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RESEARCH ARTICLE

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POST DISASTER MANET COMMUNICATION USING SMART PHONES

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ABSTRACT

In the event of disaster, the communication infrastructure can be destroyed. The loss of communication systems made the rescue operations very difficult. Generally, a post disaster situation demands a reliable communication and coordination among rescue teams. In this situation, MANETs are suitable for providing communication because as they are easy to deliver and do not require any infrastructure. We can create adhoc network by using laptops or mobile phones but laptops are not easy to carry. For this reason, we preferred to establish the communication through smart phones. In this paper, we have successfully sent the image file by capturing the location through our application from one android smart phone to another android smart phone.

Keywords: post disaster, rescue operations, MANET, Smart phones, Image file

INTRODUCTION

In every year, the world is affected by disasters such as earthquake, floods, tsunami, etc. After disaster the rescue operation is very difficult because of loss of communication system. At this situation, we can construct MANET [5] with Wi-Fi ready laptops or mobile phones owned by rescue volunteers themselves. Here we are using smart phones because the popularity of Wi-Fi ready smart phones is very high nowadays. MANET is hot topic of present technology of research. MANET is important advantage for the future of network centered military operations, virtual class rooms and emergency related operations. MANETs are working based on the Principle of proximity (nearby objects are detected). MANETs do not require any centralized access point or existing infrastructure. Information exchange purpose we are using smart phones because in day to day life use and performance of smart phones as increased rapidly from previous few years. These smart phones are used for file sharing.

RELATED WORK

The use of smart phones [1] [2] has been increasing from previous few years. 60% of people are using the smart phones. Peer to peer sharing of information among smart phones was one of the benefits at the disaster by the adhoc wireless links. Adhoc networks are used for file sharing such as Wi-Fi, Bluetooth [4].Wi-Fi as faster communication than Bluetooth. This Wi-Fi is two types. The below figure1 will illustrate the representation of infrastructure network and adhoc networks.

The main usage of android smart phones is its open philosophy, which guarantees that any insufficiency in user interface or native application design can be fixed with replacement or extension. Android provides us as a developer, the possibility to create

smart mobile phone interfaces and applications designed to feel, look and function exactly as we imagine them.

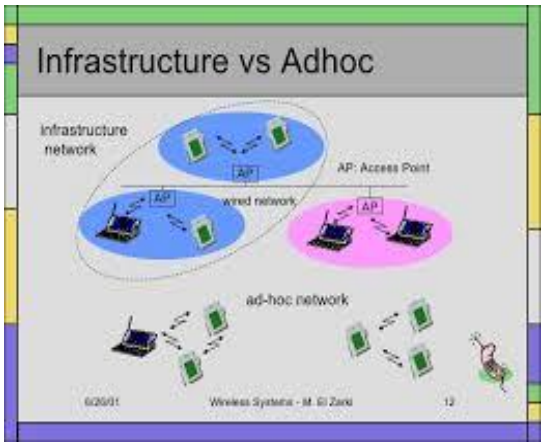


Figure 1: Infrastructure and adhoc networks

Android applications are written using a custom virtual machine called "Dalvik" rather than a traditional java virtual machine. An android device with Wi-Fi direct hardware capabilities can automatically create and maintain a mobile adhoc network with nearby similarly configured mobile devices to enable peers to share information.

Wi-Fi Direct is a peer to peer implementation of the traditional Wi-Fi 802.11[3] allows devices to create a mobile adhoc networks. Android version 4.0[6] above versions only supports the Wi-Fi `direct. For single hop adhoc connection no need to run any network protocol. The Wi-Fi Direct communication for file transferring is based on the socket programming. In the socket programming IP address and port numbers are integrated so that nearby objects is automatically connected.

Below figures 2 & 3 represent the recent disaster "HUD-HUD" in Vishakhapatnam.

Figure 2: Hud-Hud post disaster situation

Figure 3: Hud-Hud post disaster situation

METHODOLOGY:

We can construct the mobile adhoc network in four ways

i. Theoretical analysis
ii. Simulation
iii. Emulation
iv. Real world Experimentation

The first three methods may or may not give the exact results. But the fourth one will give the exact results.

