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Authentication Based Wi-Fi Calling For Mobile Phones

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Abstract— The use of Wi-Fi empower cell phones to access internet away from the PC is increasing nowadays. The use of Wi-Fi enabled cell phones like IP phones, and their communication within a local WLAN is being discussed in this paper. This proposed system is a form of telecommunication that allows data voice transmission to be sent across a large range of interconnected networks. The models, which are Wi-Fi enable and have J2ME platform, can communicate with each other through free 2.4GHz communication channel. Each mobile device connects to a wireless LAN router and identifies itself in the routing tables. Calls are placed by user by sending the packets to a router, which then tries to find the destination. The destination must be connected to the WLAN; if not the Wi-Fi server can turn the calls to the GSM network using UNC. Since the communication channel is capable of being affected by an inside impact like hacking. It is provided with cryptography techniques, which provide high security.

Keywords—Wi-Fi, voice calling

I. INTRODUCTION

Mobile device are continuously growing which are more cheapest, capable and easy to use tools nowadays. Especially with the advancement of cleverly integrated phones capabilities and facilities. With better wireless network, transmission of time media in recent life has become possible. Riding this new wave will be very profitable for private as well as public organizations. Communication systems has developed steadily and new means of communication are being developed from long time. Cell phones has a great diversion from being simple communications device to powerful portable computer. This Instrument has become so commercial that it is available as a key-item in every bodies pocket, benefitting the user and serving as a lucrative business for manufacturers. The increased in the number of service providers has made it a battle fields for all of them, to gain many customers, and the cheaper one always manages to outstrip the others. Service providers such as Vodafone, Star hub, CSL, has already earned a name in the market and are still expanding their services all over the world. It is a very hectic task to design a communication system, knowing how badly it is susceptible to noise.

The latest and widely used software platform is android. It is one of the best operating system designed and developed for mobile systems. Today thousands of applications are designed and developed because of modularity and easy of applications development tool. It allows us to place a call over Wi-Fi network. Today wireless network become an open standards also called 802.11. And it is 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 support to wireless networks, such as laptop, mobile phone, ipad, iphone, and now android based smart phone also support Wi-Fi facilities.

II. LITERATURE SURVEY

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

Today for providing such facilities of communication over network we have various applications available those are Skype, Tmobile, Tpad, But all this services works only for pc to pc communication on free basis. Take an example of Skype, It only allows pc to pc calling using VoIP service. It can support pc to mobile calling connection and pc to landline calling connection, but for using such facility we need to pay first in it. Jaxtr is the latest service invented in India by Mr.Sabeer Bhaitya but later on this service was stopped by him. Tpad and Tmobile also follows same problems of paid service. The Key components of our proposed system are as below:

1. GSM

When the compression rate is high the number of bits per seconds are less while voice calling. It depends on the user of the GSM module to select the compression. If the battery capacity is the problem, then the half rate is a good option. If we consider audio quality, then standby time the Enhanced Full Rate is a best option. If you use the microphone of GSM module to listen and to record the voice of the thefts detected by burglar alarm system, then a good audio quality will be helpful to the security in-charge to analyze the recordings. For communication systems at door entry or in lift it makes sense to select highest audio, because power consumption is often less important.

The GSM standard are given by the 3GPP collaboration and implemented in hardware and software by manufacturers and mobile phone operators. The standard makes it possible to use the same phones with different companies, or even move to various countries. GSM is the world's most explored mobile phone standard.

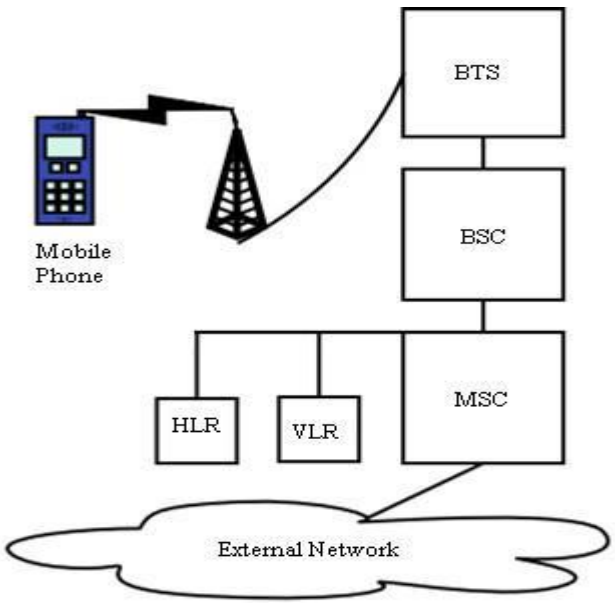


Fig 1 - GSM Architecture

2. Databases

1) HLR

The Home Location Register is a reference database for subscriber parameters. HLR have all the details like customer number, customer ID, billing details and for prepaid with intelligent network it has details of current recharge of prepaid users.

