



GLOBAL JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY
Volume 12 Issue 4 Version 1.0 February 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Voice Calls between Wireless (Android) Phones and a Cooperative Application for Sending Sms over Wi-Fi Networks

By Mr. Sandip Rane, Miss. Jaya Suradkar, Miss.Akanksha Patil & Miss.Ritu Gayakwad
University of Pune

Abstract - Wi-Fi technology is a form of telecommunication that allows data and voice transmissions to be sent across a wide range of interconnected networks. The success in deploying services and applications based on this concept needs the development of applications that allows intermediate users the reception and forwarding of information to destination users. The user may take the maximum benefit from the technology acquired inside the mobile phone for instance, since it is possible extend the radio coverage by several hops, and enjoy similar mobile's operator services free of charge. In this work we are going to present the development of an integrated Java application to send SMS and Voice among user mobile phones through its WIFI interface. A software application is developed using Android which allows free and secured communication between selected phones in the Wi-Fi network.

The base idea is unifying voice and data onto a single network infrastructure by digitizing success of wireless and mobile communications has resulted in the creation of a large variety of technologies. Expanding services through the use and coordination of these diverse networks will provide user mobility between different types of systems.

GJCST Classification: C.2.2, C.2, I.3.3



VOICE CALLS BETWEEN WIRELESS ANDROID PHONES AND A COOPERATIVE APPLICATION FOR SENDING SMS OVER WI-FI NETWORKS

Strictly as per the compliance and regulations of:



RESEARCH | DIVERSITY | ETHICS

Voice Calls between Wireless (Android) Phones and a Cooperative Application for Sending Sms over Wi-Fi Networks

Mr. Sandip Rane^α, Miss. Jaya Suradkar^σ, Miss.Akanksha Patil^ρ & Miss.Ritu Gayakwad^ω

Abstract - Wi-Fi technology is a form of telecommunication that allows data and voice transmissions to be sent across a wide range of interconnected networks. The success in deploying services and applications based on this concept needs the development of applications that allows intermediate users the reception and forwarding of information to destination users. The user may take the maximum benefit from the technology acquired inside the mobile phone for instance, since it is possible extend the radio coverage by several hops, and enjoy similar mobile's operator services free of charge. In this work we are going to present the development of an integrated Java application to send SMS and Voice among user mobile phones through its WIFI interface. A software application is developed using Android which allows free and secured communication between selected phones in the Wi-Fi network.

The base idea is unifying voice and data onto a single network infrastructure by digitizing success of wireless and mobile communications has resulted in the creation of a large variety of technologies. Expanding services through the use and coordination of these diverse networks will provide user mobility between different types of systems.

1. INTRODUCTION

As human started to get civilized, great need for more, advance equipments occurs. Most of the things which in their early phase are considered to be part of leisure, have become one of the most necessary things of daily life. One such invention is telephone. However the development of conventional telephony systems is far behind the development of today's Internet. Centralized architectures with dumb terminals make exchange of data very complex, but provide very limited functions. Closed and hardware proprietary systems hinder the enterprise in choosing products from different vendors and deploying a voice function to meet their business needs. Consequently, Web like IP phone distributed architecture is proposed to complete following functions-

1. To facilitate enterprises and individuals to provide their own phone services. The advent of Voice over

2. Internet Protocol (VoIP) has fundamentally been transforming the way telecommunication evolves.
3. This technology is a form of telecommunication that allows data and voice transmissions to be sent across a wide variety of networks. VoIP allows businesses to talk to other branches, using a PC phone, over corporate Intranets. Driven by the ongoing deployment of broadband infrastructure and the increasing demand of telecommunication service, VoIP technologies and applications have led to the development of economical IP phone equipment for ever-rising VoIP communication market based on embedded systems.
4. IP phone application can satisfyingly provide the necessary interfaces between telephony signals and IP networks.
5. Although IP phone communication over the data networks such as LAN exists but these IP phones are fixed type. We have tried to implement wireless IP phone communication using the Wi-Fi network. This network being in the free bandwidth channel is considered insecure and vulnerable to security threats and hacking. So the area of concern is the security and running cost of a communication system. As a lot of sensitive information can be lost because of insecure communication system, a lot of work is required to be done in this field to fill the lacuna. The base idea is unifying voice and data onto a single network infrastructure by digitizing the voice signals, convert them into IP packets and send them through an IP network together with the data information, instead of using a separate telephony network.
6. Also the success of wireless and mobile communications has resulted in the creation of a large variety of technologies.
7. Expanding services through the use and coordination of these diverse networks will provide user mobility between different types of systems. To achieve seamless mobility, network management operations must be conducted without causing degradation of services, and without need for user intervention.
8. The movement of a user within or among different

Author^α : +918087563180 E-mail : sandiprane2007@gmail.com
AISSMS's College of Engineering, Pune.

