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Paper on Proposed System for Placing Free Call over Wi-Fi Network Using Voip and SIP

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ABSTRACT
The Wi-Fi, also known as 802.11b, has become the preferred technology for wireless local area networking in both business and home environments. Even though it was designed primarily for private applications, Wi-Fi is also being deployed in public places to create so-called hotspots, where Wi-Fi-capable users can obtain internet access. This new domain of application could be the major future market opportunity for Wi-Fi, but in order to take advantage of it, several key challenges, both technical and business-related, must be overcome. Today the most cost effective use of Wi-Fi is calling over network. We have various facilities today such as Skype, T-Mobile, T-pad, Jaxtr for communicating over network but some restriction are placed on such system like Skype support only pc to pc calling for cellular and landline call this free service become paid. T mobile also follows the same problem. 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 system will be implemented as well as the performance will be tested by doing actual implementation of this system.
Keywords **–** Android, Free calling, SIP, VoIP, Wi-fi

I. INTRODUCTION

Mobile devices are continually growing more capable, cheap and easy to use tools nowadays especially with the advancement of cleverly integrated phone capabilities and facilities. With better wireless network, transmission of real time media in day to day to life is now possible. Riding this new wave will be extremely profitable for private as well as public organizations. The latest and most widely used software platform is android. It is now one of the best operating system designed and develop for mobile systems. Today thousands of application are designed and developed because of modularity and easy of application development tools. Android basically designed on java platform, one of the most widely used platform for mobile and desktop application build with security inside it. Java supports client server architecture thus makes it easy for application development to use this architecture in application and works fluently with speed and synchronizing all data. With latest communication evolvement such as Wi-Fi, Bluetooth, gprs, 3g, 4g technology, we can handle everything on our figure tips. I also decided to use this communication technology Wi-Fi and VoIP to develop an application which can help us to send voice over Internet.

Basically I am thinking about an application which allows us to place a call over Wi-Fi network. Today wireless network become an open standard also called 802.11 having various protocol versions available in it such as 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac. Thus this Wi-Fi helps us to communicate over a network. Today most of the devices now support to wireless networks such as laptops, mobile phones, ipad, iphone, and now android based smart phones also support Wi-Fi facility.

Till date we have various technologies which support communication over network like chatting, video chatting, and calling from one pc to another. All such system are based on protocol called VoIP (Voice over Internet protocol) commonly known as communication protocol. VoIP itself works with help of various session control protocol to make an effective communication having less jitter in it. Advantage of such VoIP system is it Wi-Fi subscriber can call each other with no cost. Most of the cellular phone especially multimedia phones having such facility of Wi-Fi and 3g network support.

The main idea behind this paper is by using such a free source facility and standard I want to develop an application for providing free calling over internet/Wireless network from one cell phone to another cell phone. This will not only help to save money on calling but also provide an effective way to utilize the resource in effective manner.

The paper is organized as follows. Section II introduces the previous researches that mean the literature survey of the proposed system. Section III briefly introduces the main open source technologies used to build our mobile application.

II. LITERATURE SURVEY

The history of communication evolved from prehistoric age to modern age. Communication ways change from smoke signal to digital signals. Previously for communicating a simple message it required days but now a days it become matter of just a few seconds. Technology is improving so rapidly that now people can talk face to face over 3g /Wi-Fi network using computers. But over this communication also some restrictions are placed such as pc to mobile communication can be possible but for such technology we need to pay money for it.

Today for providing such facility of communication over network we have various application available such as Skype, Tmobile, Tpad, Jaxtr. But all this services are allowed only pc to pc communication on free basis. Take an example of Skype. It only allowed pc to pc calling using VoIP service. It can also support pc to mobile calling and pc to landline calling also but for using such facility we need to deposit credit first in it. Jaxtr is one of the latest service opened in India by Sabeer Bhaitya but later this service has been stopped by him. Tpad and Tmobile also follows same problem of paid service.

Though technically all this service uses same technology like they need VoIP for transmitting voice over network. They need session protocols to start and maintain session of the system. But still just for generating revenue this all free system are made paid service.

