Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

International Conference on Mobility in Computing- ICMiC13, Organized by Mar Baselios College of Engineering and Technology during December 17-18, 2013 at Trivandrum, Kerala, India, pg.50 – 55

SURVEY ARTICLE

An Android Powered Wi-Fi Network

Jijina N., Vishnu Ravi G., S. Viswanatha Rao

[1,3]Department of ECE, Mar Baselious College of Engineering & Technology, Kerala University, India

[2]Bharat Sanchar Nigam Limited, India

[1] jijina_np@yahoo.com; [2] vishnuravig@yahoo.co.uk; [3] rao-sv@hotmail.com

Abstract— ***Computer networks are used for the easy sharing of data and resources within a closed user group. These networks find use in a plethora of scenarios. This paper describes an App in Android which enables the android devices in a particular Wi-Fi network to join a private wireless network such as an office. Users entitled to use this particular app can share messages and data without using any paid carriers. Data exchanged will be highly secured since unauthorized access to the network is prohibited. Users can make audio and video calls within the network. App can be used to stream live video within the Wi-Fi network as well, if the android device used does have a video camera.***

Keywords— Ethernet; WLAN; Wi-Fi Network; Android; Audio and Video Streaming

I. INTRODUCTION

Computer networks find use in a plethora of scenarios. A Manager can supervise the different processes and events happening at various levels in his organization if the same is networked according to the need [1]. A doctor can analyze the history of a patient, check the availability of medicines, and even remotely attend a patient in an emergency if the hospital is networked properly [3]. Till the advent of various Wireless networking protocols, networks were realized mainly in a wired fashion using copper cable as the media. A typical wired Ethernet network can be used for sharing information like data, audio and video between different nodes in the network. For sharing various types of information different software packages need to be installed in the computers. For example “videolanclient” software is used for video streaming application. An integrated software package which can handle all types of information may be a costly affair.

An important concern which cramps the flexibility of normal Ethernet networks is the mobility factor. Usually copper cables are used as media, and once the network is established mobility of the nodes are limited to few feet depending on the extra bit of cable that is available. Moreover if we want to change the position or restructure the whole network it requires the entire media to be replaced by new set of cables to suit the positions of the

nodes. Also in conventional networks even if the application requires lesser resources one has to setup a minimum network structure to realize the goal. Another factor which needs to be thought off while realizing a network is the power consumption. As the number of nodes increases the power consumed also get increased and it will reach a huge value if the network reaches its maximum capacity. Considering the above factors, the need of the hour is a different solution for networking which involves flexibility and mobility of the nodes, lesser power consumption and software which are cost effective, which eventually points towards the use of handheld mobile devices which use Wi-Fi to get access to a wireless network.

This paper presents design and implementation of an application in android which enables the android devices in a particular Wi-Fi network to join a private wireless network such as an office, so that they can share information like data, voice and video. One such innovation has been that of Krishi Ville an android based mobile application for the enhancement of agricultural and rural development in India, as described by Singhal M. *et al* [2].

II. RELATED TECHNOLOGIES

An Android Powered Wi-Fi Network discussed here incorporates several different technologies, which are combined to bring about maximum efficiency to the design and implementation of the network. The underlying principles of these technologies are first discussed in brief before moving on to the actual working of the system. Two main technologies used here are Wi-Fi and Media Streaming.

A. Wi-Fi

Wi-Fi or Wireless Fidelity is a popular technology that allows an electronic device such as a personal computer, smart phone, tablet or digital audio player, to exchange data wirelessly over a computer network using radio waves. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the IEEE 802.11 standards". Wi-Fi allows cheaper deployment of local area networks (LANs). A Wi-Fi enabled device can connect to a network resource such as the Internet via a wireless network access point otherwise called a hotspot. Here the coverage area of the network can be expanded using multiple overlapping access points. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs using Wi-Fi.

B. Media Streaming

Multimedia data includes audio, video clips, live web casts etc. Audio file is a record of captured sound that can be played back. It requires high bandwidth to transfer across the network. Audio files are compressed for easy storage and faster transmission. Streaming means delivering a multimedia file from a server to a client, typically it occurs over a network connection. Two different types of streaming are Progressive download and Real-time streaming. In Progressive download, the client begins playback of the multimedia file as it is delivered and the file is ultimately stored on the client computer. In Real-time streaming, the multimedia file is delivered to but not stored on the client's computer. Real-time streaming is further classified into live steaming and on-demand streaming. Live streaming is used to deliver a live event while it is occurring. Streaming technology relies on multimedia data sequences and the compression schemes. Compression schemes decreases the bandwidth requirement by lowering the sampling rate and filtering the high frequency components. The main advantage of streaming includes availability of real time audio and video with the use of low bandwidth. Different methodologies for video streaming on Android based mobile phones are explained by Massandy D. T. *et al.* and Vun N. *et al.* [4], [5].