Author^σ : +919096509948 E-mail : jayasuradkar1@gmail.com
AISSMS's College of Engineering, Pune.

Author^ρ : +91 9096832900 AISSMS's College of Engineering, Pune.

Author^ω : +91 9890725579 AISSMS's College of Engineering, Pune

types of network can be referred to as intersystem or vertical mobility.

II. SYSTEM PREREQUISITE

a) Current System

MILPITAS, Calif.--(BUSINESS WIRE)--Kineto Wireless, Inc., the key innovator and leading supplier of solutions that enable delivery of mobile services over broadband, today announced that T-Mobile USA, Inc. will deploy its Smart Wi-Fi Application for Wi-Fi Calling for their customers to improve indoor coverage through the use of existing Wi-Fi access points.

"Kineto's Smart Wi-Fi Application is a smart choice for T-Mobile; it's a low-cost solution that makes use of Wi-Fi access points already deployed in customer's home or office to improve coverage and increase capacity. T-Mobile plans to preload Android-based smart phones with Kineto's application to extend T-Mobile's existing Wi-Fi Calling service.

Kineto's Smart Wi-Fi application will offer the following benefits to T-Mobile and its customers:

- Existing Wi-Fi access points become extensions of the mobile network, increasing coverage and adding capacity in the places where customers demand it most at home and in the office.
- The smart phones' user interface is integrated seamlessly with the application, so customers receive exactly the same experience (dialer, contacts list, phone number, billing, etc.) when connected over Wi-Fi or the cellular network.
- Business customers with a Wi-Fi Calling plan can use it abroad to avoid expensive international roaming charges when calling back to the US.

b) Comparison With Existing Systems

Both the technology includes form of telecommunication that allows data and voice transmissions to be sent across a wide variety of networks. But the smart phones' user interface is integrated seamlessly with the application, so customers receive exactly the same experience (dialer, contacts list, phone number, billing, etc.) when connected over Wi-Fi or the cellular network and in our system we are using Voice over Internet Protocol (VoIP) which allows businesses to talk to other branches, using a PC phone, over corporate Intranets. Although phone communication over the data networks such as LAN exists but these phones are fixed type. The base idea behind this system is unifying voice and data onto a single network infrastructure by digitizing the voice signals convert them into IP packets and send them through an IP network together with the data information, instead of using a separate telephony network.

III. SYSTEM FEATURES

a) Product Functionality

a. Architecture

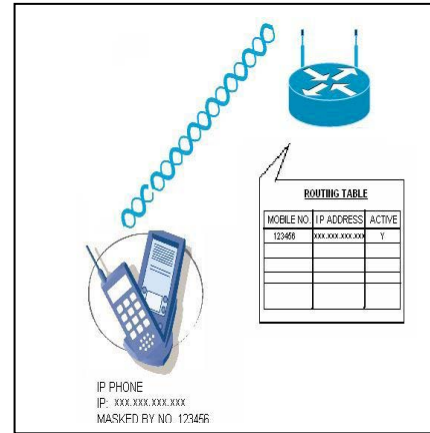


Figure 1: Registering of IP phone in the Routing table

IP enabled cell phones are the mobile units capable of accessing the WiFi network. WiFi Routers have routing tables which are used to route the calls to the desired IP phone. A J2ME application was developed which provide access to the IP phone in the WiFi network.

