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Telephony Calls over Bluetooth

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Abstract - VoIP is born from the growing Internet infrastructure, which has over the years seen significant improvements in both bandwidth and end-to-end latency. Merging VoIP technologies with telephony infrastructures is of particular interest since it significantly reduces the costs. In this project, we are making voice calls over Intranet available on a mobile phone using Bluetooth as the access protocol. Bluetooth was selected because it is increasingly available in mobile telephones. Most modern mobile phones with a focus on wirelessly sharing data between the device and a host PC come equipped with a Bluetooth adaptor.

The project mainly consists of developing a Voice-over-Bluetooth (VoB) mobile application for Android phones and a PC application to enable voice calls over Intranet and Bluetooth connection. The mobile application connects to desktop application over BT to make and receive calls. The desktop application establish/receive call with/from other mobile/phone terminals over Intranet. When in range of a PC, a wireless Bluetooth connection to the IP network is made available to the mobile phone, offering the choice of connecting to a conventional mobile GSM network or to a lower-cost IP infrastructure. The vision for the future is to make the mobile phone's operation fully transparent to the user by making both technologies completely interchangeable.

Keywords : *Bluetooth, VoIP, Android.*

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I. Introduction

Purpose : Telecom operators in growth markets are facing extreme network congestion due to high Tele density in metro cities. This leads to dropped calls and poor voice quality causing customer dissatisfaction and loss of business. This project aims to decongest telecom network, where possible, by employing Bluetooth technology and VoIP and use Internet as a secondary network to route phone calls. With this solution, the mobile phone transparently switches to Bluetooth and VoIP (when present) while establishing call.

Scope : We are developing this system to decongest the telecom network. Rather than using the GSM network we are going to route the telephony calls through Internet. This will reduce the problem of call drops and poor voice quality. Due to use of internet or intranet the service cost of telephony will reduce by considerable amount.

There are basically two applications - a Voice-over-Bluetooth (VoB) mobile application for Android phones and a PC application to enable voice calls over Internet or Intranet and Bluetooth connection. The mobile application connects to PC application over Bluetooth to make and receive calls. The PC application can be extended internally to establish/receive call with/from other mobile/phone terminals.

Product Perspective : We can see this system as a replacement or an alternative for the traditional GSM system. With this system the mobile application connects to desktop application over BT to make and receive calls. The PC application establish/receive call with/from other mobile/phone terminals.

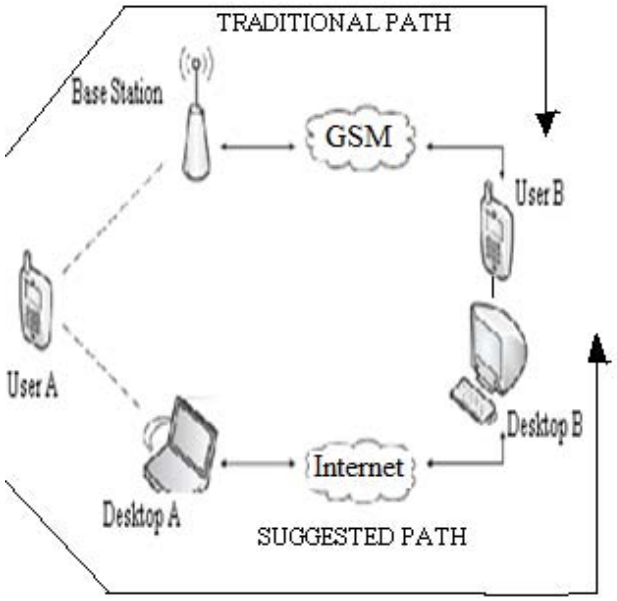

Fig. 1: System Block Diagram

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II. System Architecture

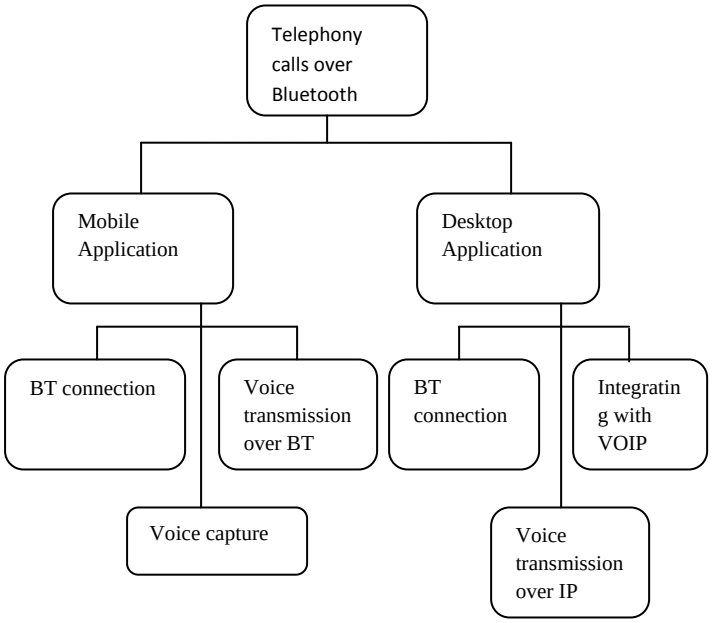


Fig. 2: Functional Decomposition

a) Mobile Application

In mobile application we have two functionalities viz. connect mobile to intended PC and capture and transfer voice.

