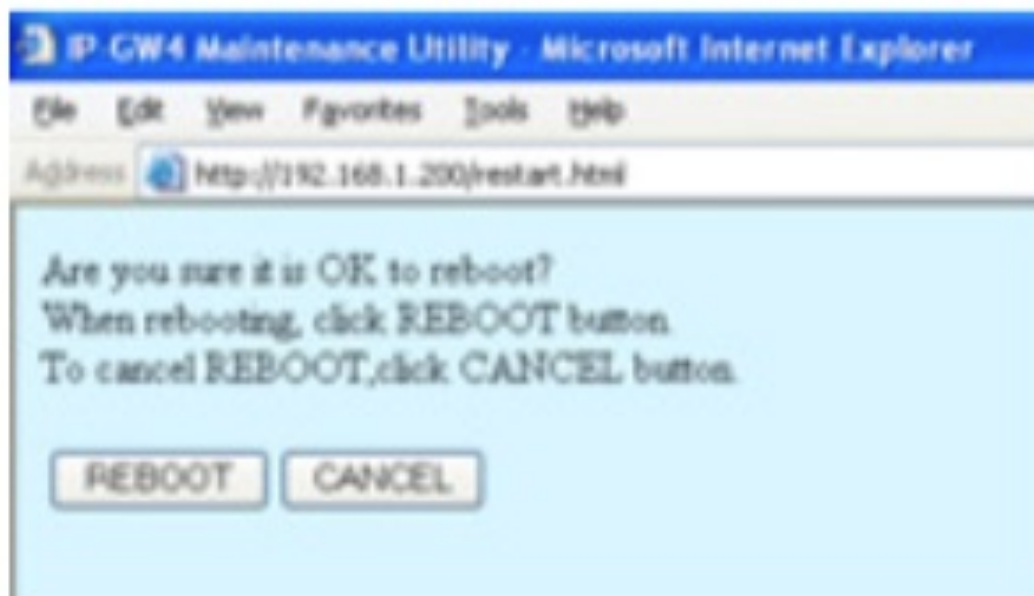


Figure 14: Rebooting

4.3 Card Configuration Testing

When verifying if all the parameter assigned to the card was active, the assign static IP address will be used to login again. However, the author was able to login into the card with assign static IP address which implies that the card is ready to use. Then the author used (CAT5). Ethernet straight cable to connect the device to a router for full operation.

5 Conclusion

Continuation of the final testing of implementation of Panasonic IP gateway card into the old PBX system, the PBX system device was power on to a fully operation and calls was make to other branches and employee were able to pick up, the signal was clear without any disturbance, some features that were testing include,

- How to use the assigned pin to lock and unlock telephones.

- Ensure that does who have access to international call can calls.
- Check if the call duration limit was active.
- Check if all employee has access to call other branches using Panasonic IP gateway card.

5.1.1 Training

The successful implementation of the Panasonic IP gateway card was completed with the training of employee and employer of ISHO Nigeria Limited. This training is to give user basic knowledge on how to use the service. The training involves a simple guideline on how to have access dial-tone before dialling the desired extension number and oral instructions were giving to employee and employer to report their call experience to the company (IT) personnel.

5.1.2 Further Development

This project was based on the implementation of Panasonic IP gateway card as a hardware device which will help organizations to reduce their telephones bill. The present system does not allow employee or employer to use their extension number when visiting other companies' branches, the user has to inform another user on the extension to call when visiting other departments. A Panasonic deck base station device can be install into the current system, the deck base station is a wireless device that works with both analogy phones and IP phones which allow a user to maintain their extension number when visiting another branches as long as they are within the company networks.

5.1.3 Estimating Investment and Returns

After a successful implementation of Panasonic IP gateway card, a return on investment was determine to the stakeholder of ISHO Nigeria Limited, by taking the expected return from this project with a subtraction cost of implementation then divided by (5) years. Then the client

realizes that at a long run the service will yield interest and save more credits on telephones bills.

5.1.4 Monitoring

With the complexity of today application and network, the author advice user to report their call experiences to the (IT) manager and the manager should endeavour to check the status of the networks at all times to enable smooth conversation over the network. Also, when a new user is added to the network the need to upgrade the bandwidth might arise.

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