BTCHAT – A Bluetooth Chat application supporting different versions of ANDROID OS

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ABSTRACT

The primary need for the Android Bluetooth chat is to enable communication within 10 metres without the use of Wifi. This is useful when individuals have to communicate confidential information between each other in an office. The application is implemented as a two stage process as a server-client socket communication The application is launched and a permission is requested to turn on Bluetooth. After Bluetooth is turned on, the client device will discover devices that have Bluetooth turned on and are displayed in a list. When a device is tapped , the tapped device acts as the server and connection is established between Client and Server. The important aspect of this stage of the process is that the device that is going to be part of this connection should have the application launched and it will discover devices. Once the connection is initiated the Chat window opens in both Client and Server devices. For connection to be established sockets are created in both server and client side. Communication occurs through these sockets. The sender writes a message and is added to the list and is written to the socket. The message is sent to the receiver. Once the message is received, it would run that process in the UI thread and display the message in the list. Multi-threading concept is used to ensure full-duplex communication. Communication could be terminated either by tapping the back button in the application which initiates closure of the socket.

Keywords: Android,Bluetooth,Chat,OS

I. INTRODUCTION

A chat is a form of text communication over real time. The method involved in chatting between devices varies from the technology that is used. A SMS chat uses a capacity determiner that determines the amount of information that can be transmitted and use this information for transmitting data. Based on this capacity of the network, the message is divided into fragments at the application layer of the sender and later reassembled at the receiver [1]. A Wi-Fi based chat is communication between devices over the internet. Wi-Fi based communication is not limited to just chat, but also to voice and video communication [2]. Bluetooth technology is a short range communication mechanism over wavelengths of 2.4 to 2.485 GHz from fixed mobile devices. Some of the advantages of Bluetooth is that it is fast over short ranges and is inexpensive [3]. However, there are disadvantages associated with Bluetooth in terms of security concerns and issues during the devices pairing mechanism [3]. In addition to this, Bluetooth version incompatibility also adds to the issue in communication through Bluetooth. This

disadvantage is overcome and discussed in this paper when different devices have differing versions of Bluetooth to communicate. In this paper, we have developed a full duplex Bluetooth chat system that handles version incompatibility of Bluetooth between the devices. The rest of the paper is organized as follows: Section 2 discusses on the literature survey where we discuss the various forms of chat highlighting on the use of Bluetooth, Section 3 on the proposed system, Section 4 discusses on the results and analysis and finally Section 5 concludes the paper with possibility for future extension.

II. LITERATURE SURVEY

The first form of chat communication is through SMS which stands for Short Messaging Service. It takes into consideration the capacity of the network to send messages over the network. At the sender's end, a Fragmenter module divides the message into fragments and sends the fragments over the network. At the receiver end, a Reconstructor module combines these fragments and reconstruct these messages which is displayed in the device.[1] This typically happens across mobile networks based on the bandwidth of the mobile network. The drawback of this system is huge messages cannot be sent and it relies on the mobile network's bandwidth. If the mobile network is down or if in a particular region, there is no mobile connectivity, then this form chat communication is not possible.

The next form of chat communication is through the Internet. Various messaging applications like Yahoo messenger [7], MSN messenger[7], Google Talk [7], WhatsApp [6], etc are some of the popular applications. Some of these applications involve a central server. A user sends a message to a another user, it first goes to the central server and then is downloaded by the receiving user. With mobile devices occupying the entire communication medium, Wi-Fi support becomes mandatory. Wireless communication is also possible through the internet by having devices that support wireless communication between devices. Using the existing messaging services communication happens through wireless LAN which operates at frequencies of about 10 GHz. Wi-Fi models consists of a hub of transceivers for the purpose of multiple data sources and destinations [4]. The drawback of this is on the reliability for internet connection with or without support for Wi-Fi. Thus communication cannot

happen when there is no Internet connection or poor connectivity with reduced bandwidth.

All mobile devices come with support for Bluetooth communication. Bluetooth is a low cost, short range technology and is used for communication between mobile devices that are within a short distance. Most of the mobile phones , tablet, iPad now have Bluetooth technology. Bluetooth is typically used to transfer data from one device to another without using the internet connection or mobile network's data. However, for large files, Bluetooth is not a reliable form of communication as speed and security are the main concerns **[3]**. In this work, we will be discussing an architecture that supports communication through Bluetooth that takes care of version incompatibility between devices.

III. PROPOSED BLUETOOTH CHAT SYSTEM – BT CHAT

The ideal scenario for the use of Bluetooth chat is for short distance communication among adjacent offices when there is no internet access.
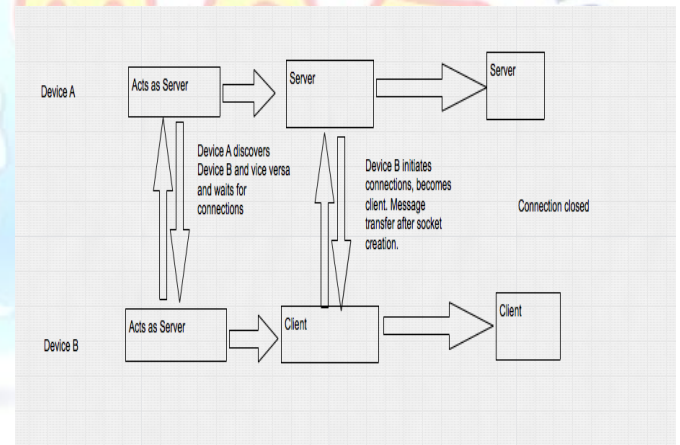

Fig 1: Block Diagram

Fig 1 shows the block diagram of the proposed system for communication. In this, both devices act as client as well as server. The application (BTCHAT) is developed in Android platform that has a user interface module similar to that of any messaging application. Both the server and the client need to have BTCHAT installed in it and thus supports full-duplex communication.