In the former functionality the calling mobile first searches for the Bluetooth enabled PCs in range. For this purpose mobile application makes use of Service Discovery Protocol (SDP) which also returns Mac address of those PCs. After searching all the PCs in range the application connects to intended PC using the MAC address.

In later functionality the application captures real time voice using mobile multimedia API and transfers it over Bluetooth connection.

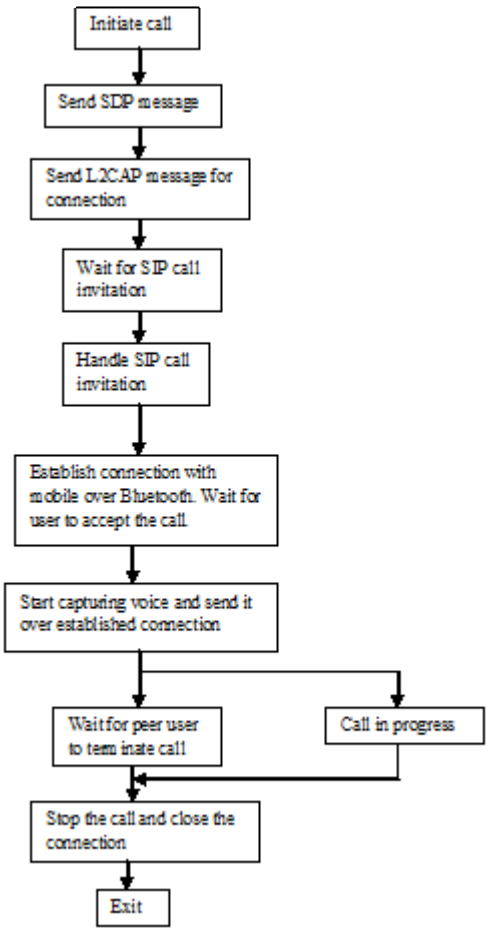
b) PC Application

In the PC application we are making use of VOICE OVER IP technology. This technology connects two PCs over Internet/Intranet and allows two systems communicate the real time data with each other.

After getting connected with mobile application, PC application starts sending and receiving data to and from corresponding mobile.

Also sender side PC application connects to receiver side PC application over intranet/internet and transfers data over established connection.

III. Work Flow



IV. Android Application

Android applications consist of loosely coupled components, bound using a project manifest that describes each component and how they interact.

There are six components that provide the building blocks for your applications:

Activities Your application's presentation layer. Every screen in application will be an extension of the Activity class. Activities use Views to form graphical user interfaces that display information and respond to user actions. In terms of desktop development, an Activity is equivalent to a Form.

Services The invisible workers of your application. Service components run invisibly, updating your data sources and visible Activities and triggering Notifications. They're used to perform regular processing that needs to continue even when your application's Activities aren't active or visible.

Content Providers A shareable data store. Content Providers are used to manage and share application databases. Content Providers are the preferred way of sharing data across application boundaries. This means that you can configure your own Content Providers to permit access from other

applications and use Content Providers exposed by others to access their stored data. Android devices include several native Content Providers that expose useful databases like contact information.

Intents A simple message-passing framework. Using Intents, you can broadcast messages system-wide or to a target Activity or Service, stating your intention to have an action performed. The system will then determine the target(s) that will perform any actions as appropriate.

Broadcast Receivers Intent broadcast consumers. By creating and registering a Broadcast Receiver, your application can listen for broadcast Intents that match specific filter criteria. Broadcast Receivers will automatically start your application to respond to an incoming Intent, making them ideal for event-driven applications.

Notifications A user notification framework. Notifications let you signal users without stealing focus or interrupting their current Activities. They're the preferred technique for getting a user's attention from within a Service or Broadcast Receiver. For example, when a device receives a text message or an incoming call, it alerts you by flashing lights, making sounds, displaying icons, or showing dialog messages. You can trigger these same events from your own applications using Notifications.

V. Conclusion and Future Work

Conclusion : We tried to study how Telephony calls over Bluetooth in conjunction with IP based network can be beneficial over GSM network. Network congestion, network unavailability problem could be totally removed with this solution. In case of critical communication this could be indispensible option as probability of internet server going down is very rare. Currently a simple application is used to send voice over IP. However tools provided by VoIP service provider can be used to achieve quality and efficiency. Long duration calls needs to be tested to exploit the communication support provided by mobile device. With this solution, dependency on service provider for mobile communication or GSM based communication is totally removed. Hence cost benefit could be achieved if the cost of IP based network is minimal.

Future Work : The implemented prototype could be enhanced to handle multiple concurrent calls. Also other communication applications like messaging, video calls could be built on the top of this application to experience mobile face to face communication in any situation. Also the GSM service provider based identity of mobile device (i.e. mobile no) could be replaced with other customized identity in conjunction with other device specific identity.

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