

Design a Free Voice Calling System Using Raspberry Pi

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ABSTRACT:

As the modern telephone networks begun to take shape, private companies saw a greater reliance on telephone communication. Many decide to implement their own service. So that they could handle calls internal to the organisation. Voice telephony over mobile is currently supported at a cost using service provider such as GSM, or using IP service provider at cheaper cost. The purpose of this research is to design and implement a telephony program that uses WIFI in p2p (Peer-to-Peer) or WLAN (Wireless Local Area Network) as a means of communication between mobile phones at no cost. The asterisk software will use a correlation between current address books available in mobile phones to convert phone numbers into IP addresses. The system will allow user to make voice conversation. The current system will only allow for one call per connection, and no call waiting, or conference calls. Different security services relevant for VoIP are presented and we argue that end-to- end authentication and encryption should be provided by default.

Keywords: GSM,IP, WIFI, p2p, WLAN, asterisk, VoIP

1 .INTRODUCTION:

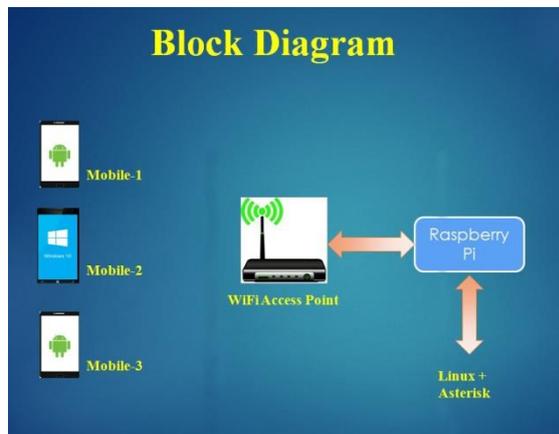
Voice over Internet Protocol (VoIP) is a form of communication that allows you to make phone calls over a broadband internet connection instead of typical analog telephone lines. Basic VoIP access usually allows you to call others who are also receiving calls over the internet. Interconnected VoIP services also allow you to make and receive calls to and from traditional landline numbers, usually for a service fee. Some VoIP services require a computer or a dedicated VoIP phone, while others allow you to use your landline phone to place VoIP calls through a special adapter. The system is based on the operating system called "CentOS for pi" which is Linux based VoIP PBX server operating system for raspberry pi. These operating systems consist of the telephony package called "Asterisk". This operating system with Asterisk is install in Raspberry Pi. The Raspberry Pi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi

Foundation with the intention of promoting the teaching of basic computer science in schools and developing countries. Asterisk supports audio protocols such as SIP which is Session Initiation Protocol used for the audio communication. This package consists of several features such as Voicemail, Call Waiting, Caller ID, Call Transfer etc.

2. OBJECTIVE

- a) Objective of this project is to make a voice call where there is no network coverage and no Internet.
- b) To make a free voice call without SIM card.
- c) To install this project in Small Scale Industries, Large Scale Industries and College Campus.

3. METHODOLOGY



4. WORKING

a) In the server we create users having username and password with a number (say 5000, 5001, 5002.....)

b) When the server is connected to the WI-FI the smart phone app get connected to server via WI-FI.

c) This client and server systems will get the IP address from WI-FI access point.

d) All are now in the network and the service of the asterisk server will start in the system.

e) Now the call can be establish in the WI-FI network.

5. HARDWARE

5.1 Raspberry

The Raspberry Pi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools and developing countries. The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity, and peripheral device support. The Raspberry Pi 2 has 1 GB of RAM. The Raspberry Pi Zero has 512 MB of

RAM. The Raspberry Pi may be operated with any generic USB computer keyboard and mouse. The Raspberry Pi does not come with a real-time clock, which means it cannot keep track of the time of day while it is not powered on.

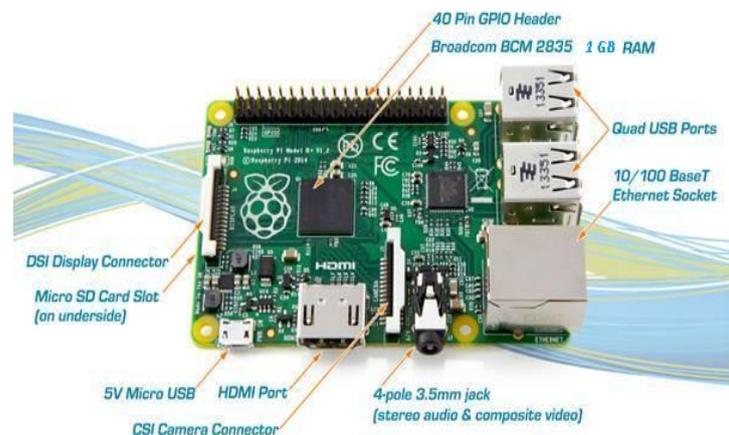


Fig.: Raspberry Pi

5.2 ROUTER

A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet. A data packet is typically forwarded from one router to another router through the networks that constitute the internetwork until it reaches its destination node. A router is connected to two or more data lines from different networks. When a data packet comes in on one of the lines, the router reads the address information in the packet to determine the ultimate destination. Then, using information in its routing table or routing policy, it directs the packet to the next network on its journey. This creates an overlay internetwork.