b. Connection Mechanism

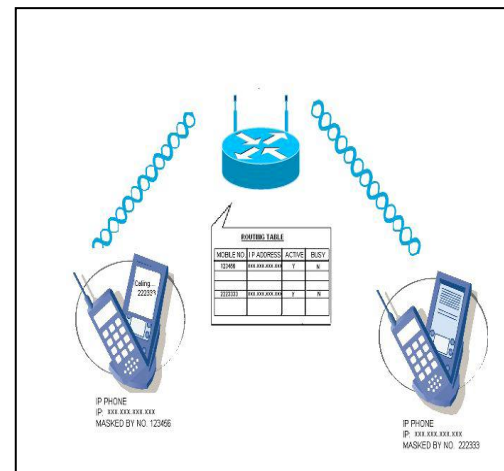


Figure 2 (a) : User 1 dialing

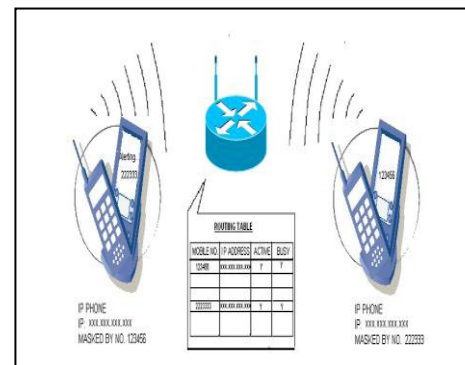


Figure 2 (b) : User 2 receiving a call User 2's number from User 1

1. IP phones registers its fixed IP on the WiFi route, where the router will update its routing table with this IP phone being active (Figure 1).
2. The name and number of the phone with the particular IP are searched in the database and IP is replaced with the name of the user in the WiFi routing table.
3. If the number starts with a special symbol say asterisk ' * ' then the router tunnels the call to GSM network using UNC.
4. When signal of WiFi fades out handover takes place and the mobile unit starts working on the GSM network.

c. Management Of Call Between Wifi To Wifi

A number (user 2) is dialed using the J2ME application from user 1's mobile unit. The application then sends the number in 128 bit encrypted form to the router, requesting a call to be placed (Figure 2(a)). The router in the WiFi network searches its routing table for the desired number and if the number is active then a packet of data signaling an incoming call is sent to the corresponding IP on the WiFi network . The J2ME application on user 2's mobile unit alert's the user of an incoming call . The routing table gets updated to both the IP mobile units as being busy (Figure 2(b)). When the user 2 accepts the incoming call, real time transfer of voice data packets starts between the two mobile units .The header of each packet is encrypted in such a way that the router can decrypt it and route it to the required mobile unit. While the actual voice data packets are encrypted in such a way that only the other mobile unit can decrypt and it can not be decrypted at the router end. When the call is broken down the routing table is again modified and the busy status is changed. If the user at the other end doesn't want to take the call and presses the hang up button then the user at the first end is send a message that the user dialed is busy.

d. Management Of Call Between Wifi To Public Network

When a user wants to dial a call to the outside world(that is to the public network) , he has to suffix an ' * ' before the number he wants to call to. If he dials "*1234567890", Then the WiFi router identifies the ' * ' and routes the call via broad band connection to the UNC (UMA Network controller). Till UNC IP was being used to carry the voice – data packets (Refer to Figure 3). After that point it depends upon the UNC which technology is used to carry the packets. Also if the call has to be routed to the outside world the packets have to be decrypted as the UNC is unaware of the encryption used by the WiFi network. Moreover the packet has to be organized and decrypted according to the needs of UNC.

e. Wifi To GSM Handover

In case of WiFi to GSM handover, first the mobile unit has to detect that the WiFi signal has completely faded out. Also now the WiFi service is no longer acceptable. At this stage the mobile unit sends a handover request to a neighboring GSM cell. The selection of mobile cell depends upon the SIM card present in the mobile unit at that time. Then the core network of the service provider has to handle the resource allocation procedure with the base station controller (BSC) for the GSM calls. Once the allocation is complete a signal is sent to the mobile unit that the handover has taken place.

