

Voice Over IP Based Server Design for Free Calling without Internet

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Abstract:

VoIP (Voice over Internet Protocol) phone systems have been gaining popularity in businesses as replacements of existing PBX (Private Branch Exchanges). These VoIP systems usually rely on the Ethernet structure readily available in a business facility. The emergence of wireless LAN (local area network) is also gaining immense popularity due to the additional mobility given to the users. In this project, a PBX-style VoIP system employed over an 802.11b network is simulated. Three performance factors were analyzed. They are end-to-end delay, delay jitter, and packet loss. The variable parameters of the system included the speed of the wireless network, the type of voice encoding (G.711, G.723, G.729, etc.), and the number of stations in the network.

Keywords — PBX, SIP, IPPBX, EAPBX.

I. INTRODUCTION

Voice over IP (VoIP) has existed for several years, it has only recently begun to take off as a viable alternative to traditional voice systems. Interest in VoIP has grown in part because the technology can help the enterprises to reduce costs by using a single IP network for both data and voice applications. VoIP provides a means of transmitting voice communication over an IP based network. VoIP can use a variety of types of protocols, by far the most common types are SIP i.e. session initiation protocol. The IPPBX system is a phone switch serving a business or organization. The PBX provides phone services including internal calling, auto-attendant, voice-mail, and automatic call distribution services for the organization. In the traditional circuit switched telephony world, people were

connected by dedicated circuits that were designed over 100 years ago. The introduction of IP (Internet Protocol) has changed the telephony market on many levels. IPPBX offers an alternative to EAPBX for voice. One of the reasons large enterprises are drawn to IP telephony is the potential efficiency gained from combining the voice and data functions in one single organization.

The network architecture is shown below:

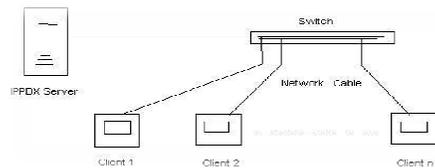


Fig 1. Server Connection in Network

Here the server provides the VoIP service to the client operating system based softphone. IP is flexible, and has enabled the development of a wide variety of innovative telephony solutions less costly IP PBX systems to help their installed base migrate to IP, as well as bring PBX functionality to a new set of customers they could not previously reach with a TDM-based PBX. The base of the system is the linux based open source operating system use on Raspberry pi. It consist of the telephony platform called "Asterisk". Asterisk is software that turns the computer into a voice communications server. It is used by small businesses, large businesses, call centers, carriers and governments worldwide. Asterisk is open source software. The client extension phone has two types: a softphone and a Hardphone. Softphones are SIP based client phone devices which run on Windows or Linux operating systems. A soft phone is a computer application that allows users to make telephone calls directly from their computer. The soft phone is part of a category of technology known as computer telephony integration. A softphone can be cheaper to use than a regular telephone, since the technology requires no hardware beyond a network-connected PC. Softphones offer the same features as traditional standalone phones. In fact, most softphone programs offer more features than most standard telephones.

II. LITERATURE SURVEY

The Author Bhushan R. Jichkar discusses in this paper that nowadays, Wi-Fi, also known as 802.11b, has become the chosen technology for communication over wireless media in both professional and personal environments. Designed initially for private access Wi-Fi has continued to emerge as an universally acceptable technology. User friendly interface and easy access has made this technology much in demand. Today the most cost effective use of Wi-Fi is calling over network. Hence to overcome such issue we are developing a system which allows free calling over Wi-Fi network using VoIP service. Our system allows peer to peer calling and an additional feature of group

calling. For supporting group calling feature we are using SIP (Session Initiation Protocol). This technology will help us to find a way for free calling and thus ultimately helps to private organization for reducing bills over communication. In this paper, the author discusses that the system will be implemented as well as the performance will be tested by doing actual implementation of this system.