We have done the application in Real World Experimentation, which has given the exact output.

DESIGN:

For the application development we have used two Asus Zen phone5 with android version 4.3 Kit Kat mobile phones. This application is working only for above version of android 4.0 package api20.

IMPLEMENTATION:

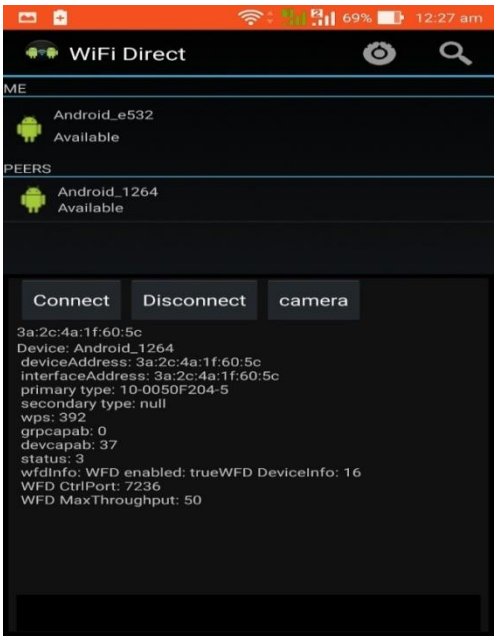
First of all, install the application in two Wi-Fi direct enabled smart phones and then on the Wi-Fi direct which is available in system settings. Open the application and search the peers. In two smart phones one will act as server and another will act as client. Only one-way communication is possible through this application i.e. from client to server. After getting the peers invite the second one through the first one. After the acceptance connect to the server. Now the server is ready to receive the files from client files. Whenever we click on the camera button, camera is opened. We can take the location instantly and send the location image to server.

EXPERIMENTAL RESULTS:

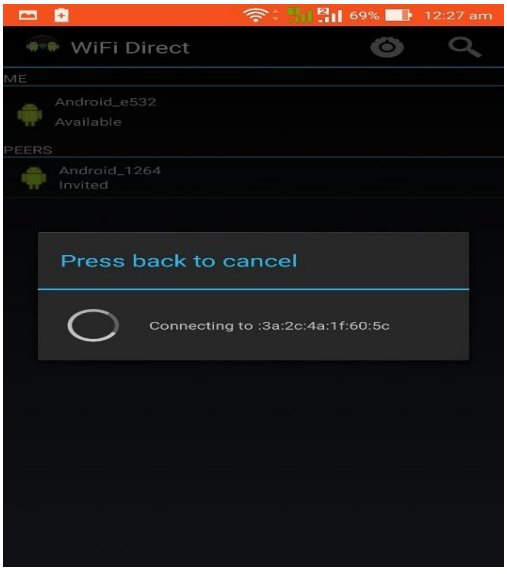
The image file transformations from one smart phone to another smart phone experimental result are shown in below snapshots. We have done these results in indoor environment. For the time being these experiments were conducted in indoor environment only. This application will perform the same operation during post disaster situations.

SNAPSHOTS:

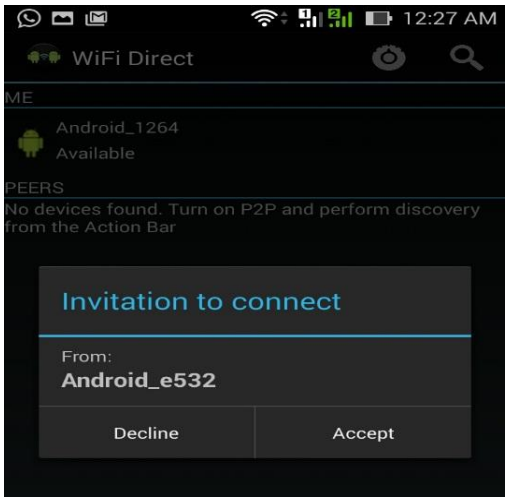
These below snapshots from 1 to 6 show the step by step transfer of files using "Wi-Fi Direct" application.