BTCHAT's primary requirement is to have Bluetooth enabled on both the devices. Once Bluetooth is enabled, the devices will detect each other. BTCHAT initiates communication by pairing with the other device that has BTCHAT. Once the device is discovered, the name of the device is listed in the list view of the android application. There are certain threads required for communication and to render the messages in the user interface.

They are the Bluetooth client thread, Bluetooth server thread and the user interface thread. When BTCHAT is launched, both act as server. One device will initiate the connection and becomes the client. On this device, the client thread starts to run and in the other device, the server thread will begin running. When these threads are running simultaneously, a socket is created and a connection is established. Message transfer happens through the socket. The message is converted to bytes and then sent through the socket. At the receiving end, the bytes are converted to the original message. The user interface thread helps in adding the messages to a list view defined in the android application. Once the back button is pressed either as a hardware or software button, the socket is closed in both the server and client and thus terminating the conversation.

The advantage of this system is once communication is established between the devices, BTCHAT allows the communication even with differing version compatibility of Bluetooth. However, the requirement is that the device that possesses a higher version of Bluetooth should act as a server to initiate communication.

Some of the advantages of Bluetooth is that it is useful for short range communication. The speed varies among the type of Bluetooth used with a minimum rate of 1 Mbps and a maximum range of 30 metres**[5]**
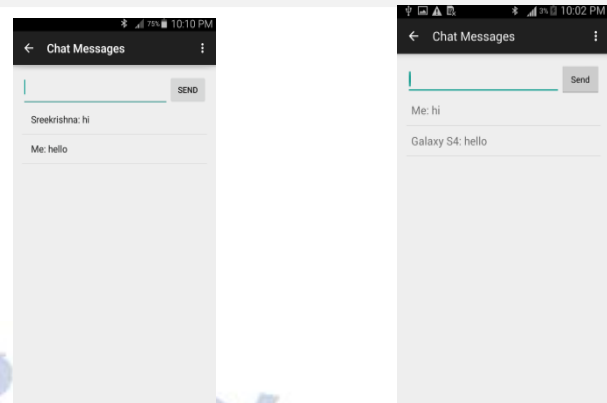

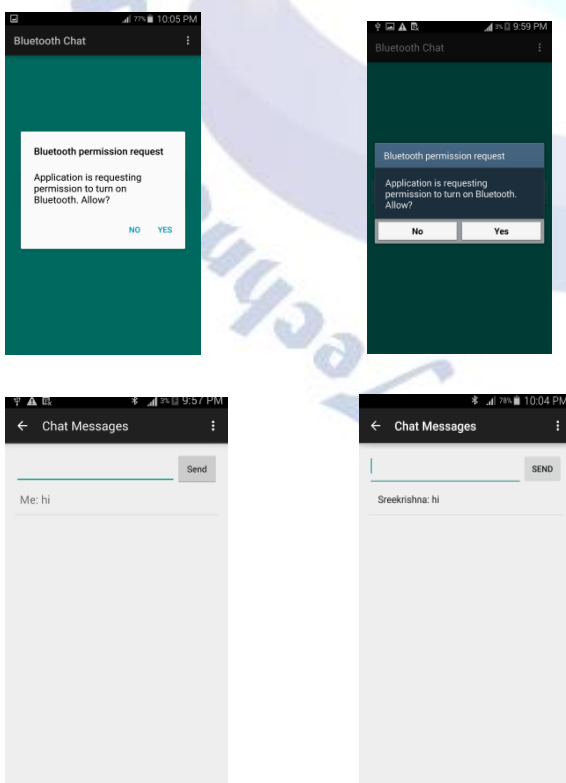*Fig 2: Screen shots of the proposed system*

Since Bluetooth LAN can have up to eight devices connected, ideally it should support group chat. But it may not support two simultaneous individual chats because Bluetooth socket can only be connected one at a time. Figure 2 shows the sequence of communication from initiation of a chat to communication of the proposed BT chat system.

IV. RESULTS AND DISCUSSION

BTCHAT was developed with Bluetooth Version 4.0 on ANDROID OS KITKAT / LOLIPOP version and was launched on the devices Samsung Galaxy Grand 2, Samsung Galaxy S4, Google Nexus 5 and Oneplus2. The Nexus and the Oneplus2 were running with tiger versions of Bluetooth, so they could not detect the devices like the Grand2 and S4 because they were using a lower version. However, the Samsung devices could detect the Oneplus2. BTCHAT however supports differing versions of ANDROID OS. The Samsung Galaxy Grand2 was running the Android KITKAT version while, the Samsung galaxy S4 was using the LOLIPOP version of Android. The only constraint that should match with the devices is the Bluetooth version for both the devices to initiate conversation.

V. CONCLUSION AND FUTURE WORK

In this paper we discussed a Bluetooth chat application which has been developed in the ANDROID platform. BTCHAT establishes full-duplex communication between differing and same ANDROID OS. It supports half-duplex in terms of Bluetooth version incompatibility and requires version compatibility of Bluetooth to enable full-duplex communication. This can be scaled in a Bluetooth LAN, where we can connect a maximum of eight devices. One device acts as master and the others as slave to establish full-duplex communication.

We can expect bluetooth chat communications with multiple devices in the future. However, as Bluetooth is less secure than Wi-Fi based communication, a secure mode of communication that encrypts and decrypts data using any one of the traditional encryption algorithm could be used for secure data communication.

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