Wi-Call: Voice Call Through Wi-Fi Without Internet

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***Abstract*—Thispaper presents a system where we can send files and make calls without internet. Here we are using Raspberry pi as our controller section a Wi-Fi router to connect our devices. This system is developed for institutional or organization point of view so that we could connect various departments and section under a controlling unit. Nowadays we are using LAN connections for sharing files and inter connections are done for calling. But by making the present situation to a faster effective wireless communication system, we will be able to reduce the connection cost and the complexity and bulkiness of the connection.**

I. INTRODUCTION

The old telephone system was improved to a new system known as Private Branch Exchange (PBX). PBX system performs communication tasks such as inbound calls and out bound calls along with Voice over Internet Protocol (VoIP) algorithm. VoIP is used to transmit voice data over internet. PSTN (Public Switched Telephone Network) is like an internet or broadband connection that changes to VoIP services. It offers to make call by converting consumer's voice into packet data using VoIP technology. These packets transmitted through the internet from one user to another user get converted into voice at the other end. Main aim of VoIP service is to provide good voice quality and security. Due to some issues in the VoIP PBX technologies Asterisk based on voice exchange was developed. It is the best voice exchange method that works on VoIP and is a good solution for flexibility.

VoIP technology was developed in 1995. It has a lower cost and better flexibility compared with its predecessor. It is used in small, middle and large industries for communication purposes. It consists of many added features like multi-carriers to save call charges and provide good quality service. It is the process of converting audio or video into small signals and that signals is converted in VoIP network so that the users are able to communicate using audio or video or both.

Here, we designed to develop a system which is used to make a call through Wi-Fi without any internet. We have Raspberry pi as the controller section and Wi-Fi router to connect the devices. Connections are less due to the use of wireless communication. Hence this system is used to reduce the complexity of the connection and also reduce the cost.

II. EXISTING SYSTEM

A. Intercom

An **intercom** is a stand-alone voice communications system used within a building or small collection of buildings, functioning independently of the Public Telephone network . Intercoms are generally mounted permanently in buildings and vehicles. Intercoms can incorporate connections to public address loudspeaker systems, walkie talkies, telephones, and to other intercom systems. Some intercom systems incorporate control of devices such as signal lights and door latches.

There are simple house intercoms and intercoms developed for collective apartments. Some are equipped with video, and its wiring (electrical installation), can be connected to the outside with few pairs (4-6 pairs) while controlling an electric strike. The last generations are even compatible with computers and some models include TCP/IP.

Traditional intercoms and public address systems are composed entirely of analogue electronics components but many new features and interfacing options can be accomplished with new intercom systems based on digital connections. Video signals can be carried as well as voice. Digital intercom stations can be connected using Cat 5 cable and can even use existing computer networks as a means of interfacing distant parties.

Many schools and office buildings now use audio / video systems to identify visitors trying to gain access to a locked building, and can be interfaced with the building's access control system.

Besides fixed locations, intercom systems are used intrains, watercraft, aircraft and armoured fighting vehicles. Several portable intercoms are commonly used by special event production crews and professional sports teams. Performing arts venues such as theatres and concert halls often have a combination of permanently mounted and portable intercom elements. Motorsports race tracks often have both

portable and permanent intercom stations mounted at critical points around the racecourse for use by race officials and emergency medical technicians.Portable intercoms are connected primarily using common shielded, twisted pair microphone cabling terminated with 3-pin XLR connectors. Building and vehicle intercoms are connected in a similar manner with shielded cabling often containing more than one twisted pair.

III. PROPOSED SYSTEM

A. *Overall Architecture*

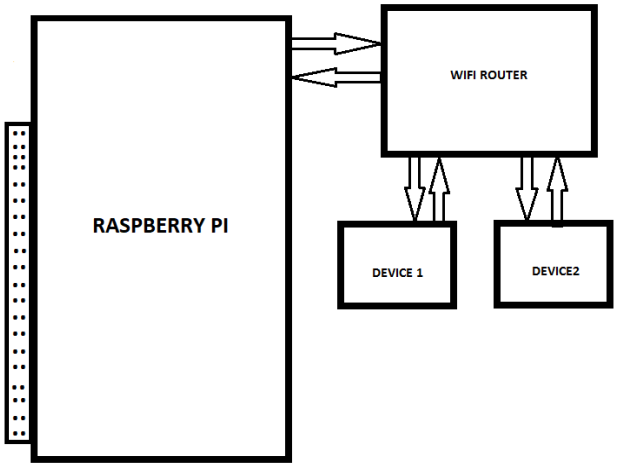

Fig.1.Overall block diagram of the system

This system introduces a fully wireless intercom system without internet. For this wireless communication to take place in local area usage of Wi-Fi is the most better option.