Various identification numbers, addresses, and authentication parameters are being stored. When a new subscriber is added to the system the information is entered into the database by the network providers. This database contain the master database of all the subscribers to a GSM PLMN.

2) VLR

The VLR contains a replica of the data present in HLR. It is temporary data which exists only as far as the subscriber is "active" in the specific area under VLR.

The VLR database will therefore contain some duplicate data as well as more specific data relevant to the subscriber remaining within the VLR coverage (here coverage means status of customer of last call location area code updation). The VLR provides a database for the subscribers wherever they are physically located within a PLMN, this might be or not be the home system. This function eliminate the necessity of time-consumption and excessive

3. IP Network

In order to communicate correctly with other devices on the network each device on an IP network requires 3 different information they are: an IP address, a subnet mask, and a broadcast address.

The Internet Protocol is the main communication protocol. The Internet protocol suite for broadcasting datagram over network boundaries. Its routing function allow internetworking, and establish the Internet. Depending on the IP addresses in the packet headers IP has the task of delivering packets from the source host to the destination host.

For this, IP provides packet structure that wrap the data to be delivered. Internet Protocol define addressing methods with source and destination information that are used to label the datagram.

Though technically all this services uses same technology, they need VoIP for transmitting voice over network. They need session protocol to start and maintain session of the system. But still just for generating revenue all these free systems are made paid services. Today if this application work on large scale it will definitely help to reduce the communication price and help to use Wi-Fi network in an effective full manner. Thus it will also help to lower down the communication cost, as all we have to pay is only for having wireless network, not for any additional carrier charge.

IP based connectivity is a very challenging research based topic with good scope of further possibilities with new technological advancement. Novel way to use the IP technology to make secure connection between the two mobile device is by using Peer- to- Peer mechanisms. Also an ideological algorithm design is presented to give better idea of the process going in the background, to establish a well define connection. This process will be totally transparent to the user, and the user will just have to dial a number or send some of the data using current hardware setting only. The Java for Micro- Device or J2ME software will be used to implement this system.

III. PROPOSED SYSTEM

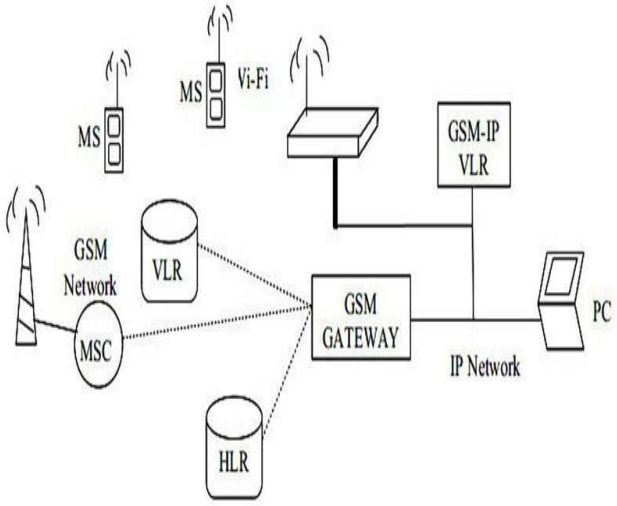


FIG 2 . System Architecture

Fig 2. Indicates the design of proposed architecture, when user is finding Wi-Fi range available, Manually user can switch to Wi-Fi network for voice calling facility irrespective of the GPRS/GSM network availability or unavailability. To establish a call from device connected to Wi-Fi, application on handset can be used, in this authentication is done on the basis of unique user id and password. User may be allocated the IP address dynamically but once user registers into Wi-Fi network, allocated IP address will only be reserved for that user till the time of roaming to another Wi-Fi access point (AP) or deregistrations from Wi-Fi network. The allocated IP addresses and user ID are bind to each other and this information is stored in new type of register called GSM-IP visitor location register (VLR). The functionalities of the GSM-IP, VLR is similar to that of VLR in GSM system which stores the location information, temporary subscribers identity, mobile station roaming IP (MSRIP), Especially IP address allocated at the time of registration, mobile status (busy/free) , but the only difference is that it stores this information along with IP address binding. MSRIP in this case is user ID and IP address of the device as device is connected to IP networks. This Mobile station roaming IP is used to tunnel all the incoming calls either coming from IP network (GPRS/ WIFI) or GSM network to this device through IP network. In the same way, outgoing calls from this device to device on IP network (GPRS/ WIFI). While calling if called device is busy with some another call, then the new caller will be informed about busy status in similar way to that of status information used in GSM, and the user is made available and call setup will take place.