The Author Omkar V. Manjare , Sagar S. Bamnikar , Prathamesh N. Deshmane ,Om U. Dongre , Guide: Dr. Preeti S. Patil study about Voice Call Over Wi-Fi, is to make use of available resources in order to provide a facility of making free voice calls, without using service provider. Pre-established Wireless Fidelity (i.e. Wi-Fi) service is more often used as medium to access internet. This project enhances the use of WLAN, offered by Wi-Fi as a medium for voice transmission. Wi-Fi enabled smart phones can be connected to the router and can communicate with each other. This system can prove as the best alternative for existing intercom system. Use of existing resources put no burden on institute as infrastructure cost.

The Mr.Mukund A.Ghogale, Dr.Prashand, V.Ingole,"IP-PBX:Architecture, IORD Journal Of Science And Technology E-ISSN:2348-0831 Vol.1,Issue 4,Sept-Oct 2014.The paper describes that the Wireless communication plays a vital role and VoIP is one of the most exciting new developments emerging within the telephony market.Wireless VoIP utilizes wireless LAN technology ,the same wireless infrastructure used for the corporate network,in order to communicate. Wireless IP phones can be used to access corporate telephony system as the technology combines the telephony function directly into an already existing data network infrastructure.

Wireless Voip Implementation Using Asterisk Pbx And Open Source Softphone2019 This paper reechoes the need to use VOIP-based communication channels in order to reduce the heavy cost burden in Sub Saharan Africa. We focus specifically on the context of the campus environment and implement IP PBX to cut down

the cost of placing and receiving voice calls, instant messaging and voice mails with other colleagues connected to an asterisk server on WIFI-enabled networks.

III. PROPOSED SYSTEM

By using proposed system all internal telephony is routed through the existing LAN (local computer network). This way a separate network for telephony is not required. Since IP phone is mostly using the open SIP standard, it doesn't limit the growth of a company. IP phone call uses raspberry pi and replaces PBX with asterisk which is software implementation of PBX, SIP protocol to initiate and terminate the calls. PBX stands for Private Branch Exchange, which is a private telephone network used within a company or organization. The users of the PBX phone system can communicate within their company or organization. This introduces a low cost solution to connect to desired user by using LAN port. Costs include hardware requirement, training cost, which over cost for telephone services based on whether they are working on international or local level. The extended features like call forwarding, sending message to a person mail box.

Block diagram is as shown in the fig.2.

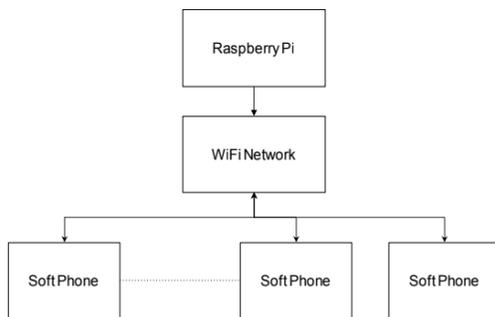


Fig 2. block diagram

IV. METHODOLOGY

Raspberry pi is a small card sized board which is core of implementing IP phone. Many devices like headset, power supply are connected. All the logics are implemented

using python. Raspberry pi comes with different models, IP phone uses model 2 which has 1GB RAM, Bluetooth, wifi and SD card. It does not have built in memory so it uses SD card preloaded with LINUX operating system in SD card. Many operating system are also supported in pi basically it uses raspbian which works on LINUX and is specially designed for raspberry pi.

Asterisk

Asterisk is a software implementation of PBX it allows to connect call to the desired user. The user must register asterisk to make calls, and if this server is not running then call connection is not possible. The feature of asterisk is the Ease of implementation in Unix/Linux systems.

Soft phones

A soft phone is a software program for making telephone calls using a general purpose computer, rather than using dedicated hardware. The soft phone can also be installed on a piece of equipment such as a workstation, portable computer, tablet or even a cell phone and allows the user to place and receive calls without requiring an actual telephone set. Often a soft phone is designed to behave like a traditional telephone, sometimes appearing as an image of a phone, with a display panel and buttons with which the user can interact. A soft phone is usually used with a headset connected to the sound card of the PC.

SIP

The Session Initiation Protocol (SIP) is one of the supporting protocols of IP which is a network layer protocol and also communications protocol for call initiation and termination of phone calls.