The block diagram shown above consits of a Raspberry Pi which acts as a server, a Wi-Fi router for routing the devices and communication devices (android phone). We use an android application in the communication devices. The user has to create his own personal id using this application by filling out his details. Once the registration process is completed the IP address of the device gets saved in the server. Once you are connected, an online status is shown to the other users. The system will allow users to search for other individuals within Wi-Fi range and to establish free voice connections without internet.

In order to make a call the user-1 has to check the online status (whether in wi-fi range or not) of the other user from the client list provided. If found online then the call option is to be selected. The application sends the informtion to the server and the finds the corresponding IP address to the other user. After finding the IP address the call is forwarded to the corresponding IP address. In case the person you are calling is busy with other call, abusy status is shown. The option for blocking is also provided if necessary.

B. *Connection*

Communication devices connected to the server using TCP/IP protocol. The protocols in TCP/IP suite are the Transmission Control Protocol (TCP) and the Internet Protocol (IP).IP suite

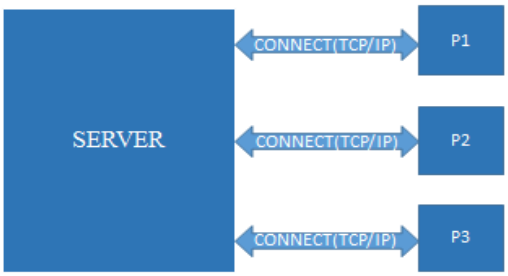

Fig.2. Connectivity of the devices

provides end-to-end data communication defining how data should be addressed, packetized, routed, transmitted and received.

C. *Making the calls*

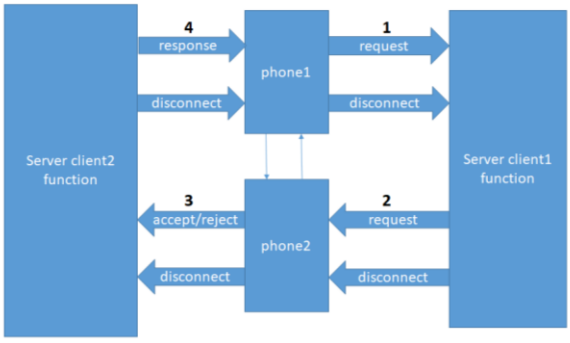

Fig. 3. Making calls from one device to another

Fig. 3 shows idea of making calls from phone1(user1) to phone2(user2). When a call is to be forwarded, a request is send from the client 1(phone1) to the client1 server part in the main server (raspberry). The server sends this call request to the client2 (phone2). Then client2 sends the response (accept/reject) to the server.Connection isestablished between two user if accept is done. If it rejected, then call is diconnected. UDP protocol is used for transmission of data between the users.

D. *UDP Protocol*

The User Datagram Protocol (UDP) is a simple

connectionless communication protocol with a minimum mechanism. By using this, applications can send datas. It is uese where either error checking or correction is required. It comprises of four fields with 2 bytes each. Unlike TCP/IP, UDP doesnot setup end-to-end connection. More over UDP is unreliable, not ordered, lightweight..etc. UDP doesn't control congestion.

E. *Algorithm of the Developed Application*

1. Sign Up
   Register with the application with unique nickname and password.
2. Login
   Nickname and Password is assigned
   Checks whether nickname already exist and update new client object to client list and IP list.
   Adds user to client list and IP list
3. Get detail
   As soon as the user login to the app, his/her IP address is saved in the server. It checks whether the IP that is entered is available in the IP list. If yes, the IP list will be updated with new data. Otherwise, new IP will be added to the IP list provided.
4. Block/Unblock
   Option for blocking and unblocking calls is provided in the app. If user1 blocks user2, then user2 won't be able to contact user1 through the app.

IV. Results And Discussions

The application and the output at the server are shown in the figure below.

V. Conclusion

UDP technology is one of the widely used technologies which supports communication. Although challenges stay behind, UDP plays key role in communication. Lower delay and good quality voice transmission is one of the key feature of the system. System also proved that communication through Wi-Fi without internet is the current cheaper and easier way in Local Area Network communications. This system can be easily implemented in companies, schools, military etc. Lower energy usage is another feature.

VI. Future Scope

The system can be implemented in more fields such as forests, hospitals etc. The login and registration security of the application increases the demand of the system in areas such as defense or military.The user friendly app is also easier to use for the office staffs in companies and schools.

In the coming future, this system is able to replace the wired intercom systems. Also this system can be improved and developed by implementing video calls over Wi-Fi without internet.

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