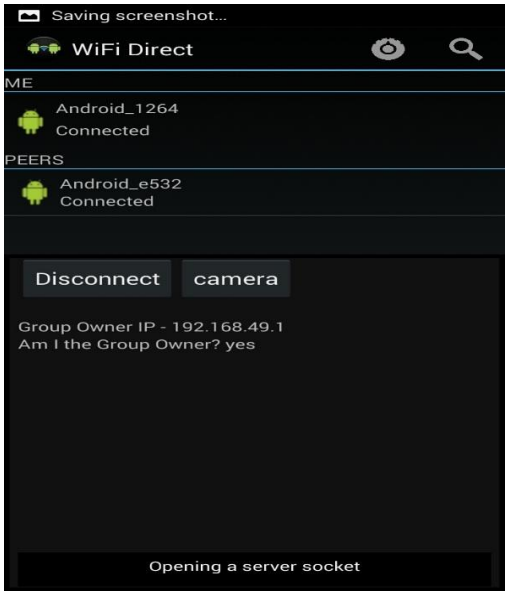
Snapshot1: Available peers



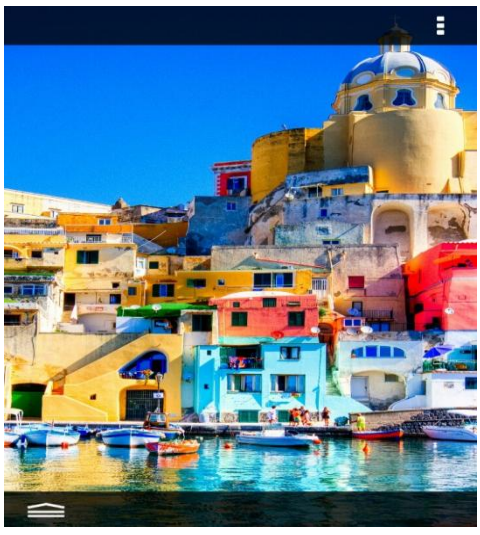
Snapshot2: Checking for connectivity



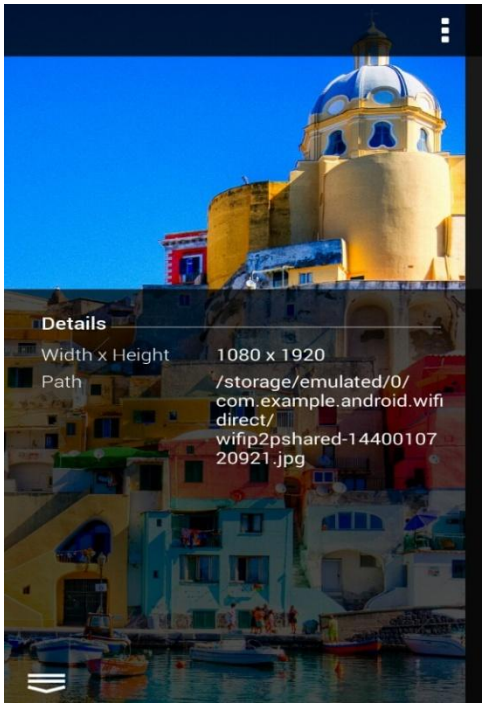
Snapshot 3: Invitation to connect peer



Snapshot4: Connection established



Snapshot5: File to be transferred at source



Snapshot6: File received at destination

CONCLUSION & FUTURE SCOPE

Finally, we conclude that whenever natural disaster occurs at that time, the telecommunication system is damaged. Mobile adhoc network is useful for post disaster situations, which does not require any centralized access point. In this paper, we successfully transferred the files from one smart phone to another smart phone. However, the network is stable frequent disconnections have occurred. In the future, we are trying to reduce the disconnections in both static and dynamic cases and we are planning for do "multi hop communication" by using the routing protocols like AODV, OLSR.

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