III. SYSTEM DESIGN

An Android powered Wi-Fi network is a wireless network that is connected in star topology with a central point and the nodes connecting to the central point as shown in figure 1. The central point or heart of the network is the Wi-Fi Router which is doing all the switching and routing functionalities between the clients within the network. Clients can be Wi-Fi enabled mobile phones or tablets with Android OS. Each of the clients is needed to be installed with a custom made communication application written in Android for communicating within the network. The particular App is developed in Android since Android is an Operating system which is free to use. The source code for Android is available under free and open source software licenses. That means anybody can write and publish programs in Android. Any bugs and errors in the system are easily found out and corrected due to the overwhelming support community in the open source world. Android is Linux based so users and services run at the lowest possible permission level there by extending the maximum security to the Operating System. In Android, like Linux, the Operating system is separated from the User Space, so stability is guaranteed. Mobile Handsets and tablets featuring android are cost effective. Full utilization of available resource is possible in Android unlike other proprietary Mobile Operating Systems like iOS, Symbian and Windows. And more over Android is the most popular Mobile OS available in terms of look and feel and it is optimized for touch input which is the future trend in computing [6].

Within the network clients are getting connected to the Router by means of 2.4 GHz radio channels. Number of clients that can be connected will be depending on the Bandwidth capacity of the Wi-Fi Router and the Class of the IP pool that is being used. Preferred Class of the IP Pool is Class C, in which a maximum of 254 Clients can be connected.

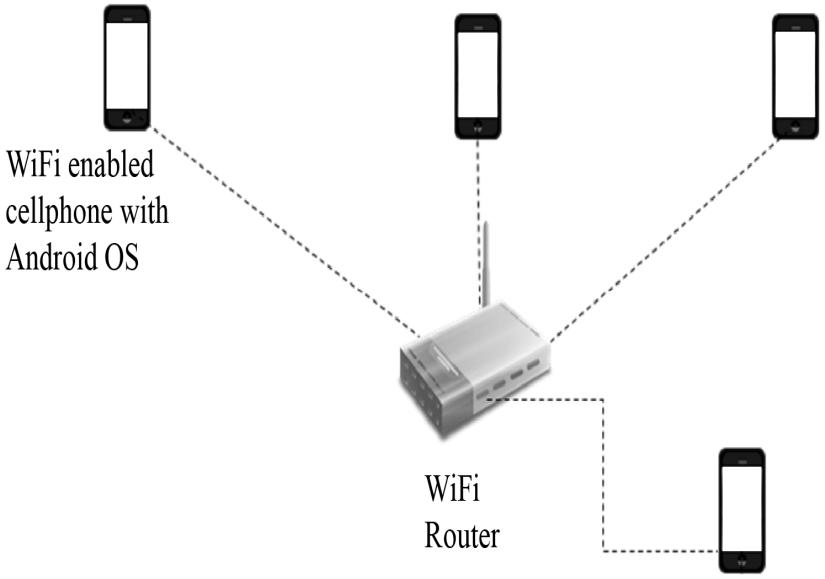

Fig 1: Android powered Wi-Fi Network

The range of transmission will depend on the protocol used, transmission power of the Router and the obstructions and interference from the surroundings. Range can be enhanced by using additional Wi-Fi routers wherever required. Memory of the network is limited to device memory and hence an optional central server can be configured to provide additional memory features. The central server can be used to monitor the signal strength as well the

availability of each device in the vicinity. If capable software is loaded in the server, it can be used for internal surveillance using the video from the mobile phones in the network.

The Android App supports a number of features. It enables the android devices in a particular Wi-Fi network to join a private wireless network which can be used for internal surveillance, file sharing and data exchange within an organization like offices, factories and hospitals were security and mobility is the prime concerns. Users of this App can communicate with in the group using text, voice and video. Since Wi-Fi is used for communication, no paid carriers are used.

