

Implementation of Voice, Video and Text Data over Wi-Fi

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Abstract- Communication through mobile phones comes at a certain expense. What if we cut down the expenses and make this communication a cost-free communication. This is the concept of Voice over Wi-Fi. This paper consists of three modes of mobile based communication over Wi-Fi i.e. Messaging, Voice calling and Video calling.

Keywords— Android, Wi-Fi peer to peer, Smartphone, Router, Proxy Server, APIs, Wi-Fi-Direct.

I. INTRODUCTION

Communication has developed from a simple cell-phone to an advanced smart-phone thus increasing the functionality and user interactivity. Due to its increasing efficiency and reliability, it can be seen today in everyone's pocket. Thus providing users with cheaper and smarter phones has become a lucrative business for many manufacturers. With the increasing demand for mobile devices, there is an increase in the number of service providers too. But the cheaper service providers usually win over the costlier ones. Service providers that have already earned a name are still expanding further and further to earn recognition throughout the globe. With the worldwide communication between people through mobile phones increasing day-by-day, it has become a priority to reduce the costs of data transmission through a certain sets of texts, voice or video.

The concept behind modulation is to neglect low frequency noise and to make it feasible for long distance transmission and at a higher efficiency. This concept being very useful and productive has made a mark in the field of data transmission. There has been increasing demands to have cheap communication within a fixed range, like an office, in a building or a township. The recent advancements in the mobile phone technology have incorporated the features of accessing Wi-Fi from a very small device. The presence of Wi-Fi in the latest mobiles allows the user to access internet with the help of a Wi-Fi router. Exploiting the entire bandwidth of 2.4GHz for making voice calls between devices, it eliminates the need of using the service provider's bandwidth. Hence voice calls, messaging and video calls can be made at zero cost.

Almost all of the recent launches of phones comes with Wi-Fi. The number of people using Wi-Fi devices is increasing day-by-day. Our proposed model would eliminate the use of service providers and would provide zero cost communication for short distance. 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.[2]

II. SYSTEM DESIGN

A. Messaging

- Analysis



Fig.1

Internet- based instant messaging applications allow users to send/receive messages over the internet. There are many such existing apps. For example Viber, Skype, BBM etc. But these applications require internet connection from mobile service provider which is not free of cost. In this paper, we propose a communication system that allows android based smartphone users to send and receive messages over the Wi-Fi range which requires neither any internet connectivity nor any messaging service from the mobile service providers as shown in figure 1.

The APIs used to develop this app is wifi.p2p which provides classes to create peer-to-peer (P2P) connections with Wi-Fi.

Proposed architecture basically consists of client and router which may include the following steps. 1. First of all router is set with an id and password 2. Then client program runs on android based mobile device and send a request to connect with router.

3. Once the client is successfully connected, the application provides the list of all other active users to the client.

4. Client can view the list of all active users and can communicate with them.

5. When a client sends a message to another client, this message first goes to the router.

6. Then router sends this message to the appropriate receiver.

7. Once the receiver receives the message, can read it.

8. In the same way receiver can reply message to the sender.

9. This application basically uses the concept of Wi-Fi peer to peer socket programming. This approach allows Message transfer between android based devices which is implemented, tested and works on or above Android version 4.1.

B. Voice Calling

- Analysis:

The idea of voice calling predominantly comes from the fact that people all over the world are connected through mobile phones that mainly uses voice calling as its main source of communication. The idea of VoWi-Fi was derived from the fact that the existing wireless local area networks that were initially designed to support data communications, can eventually support voice communication. However, there were issues pertaining to voice quality as people communicate from different parts of the world. This may sometimes lead to voice disturbance, noise, improper sending and reception of noise, etc. This resulted in many manufacturers coming out with their own designs and implementations to support voice over wireless network. . In this paper, we propose a communication system that allows android based smartphone users to send and receive voice data over the Wi-Fi range which doesn't require any internet connectivity. Services such as MAC as well as Real Time Transport Protocol (RTP) and Real Time Transport Control Protocol (RCTP) will be used.

- Working



Fig. 2

The above figure [1] no.2 shows a general architecture of audio transmission application. It shows a typical chain of how a data is transmitted.