Today if this application works on large scale it will definitely help to reduce the communication cost and helps to use Wi-Fi network in an effective manner. Thus it will also help to reduce the communication cost as all we have to pay is for only having wireless network not for any additional carrier charge.

III. TECHNOLOGY

A] Android Platform.

It is a new operating system designed and developed on java based mobile technology and is used for developing applications that can run on a consumer wireless device platform such as PDAs, cell phones and iphones.

Android platform is mobile devices platform and embedded systems. It has been carefully designed to strike a balance between portability and usability. It does indeed offer many benefits, including security advantages, over native application development alternatives. As this operating system is similar to java development it also provide lots of feature similar to java such as robustness, security, support for off-line processing and local data storage, to its leverage of any wireless infrastructure, to its fine-tuned control of data exchange. It is a safe platform and encourages robust programming. Its portability beats other technologies. It is Network agnostic, and can exchange data over many protocols like TCP/IP, WAP, and i-mode spanning across many bearers like GSM, CDMA, Wi-Fi, and Bluetooth etc. Its advantages include improved security and consistency of applications across platforms and devices, superior user interfaces with graphics, the ability to function off-line out of wireless coverage, peer-to-peer networking and no licensing expenses needed for the SDK, which means that anyone can create an application and market it over Google play.

Several security features in android makes it convenient for user as well as developer to set different kinds of user-permission for an application. This way application can connect only when end user wants to use it. Mobile systems are hardware specific especially android cell phones so for those systems operating systems take care of such devices with inbuilt software inside it. So after getting new version or application installed there won't be any software issue as all necessary files are already preinstalled within system. For a mobile device to communicate with another it needs a communication platform. For that purpose Wi-Fi, Bluetooth, and GPRS facilities are provide with cellphone.

In our application I am using android platform to develop an application because I want to take advantage of Wi-Fi systems, which is provided by many mobile vendors along with necessary drivers provided with OS. Now a new feature is also added in operating system and it is of using Wi-Fi network as a hotspot. It means I can create my own Wi-Fi network under my own device and setting. So it much more beneficial for my application to use android operating system as it is open source and Wi-Fi is also an open source technology. So basic cost of application would be very low.

[B] Session Implementation Protocol (SIP).

SIP is protocol designed to initialize, manage, control and destroy session over VoIP on internet. It is a signaling communication protocol used for multimedia communication with video and voice. It is implemented with the help of VoIP (Voice over Internet Protocol). It is useful for implementing one session between two devices, also known as unicast and multiple session among various devices, known as multicast. With help of SIP, we can

perform video conferencing, online streaming, instant messaging etc. For transmitting video and voice, it uses Real-time Transport Protocol (RTP) or Secure Real Time Transport Protocol (SRTP). From this SIP we created a simple SIP phone or softphone. This SIP phone help us to manage session between various devices. We created a simple software based SIP phone and installed it on server. So whenever any call placed over Wi-Fi network, its validity is checked first after that session is created by this SIP phone and then call is connected and maintained by it. Following figure explain simple SIP unicast implementation.

The following figure explains how does signaling and acknowledge mechanism works in Sip and after acknowledgement media path is opened directly between user1 and user2 for communication supporting video and voice over network. Using this media path we can also capable of performing online streaming, video conferencing etc. As SIP is capable of maintaining multiple session. So we can take advantage of it and provide another facility of group calling. We can provide this feature by simultaneously implementing SIP for users and connecting them to each other.

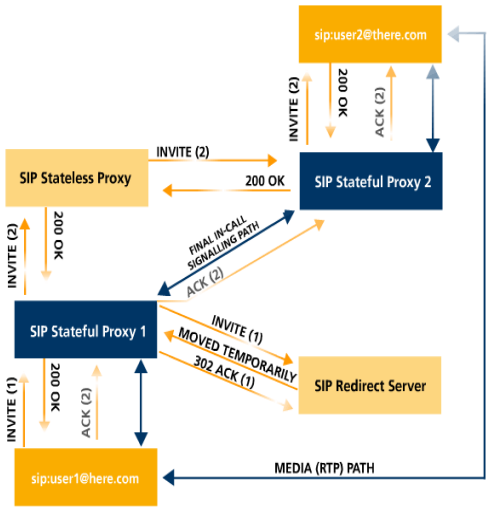

Fig 1: SIP Signaling and acknowledgement between user1 and user2. This figure demonstrate how connecting takes place and acknowledge is send between over SIP server.