A Application

When the App starts, it will check for the availability of Wi-Fi before the main menu and interface is displayed. If Wi-Fi is not available, the App will display an error showing the unavailability of Wi-Fi. If Wi-Fi is available then the App will display the main menu and it will wait for the next event. A flow chart depicting the whole process of the application is shown in figure 2.

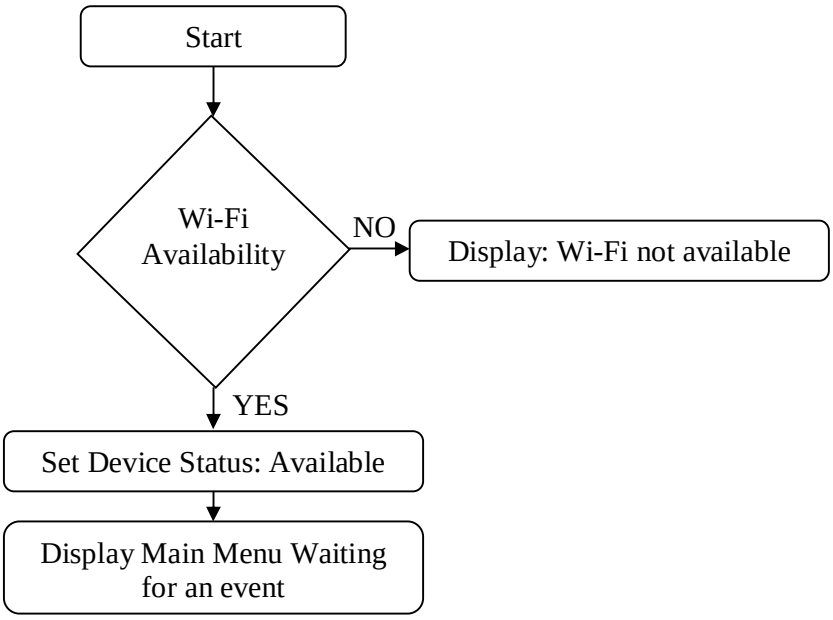

Fig 2: Application Flow Chart

B. Main Menu

The proposed App has to support data, voice and video. The main menu of the App is shown in figure 3. The buttons corresponds to the functions of the App namely, sending text, sending file, audio call, video call and settings respectively. The text space shows the status of the App. Different status messages are Available, Incoming Audio Call, Incoming Video Call, Incoming File and Incoming Text.

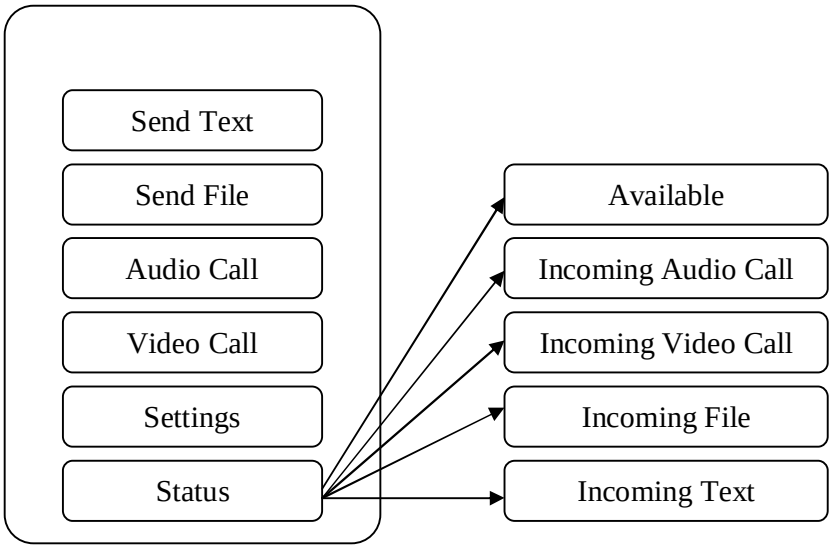

Fig 3: Main Menu

IV. IMPLEMENTATION

The proposed application was written in Eclipse which is an Android /Java IDE [7]. Like any other Mobile phone/tablet application sufficient care was taken so that the application can be run on devices with various display sizes. Proper entries were made in the layout folder of the application for supporting various display sizes. Since android programming and concept is similar to JAVA, JAVA coding was used to realize the network functionalities of the application. The code was tested in an Android Emulator which comes preloaded with the Eclipse IDE. Socket programming concepts were used for realizing the network functionalities of the App.