Proposed architecture functions according to the following steps:

1. First data is digitized and recorded.

2. Then the recorded data is converted into samples of 20ms or 30ms.

2. The recorded data is then encoded to minimize the transmission bit rate and are transmitted.

3. In the receiver side, the received data is decoded using audio decoder.

4. The decoded data is then reproduced using audio player.

The APIs that are needed to build this app are as follows:

- android.os:
It provides basic operating system services, message passing and inter-process communication on the device.
- android.util:
It provides common utility methods such as date/time manipulation, base64 encoders and decoders, string and number conversion methods, and XML utilities.
- android.view:
It provides classes that expose basic user interface classes that handle screen layout and interaction with the user.
- android.app:
It contains high level classes encapsulating the overall Android application model.
- android.net:
It contains classes that help with network access beyond the normal java.net.*API'S.
- android.media:
It provides classes that manage various media interfaces in audio and video.[5]

C. Video Calling

- Analysis

In a typical Wi-Fi network, clients discover and associate to WAPs which are recreated and announced. In this way, a device unambiguously behaves either as an AP or as a client, both having different functionalities. With Wi-Fi Direct one main advantage is that it is dynamic, that is it behaves both as an AP as well as a client depending upon the need. These roles are therefore logical roles that could even be executed by the same device simultaneously. In order to establish a connection, P2P devices have to agree on a role that each device will assume. In the following, we describe the steps or methods that are needed for video sharing.

- Working

We have built a voice calling module between the mobile devices using Wi-Fi Direct. Our problem can be simply described as that when 2 mobile devices encounter with each other, one needs to detect whether there is a mobile in the vicinity. In the real case, it could be multiple devices sharing information at the same time. After we find the peers, we will connect peers via Wi-Fi Direct. The Wi-Fi Direct has many limitations, like crash problems, only in Android 4.0 device, and all the devices need open Wifidirect all the time to wait for connection. Since it is convenient, we will use it to simplify the work, and we will focus on developing the protocols and algorithm.

After connecting with peers, we will establish socket communication. Then we need use some protocols to check the availability. After all the work set, we can transmit the data based on the requirement.

The basic steps for a Wi-Fi Direct application are:

- Initial Setup
- Discovering Peers
- Connecting to Peers
- Transferring Data
- Establishing the connection

The Client Server processes are similar to each other. The client will send out the request message upon connection set up. Server and client get the requests and they open the video activity screen. The client starts recording and tap on the send button to send the messages from the client to the server.

The APIs used for video calling are:

- android.os:

It provides basic operating system services, message passing, and inter-process communication on the device.

- **android.util:**

It provides common utility methods such as date/time manipulation, base64 encoders and decoders, string and number conversion methods, and XML utilities. It is a very important API.

- **android.view**

It provides classes that expose basic user interface classes that handle screen layout and interaction with the user.

- **android.net.wifi:**

It provides classes to manage Wi-Fi functionality on the device.

- **android.net.wifi.p2p:**

It provides classes to create peer-to-peer (P2P) connections with Wi-Fi Direct.

- **android.app:**

It contains high-level classes encapsulating the overall Android application model. An Android application is defined using one or more of Android's four core application components. Two such application components are defined in this package: Activity and Service. The other two components are from the android.content package: BroadcastReceiver and ContentProvider. An Activity is an application component that provides a screen with which users can interact in order to do something, such as dial the phone, take a photo, send an email, or view a map. An activity can start other activities, including activities that live in separate applications.

The Fragment class is also an important part of an application's design—especially when designing for large screen devices, such as tablets. A fragment defines a distinct part of an activity's behavior, including the associated UI. It has its own lifecycle that is similar to that of the activity and can exist alongside other fragments that are embedded in the activity. While an activity is running, you can add and remove fragments and include each fragment in a back stack that's managed by the activity—allowing the user to navigate backwards through the fragment states, without leaving the activity. This package also defines application utilities, such as dialogs, notifications, and the action bar.

- **android.content:**

It contains classes for accessing and publishing data on a device. It includes three main categories of APIs: Content sharing. For sharing content between application components. The most important classes are: ContentProvider and ContentResolver for managing and publishing persistent data associated with an application. Intent and IntentFilter, for delivering structured messages between different application components—allowing components to initiate other components and return results.

- **Package management (android.content.pm)**

For accessing information about an Android package (an .apk), including information about its activities, permissions, services, signatures, and providers. The most important class for accessing this information is PackageManager.

- **Resource management (android.content.res)**

For retrieving resource data associated with an application, such as strings, drawables, media, and device configuration details. The most important class for accessing this data is Resources.