b) Functional Requirements

1. The primary feature of a voice application is that it is extremely delay-sensitive rather than error-sensitive. There are several approaches that have been developed to support delay-sensitive applications on IP networks.
2. In the transport layer, UDP can be used to carry voice packets while TCP may be used to transfer control signals, as long delay is caused by TCP by its retransmission and three-handshake mechanism.
3. The Real-Time transport protocol (RTP) is a compensative protocol for real-time deficiency on packet networks by operating on UDP and providing mechanisms for real-time applications to process voice packets.
4. The Real- Time Control protocol (RTCP) provides quality feedback for the quality improvement and management of the real-time network.
5. Several signaling protocols have been proposed for IP phone applications. SIP is peer to- peer protocols. Being simple and similar to HTTP, SIP will bring the benefits of WWW architecture into IP telephony and readily run wherever HTTP runs.
6. It is a gradual evolution from existing circuit-switched networks to IP packet-switched network.
7. A lot of work has been done to implement IP phones over data networks, even on the internet (Skype), but almost all work has been done mainly using secure communication channels and fixed IP phones.
8. A lot of work has been done to connect different heterogeneous networks like UMA (Unified Mobile Access) technology that allows the use of both GSM network and WiFi networks (indoors) for calling EAS IP PHONE COMMUNICATION OVER WIFI Fixed IP based phone communication in a particular WiFi network is free.
9. Moreover the communication is secured as the existing WiFi network is used rather than using the services of any other carrier.
10. 128 bit encrypted voice communication takes place between authorized and authenticated IP phone users.

11. If the user wants to call to outside world then he has suffix a symbol, in this case ' * '.Then the call is routed to the outside world.
12. Also, if the user moves out of the WiFi range, handover takes place the mobile unit again starts working on GSM network.

IV. SYSTEM SCOPE

Phone Distributed Architecture is proposed to facilitate enterprises and individuals to provide their own phone services. The advent of Voice over Internet Protocol (VoIP) has fundamentally been transforming the way telecommunication evolves. This technology is a form of telecommunication that allows data and voice transmissions to be sent across a wide variety of networks. VoIP allows businesses to talk to other branches, using a PC phone, over corporate Intranets. Although phone communication over the data networks such as LAN exists but these phones are fixed type. We have tried to implement wireless phone communication using the Wi-Fi network. This network being in the free bandwidth channel is considered insecure and vulnerable to security threats and hacking. So the area of concern is the security and running cost of a communication system.

The scope of the project can be explained as below-

1. Phones registers its fixed IP on the Wi-Fi route, where the router will update its routing table with this IP phone being active.
2. The name and number of the phone with the particular IP are searched in the database and IP is replaced with the name of the user in the Wi-Fi routing table.
3. The router then redirects the message to the respective phone once it has detected it in the network.
4. The base idea is unifying voice and data onto a single network infrastructure by digitizing the voice Signals convert them into IP packets and send them through an IP network together with the data information, instead of using a separate telephony network.
5. Also the success of wireless and mobile communications has resulted in the creation of a large variety of technologies.
6. Expanding services through the use and coordination of these diverse networks will provide user mobility between different types of systems.
7. IP enabled cell phones are the mobile units capable of accessing the Wi-Fi network. Wi-Fi Routers have routing tables, which are used to route the calls to the desired IP phone.
8. A J2ME application was developed which provide access to the IP phone in the Wi-Fi network.

REFERENCES RÉFÉRENCES REFERENCIAS

1. Pintel Corp., *Next Generation VoIP Services and Applications Using SIP & Java Guide*, http://www.pingtel.com/docs/collateral_techguide_final.pdf.
2. Chian C. Ho,tzi-Chiang Tang,Chin-Ho Lee, Chih – Ming Chen,Hsin- Yang Tu,Chin-Sung Wu, Chao-His Chang,Chin-Meng Huan, " *H.323 VoIP Telephone Implementation Embedding A Low Power SOC Processor*",0-7803-7749-4/ 03 IEEE.,p.163-166.
3. IEEE, "Part 11: *Wireless LAN Medium Access Control (MAC) and Physical Layer Specifications – High Speed Physical Layerin the 5 GHz band*", IEEE Standard 802.11a, 1999.
4. IEEE, "Part 11: *Wireless LAN Medium Access Control (MAC) and Physical Layer Specifications – High Speed Physical Layerin the 2.4GHz band*", IEEE Standard 802.11b,1999.
5. IEEE, "Part 11: *Wireless LAN Medium Access Control (MAC) and Physical Layer Specifications – Amendment: Medium Access Control (MAC) Enhancements of Quality of Service*", IEEE Standard P802.11e/D12.0,November 2004
6. IEEE, Mohammed A Qadeer,Robin Kasana,Sarvat Sayeed, "Encrypted Voice Calls with IP enabled Wireless Phones over GSM/CDMA/WiFi Networks",2009 International Conference on Computer Engineering and Technology, 978-0-7695-3521-0/09 2009 IEEE DOI 10.1109/ICCET.2009.95.p.218-222