The App had to be tested in a real Wi-Fi network since Eclipse or other IDEs do not support Wi-Fi as of now. The application was run over a Wi-Fi network with the Android devices as clients. The different functionalities of the App were tested using these Android devices which were either mobile phones or tablets. Consider the case of sending text message between two devices. For this the option for sending text in the Main Menu was used. While tapping that button, the user interface corresponding to sending text would be displayed as shown in figure 4. If a user wants to send a text message he/she has to enter the recipients IP address or identity, then type in the text message and tap the send button. If the message is send successfully a confirmation message is displayed. Similarly all other functionalities were tested and were working properly. Sufficient care was taken so that the App is backward compatible with previous versions of Android as well.

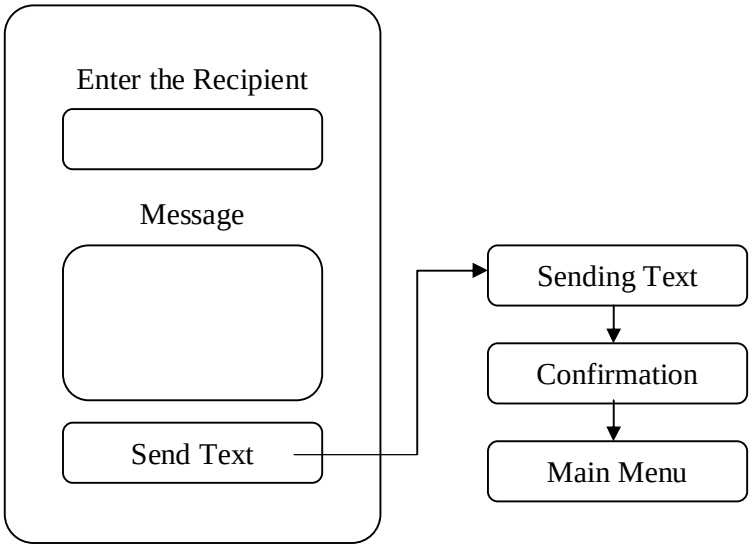

Fig 4: User interface for sending text

V. CONCLUSIONS

In this paper, we describe an App in android which enables the android devices in a particular Wi-Fi network to join a private wireless network. Proposed application can take care of text, voice and video unlike different paid softwares used in PCs. Since Wi-Fi is used no carrier charges need to be paid. Ultra portable handheld devices are used instead of Desktops or laptops as in normal networks. Hence heavy and complicated hardware can be replaced by cheap mobile handsets or tablets and hence the power consumption of the network is also much reduced. Being wireless, the App has few constraints. Uneven terrains and thick walls may affect coverage so network planning should be flawless. For video streaming we need a hotspot (normally a Wi-Fi Router) that can handle good bandwidth. In future, the data can be broadcasted to the phones in the private network if the wireless router is connected to a central server. The central server can be used to monitor the signal strength as well the availability of each phone in the vicinity. If capable software is loaded in the server, it can be used for internal surveillance using the images from the mobile phones in the network. Application of the proposed closed user group can be in Factories, Companies, Hospitals and even ships for internal communication, surveillance and data exchange.

REFERENCES

[1] Anand R., Kumar G. A., Murthy S., "Mitter – Bitter Monitoring system using Android smart phones," 2012 IEEE conference on *Computing communication & Applications (ICCCA), Feb 2012*.

[2] Singhal M., Verma K., Shukla A., "Krishi Ville - Android based solution for Indian agriculture,"2011 IEEE 5th Intl Conference on *Advanced Networks and Telecommunication Systems (ANTS), 18-21 Dec. 2011*.

[3] Yu W. D., Panwar A., Dahuja V., Goyal Y., " A Multimedia based hybrid system for healthcare monitoring," 2012 IEEE 14th *Intl conference on e-Health Networking, Applications and Services (Healthcom), 10 -13 Oct. 2012.*

[4] Massandy D. T., Munir I. R., "Secured video streaming Development on smart phones with Android platform," 2012 7th International conference on *Telecommunication systems, services and Applications (TSSA), 30-31 Oct 2012*.

[5] Vun N., Ooi Y. H., "Implementation of an Andriod phone based video streamer," *Green computing and Communications(GreenCom),* 2010 IEEE/ACM *Int'l conference on cyber, physical and social computing, 18-20 Dec 2010.*

[6] Charlie Collins, Michael Galpin, Matthias Kappler, Book on "Android in Practice".

[7] http://developers.android.com