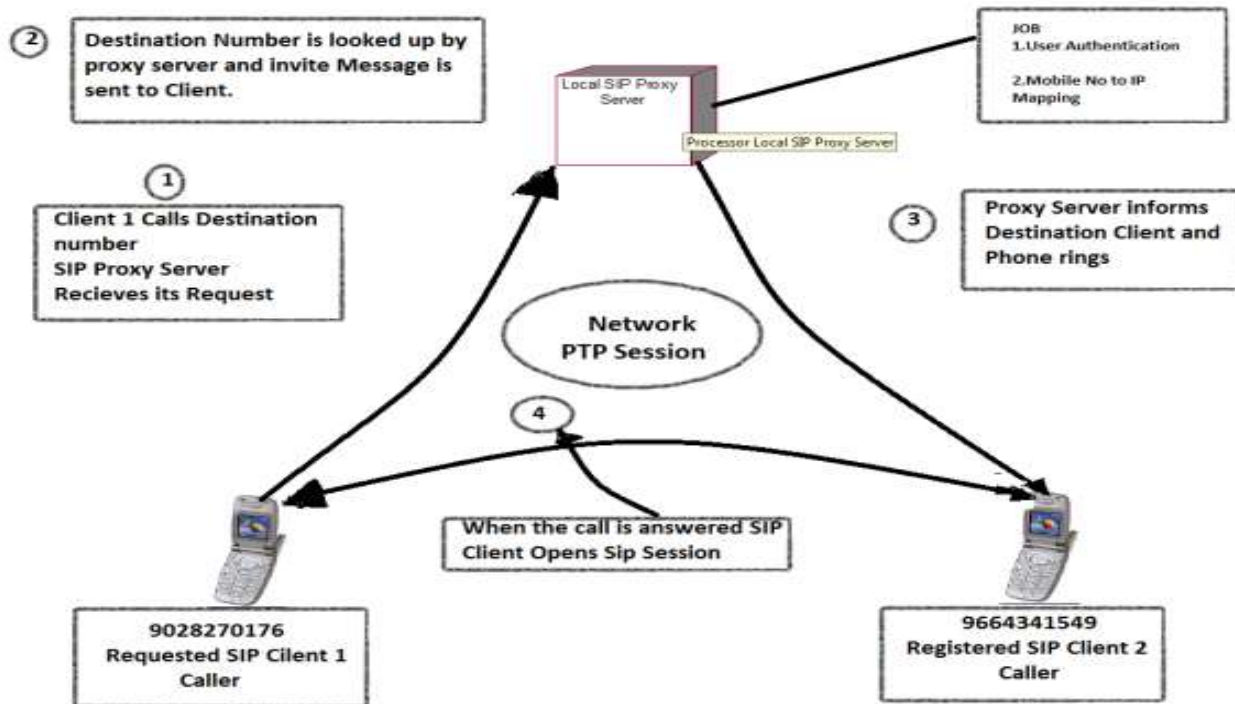
- **android.media:**

It provides classes that manage various media interfaces in audio and video. The Media APIs are used to play and, in some cases, record media files. This includes audio (e.g., play MP3s or other music files, ringtones, game sound effects, or DTMF tones) and video (e.g., play a video streamed over the web or from local storage).

- **android.hardware:**

It provides support for hardware features, such as the camera and other sensors. Be aware that not all Android-powered devices support all hardware features, so you should declare hardware that your application requires using the <uses-feature> manifest element.[5]

III.NETWORK DIAGRAM



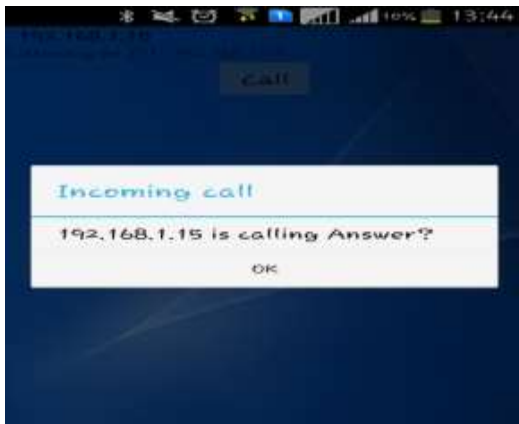
IV.RESULT



Home Screen



Messaging



Voice Calling 1



Voice Calling 2



Searching devices for Video transmission



Recording Screen for Video transmission

V.SCOPE

In the early stages, Voice over IP (Vo-IP) was used in many places because of coaxial phone cable system. But since the advent of Voice over Wi-Fi (VoWi-Fi), it has been useful since it found a replacement to costlier coaxial phone cable system. What VoWi-Fi has brought into the market is its lower cost, portability and mobility because of which it is affecting the cell phone business.

A company with fixed warehouses or locations would take advantage of their existing Wi-Fi network and use VoIP for employees to communicate with one another. This system can also be used like Land Mobile Radio System or Walkie-talkie systems with push to talk and emergency broadcast channels. It can also be used in educational institutions to contact within departments and also in various organizations like banks etc. Video calling can be used between companies at different locations where employees need video conferencing for communicating.

VI. ACKNOWLEDGEMENT

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VII. CONCLUSION

Communication is a field which will modify from one technology to another technology depending on various factors such as cost, reliability, etc. In such rapidly growing and changing environment it is possible that certain factors will not be considered. This may result into a new technology with all the factors considered that weren't before. Our paper provides an efficient way of sending

messages, sending and receiving data through voice and through video. This all facilities are provided at zero cost. All the calls within the network are free. This model can be used in many places where communication between peoples is of prime importance.

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