Fig.SD card

5.3 LAN Cable (Cat-5) :

Cat5 wire alternatively referred to as an Ethernet cable, a CAT5 or Category 5 is a description of network cabling that consists of four twisted pairs of copper wire terminated by an RJ-45 connector. Cat5 has a maximum length of 100m, exceeding this length without the aid of bridge or other network device could cause network issues. The picture shows an example of what a CAT5 cable may look like with the connector, as well as the other end of the cable with each of the wires it contains. This cable is commonly connected using punch-down blocks and modular connectors. Most Category 5 cables are unshielded, relying on the balanced line twisted pair design and differential signaling for noise rejection.

5.4 SD Card

Secure Digital (SD) Card is a non-volatile memory card format developed by the SD Card Association (SDA) for use in portable devices. SD card is used to store OS, Program and user data. Storage Capacity is 4GB

6. SOFTWARE:

6.1 Asterisk:

Asterisk is basically a telephony toolkit enabling developers to create numerous types of applications that interface with telephone networks. The most obvious application is that of a PBX. Asterisk can also be used as an IVR (Interactive Voice Response) system, for teleconferences and as a voicemail system. Asterisk is, however, most commonly used to build hybrid PBX systems that utilize modern PCI cards instead of banks of switches and relays, and software instead of custom hardware. By using relatively simple PCI cards in a standard x86 computer system running on Linux, the cost to build a working system is greatly reduced as compared to the often expensive and inflexible traditional PBX



Fig. Asterisk

6.2 PuTTY Software :

PuTTY is a free and open-source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP, SSH, Telnet, rlogin, and raw socket connection. It can also connect to a serial port. The name "PuTTY" has no definitive meaning. PuTTY was originally written for Microsoft Windows, but it has been ported to various other operating systems. Official ports are available for some Unix-like platforms, with work-in-progress ports to Classic Mac OS and Mac OS, and unofficial ports have been contributed to platforms such as Symbian, Windows Mobile and Windows Phone.

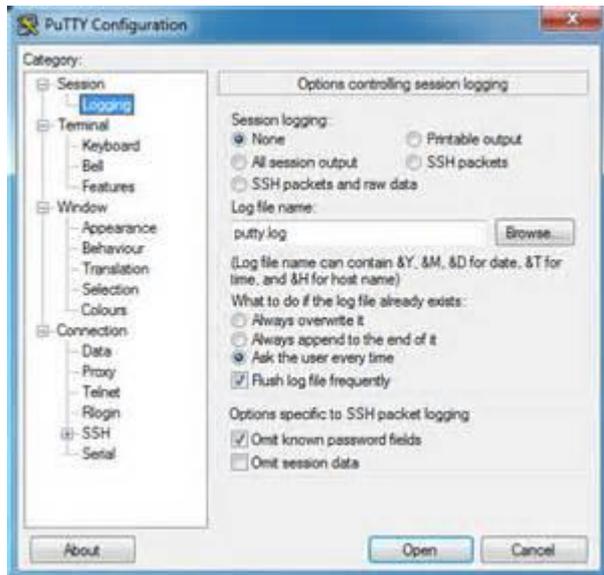


Fig: Putty

6.3 Zoiper App :

A soft phone is a software program for making telephone calls over the Internet 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.[1] 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, or with a USB phone.



7. RESULT



- 1) Able to make free voice call without SIM and Internet using Raspberry Pi.
- 2) Call is in process with high voice clarity, there is no interference
- 3) Call Waiting feature is also there, you here beep notifications of an incoming call when you are already busy attending another call.
- 4) Maximum numbers of calls are in process simultaneously.
- 5) Only limitation is that, we call only in Wi-Fi range, but for increasing range of our network we have to use router with high range or we can use Wi-Fi boosters also.

- 6) It consumes very less power supply 5 Volt for Raspberry and 12 Volt for Wi-Fi Router.
- 7) This project can also be implemented in colleges and schools so that the departments can communicate with each other free of cost.
- 8) Communication can be established within rural areas thus enabling the communication between people where no network service providers are available. Can call on mobile phone where no coverage of mobile.
- 9) service provider
- 10) Call Monitoring and Call Recording.

8. CONCLUSION:

VoIP technology is one of the most widely using technologies which support to deal with communication from anywhere in the world. VoIP engineering is necessarily varying telephony industry, enabling not just less expensive calls but also providing more advantageous and rich features and more flexible services. Increasing number of service provider is one of the reasons of VoIP technology to be cheaper comparatively with others. Although, challenges stay behind, VoIP technology already plays a key function in businesses communications and is rapidly varying the residential and consumer landscape of domestic and international communication affair. Raspberry Pi is ARM processor CPU where the Linux OS run smoothly and so as per the cost factor the system for Calling on Wi-Fi as a intercom system where there is no need of internet and SIM card.

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