***[C]* MySQL:**

MySQL provides implementation of a SQL database very well suited for small to medium applications. This database is free and open source with a commercial license available. Common applications for MySQL include php and java based web applications that require a DB storage backend, e.g. Dokuwiki, Joomla, xwiki etc. Very many applications that use MySQL are geared towards the LAMP stack (Linux, Apache, MySQL,php). MySQL is usually used with 2 different storage engines, one is called MyISAM and stores each table in a set of 3 files. The second is called InnoDB which supports transactions, this storage engine stores all data in a single set of bytes or uses one set of bytes per database directory.

MySQL has one major advantage, since it is free, it is usually available on shared hosting packages and can be easily set up in a Linux, UNIX or Windows environment. If an application requires more than database, requires load balancing or sharing, it is easy to set up maybe instances of the database requiring only the hardware costs, as opposed to commercial databases that would require a single license for each instance.

I had decided to use MySQL as backed to store information regarding users such as user phone number, name, and email address. This information is used for future reference. Whenever new user request to use application in such case registration is compulsory. Another use of storing information in database is that we can maintain frequently used contact by user. By this way our application can be very convenient for user also we are providing another feature of sending friend request to another user, by using this feature whenever users are login within application then thy can be visible to everyone and available for contact. So when user enter in app he/she can check who are available for talk on can contact with them.

As all necessary information is stored in database another advantage is we can maintain call record of user whom he contacted. Another major advantage is complete database of an application is very convenient for moving anywhere as MySQL is supported by both web based application and normal single desktop application. From future prospective as MySQL is also called as lite database we can integrate our current database with any application with very less or low configuration change. So as MySQL provide reliability, consistency, security and efficiency, we decided to use MySQL as database.

IV. APPLICATION FLOW

Following use case diagram show implementation detail and flow takes place with system.

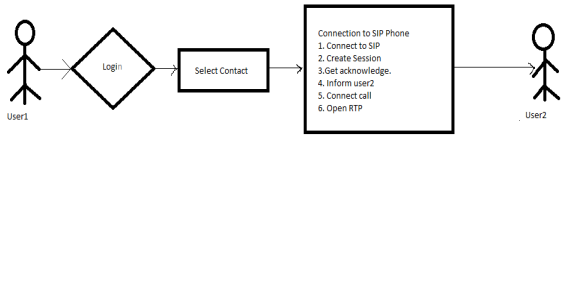

Fig 2: Use case diagram for connecting user1 to user2

In this use case user1 try to call user2 using application. When user1 want to connect user2 first he have to login in application. On second stage user1 will select contact whom to call and then application move further to stage three. In this SIP initializes and create session for call between two users. After acknowledgement that user2 is also available call takes place and RTP channel is open up between two users and user can contact with each other over VoIP using Wi-Fi network. When call gets terminated session initialize by SIP gets terminated. In this case if we need we can store information of who user1 called and for what duration. We can later save this information in our MySQL database for future reference or for processing operation over it.

This is the simple implementation of our proposed system.

V. CONCLUSION

We presented the design and implementation details of an application based on Wi-Fi technology for Wi-Fi enable devices (i.e.: mobiles, laptop, PDA's, tablets) supporting calling, community interactive services and also provides secured Wi-Fi network, based on open technologies such as android programming, MySQL database and SIP. Our goal was to create an easy to use, mobile, interactive, flexible and extensible system for calling using free resources and standards. The cost involved is only the initial set up cost and all calls within the network are free. This model will be very useful to solve the communication problems in large organizations, by making free voice calls through Wi-Fi.

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