1. Shortest Path Routing Algorithm

We use this algorithm for path selection between source and destination. In shortest path routing algo the topology communication network is represented using a directed weighted graph. The nodes in a graph represents switching elements and the directed arcs in a graphs represents communication links between switching element. Each arc has a weight that represent the costs of sending a packets between two nodes in a particular direction. This cost is generally a positive value that can inculcate such factors as a delay, throughput, error rate, monetary costs etc. The main objective of this algorithm is to find path between two nodes that has smallest cost.

2. Novel Algorithm

Novel algorithm has been invented to tackle the first fundamental problem of designing Ad hoc network and p2p telephony using WIFI, which is not dependent on central database, and does not require users registration for any service. This can be achieved by executing an algorithm to map the mobile number to a unique IP address which can be use to establish P2P connection to any other mobiles running the similar algorithm.

IV. MATHEMATICAL MODEL

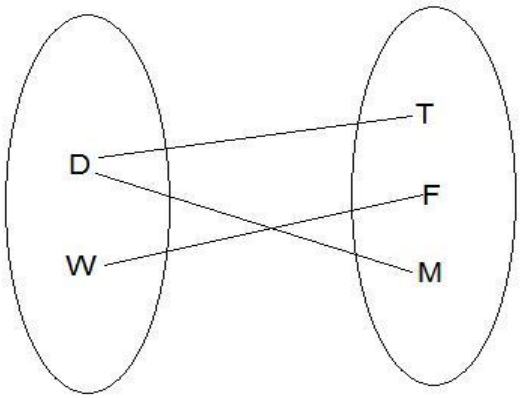
In this mathematical model we represented our system using set theory.

1. Problem Description

Let S be a technique for Audio and file Transmission. Such That S= {I, F, O} Where,

I represent the set of inputs: I= {D, W}

D= Set of Requirements for Audio Transmission W= Total Methods for File Transmission



F is the set of functions:

F= {T,F,M}

T= Check accessibility

F= Form port communication

M= Data Transmission

O is the set of outputs:

O= {C}

C= File/Audio Transmission

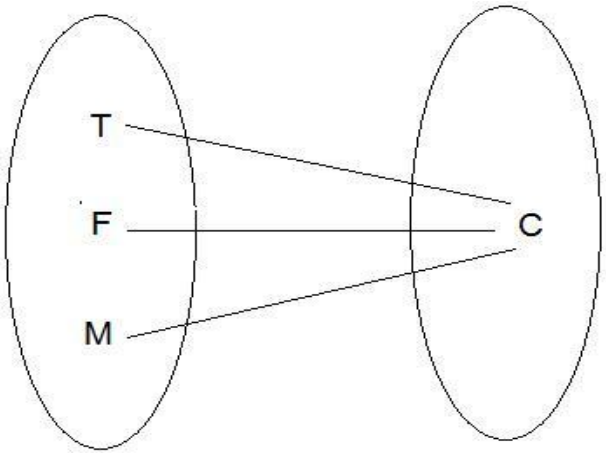


Fig 3. Mathematical Model

V. CONCLUSION

In this proposed system we design and implement details of an application based on Wi-Fi technology for Wi-Fi enable device i.e mobiles supporting calling, community interactive services and also provides secured Wi-Fi network, based on open technologies. Our goal was to create an easy to use, mobile, interactive, flexible and extensible system for calling using free resources and standards. For multiple channel and multiple interface-based multi-hop networks, call capacity increases greatly with the use of multiple channels, and to some extent with the number of hops, which also provides greater wireless coverage. Decrement of capture threshold and interference range also increases voice capacity. The presented theoretical results are validated by simulation. The capacity estimation model with quality assurance and the analysis which is presented in the paper is very useful in designing voice networks using 802.11 WLANs. We developed an analytical model to estimate VoIP call capacity over Wi -Fi networks. First, the model is developed for single channel and single hop networks. Then the model is extended for multichannel, multiple interface-based multi-hop networks. The cost involved in this is the only initial set up cost and all the other calls within the network is free. This model will be very useful to solve the communication issues in large organization, by making free voice calls over Wi-Fi.

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