V. WORKING STEP

STEP 1: Installation of OS in raspberry pi. Download the Raspberry pi OS image from asterisk.org. Use the software called Windows Disk Imager to burn the image on SD card.

STEP 2 : Write the Image. Click on Write and wait till the process completed.

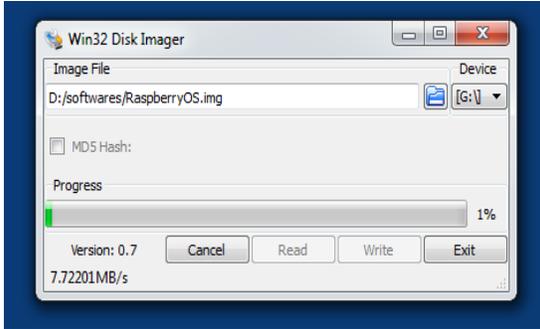


Fig 3:-Installation process

STEP 3 :Assign The Network Access

The SD card will mount as a drive/directory on computer called boot.

Open the drive using Explorer

Open a plaintext editor such as Notepad create a new file.

Add below code

country=IN

country=IN

```
ctrl_interface=DIR=/var/run/wpa_supplicant
```

```
GROUP=netdev network={
```

```
ssid="YOUR_NETWORK_NAME"
```

```
psk="YOUR_PASSWORD"
```

```
key_mgmt=WPA-PSK
```

```
}
```

Save this file as wpa_supplicant.conf

STEP 4: After Installation

Insert SD card in raspberry pi and power ON it



Fig 4:-Setup on Raspberry pie

STEP 5: After Installation

Login to the raspberry pi from the software called SSH using IP address of raspberry pi
In our case the IP address of raspberry pi is 192.168.0.100

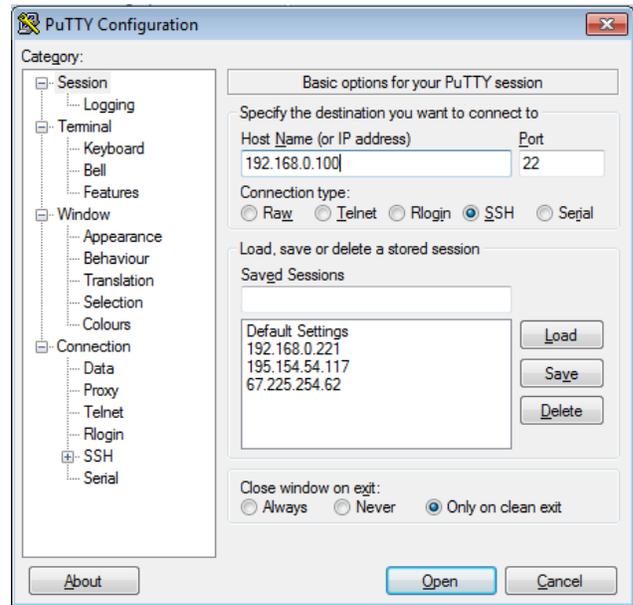


Fig 5:- Putty Configuration

After connection from software raspberry pi ask username and password : username is root and password is raspberry



Fig 6:- Login Screen

Now the successful login will show below

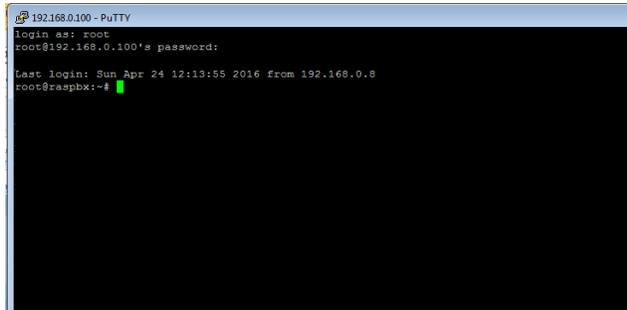


Fig 7. Successfully Login Screen

STEP 6: To install Asterisk VoIP server on raspberry pi .To program for the user account.To install android client on mobile and connect to the raspberry pi server .To test the calling.

VI. RESULT& DISCUSSION

1) After the proper set of user1 and user2, they have to check for registration before calling in asterisk server and is as shown in fig.8 below.

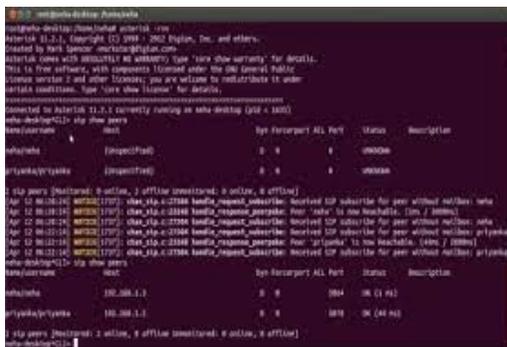


Fig 8:-asterisk server screen checking for registration.

2) Check whether you are registered on softphone. If registered then proceed to next one. Fig 9 Shows the registration on softphone. Before Login User should register to asterisk server. If none of the user registers to server call set up can't be done.

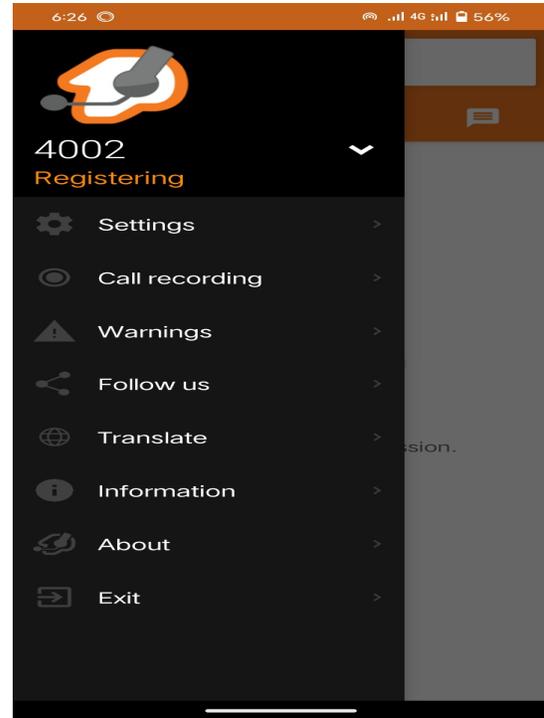


Fig 9:-Registration on softphone

3) fig.10 shows dial panel of soft phone. You can dial a number now on dialpad..User should Dial a Desired number of users phones. Once you Dial a number and call a user then the connection is established.



Fig 10:- dialpad on Softphone

4) Once user register to server can call to desire user. and fig. shows call connection.

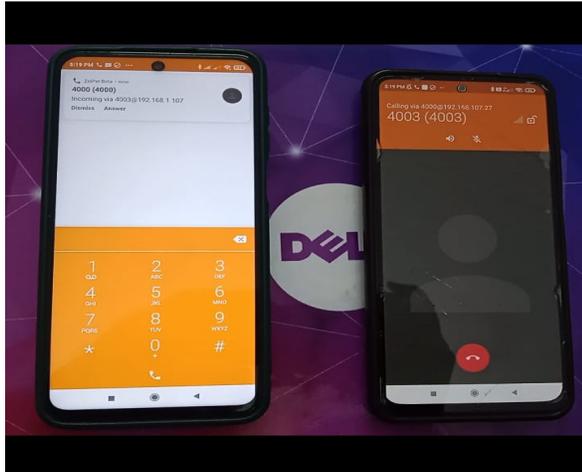


Fig 11:- call connection

VII. CONCLUSION

The IP Phone Services More Economical Than PSTN and the wired PBX methodology. Instead of using traditional PSTN and PBX methodology we use IP Phone Call are routed through LAN port using Raspberry pi and replacing PBX with ASTERISK. This introduced a low cost solution to connect to desired user. Cost include hardware requirement, Training Cost, Which over cost for telephone services based on whether they are working on international or local level.

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