

# An Effective Communication in Post Disaster Situation using MANETs and Serval Mesh Application

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**Abstract**— A post disaster situation demands an efficient communication and coordination among rescue teams. Exchange of real time information among responders and emergency situation centers is crucial for saving lives. However, communication systems were usually down due to various reasons. The loss of communication systems made the rescue operation extremely difficult. In such scenario, MANETs are suitable for providing communication mechanism as they are easy to deploy and do not require elaborate infrastructure. In this paper, I have considered the relief and rescue operations in a post disaster situation are performed using a MANET test-bed setup and Serval Mesh Application. We can create adhoc network by using laptops or mobile phones but laptops are not easy to carry. For this reason, I preferred to establish the communication through smart phones. I have successfully sent the image file by capturing the location through Wi-Fi Direct application from one android smart phone to another android smart phone instantly.

**Index Terms**— Post disaster, Rescue operations, MANET, Smart phones.

## I. INTRODUCTION

Almost every year, the world is stricken by numerous catastrophic natural disasters, such as earthquake, hurricane, typhoon, tsunami, etc. When stricken by catastrophic natural disasters such as Chennai Floods in Tamilnadu. Flash floods in Himachal Pradesh, Landslides in Himachal Pradesh emergency rescue operation is very critical to numerous lives. Many people trapped in the disastrous areas under collapsed buildings or landslides may have a large chance to survive if they are rescued in 70 hours, referred as "Golden 70Hours". People evacuated from their home jammed in highways need to communicate each other for various reasons such as allocation of rescue and relief resource as well as reunion of family members. However, communication systems, fixed or mobile, were usually down due to various reasons. Rescue teams in each stricken area consists of few trained professional squads, army, police, fire fighters, and hundreds of thousands of organized volunteers. The loss of communication systems made the rescue operation extremely difficult. Although establishing a temporary communication network to support emergency communications and networking is one of the most urgent tasks in disastrous rescue mission. I propose to use Wi-Fi ready mobile devices owned by rescue volunteers themselves to construct a MANET to

support such a need. Because the popularity of Wi-Fi ready mobile devices is very high nowadays, this solution would be highly feasible in many countries.

## II. PROPOSED SYSTEM

When a disaster occurs it becomes difficult to provide services in the affected areas due to the lack of communication. All modes of communication system get damaged and it takes a lot of time to establish an infrastructure network. To overcome this infrastructure less Mobile Adhoc network is established using wi-fi enabled devices for effective and efficient rescue operations. In this paper we have transferred the files from one laptop to another laptop by using adhoc network.

### A. MANET TEST-BED SETUP

A MANET Test-Bed is equipment used to show real time implementation of Wi-Fi enabled mobile devices which are in adhoc mode. This setup consists of Wi-Fi enabled mobile devices among which the information is shared. After the completion of Set up of MANET Test-Bed and the network is ready to share the information. The maximum range allowed for the exchange of information between the nodes is only 30 meters. If the distance is more then we use multi-hop communication for transfer.

**Experimental Design:** In the Real time Test bed We have used two laptops in which the configuration of one laptop is Windows8 32 bit operating system, 4 GB RAM, Intel i3 processor, Hard disk is 1TB. Second one is Windows8 64 bit operating system, 4 GB RAM, Intel i5, Hard Disk 1TB.

**Adhoc configuration:** Before going to create the adhoc configuration, the wireless should be turned on computers between which you are about to create adhoc network

## III. IMPLEMENTATION

**Step1: Creating adhoc wireless network** First open network and sharing center. Click on Setup a new connection or network. Then Select a "Setup a wireless Adhoc network". Then we have to click next button which will ask the network name, security type and security key. After entering the above Fields, we have to save the network and click next. Now the setup will create the network. When finished we will receive notification that the network has been created and it is ready to use. Our laptop will now broadcast this newly created network and it will wait for other computers to connect.

**Step 2: Destination side connection** The other side network notification area will show the already created adhoc network. If we click "connect", it automatically identifies the connection and it will ask the password. If we enter the password the adhoc network gets connected.

**Step 3: Sharing files & folders on the network** Now we can easily share the files from one laptop to another laptop.

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IV. 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 Samsung J7 phone with android version lolipop mobile phones. This application is working only for above version of android 4.0 package api20.

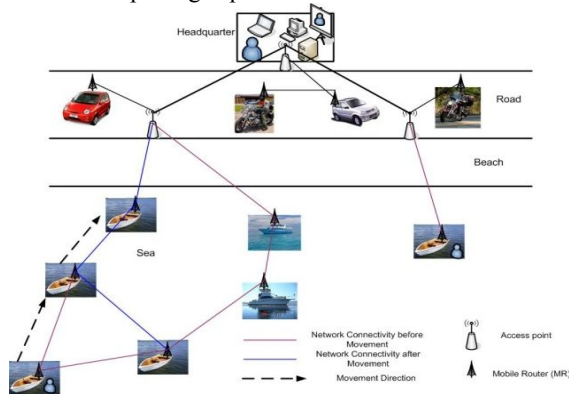


fig..1 The test bed Senario for MANET.

**B.SERVAL MESH APPLICATION**

In these mobile phones we have successfully sent data and made the calls to the one mobile to other mobile by using Serval Mesh application.

**Serval Mesh Application Design:**

In this Serval Mesh Application we have used the two smart phones of android operating system. One is Samsung J7 with android version 4.4 Lollipop. Another one is Lenovo a6000 with android version 4.4 LOLIPOP. This Serval Mesh Application is developed based on the android.

**Mesh network**

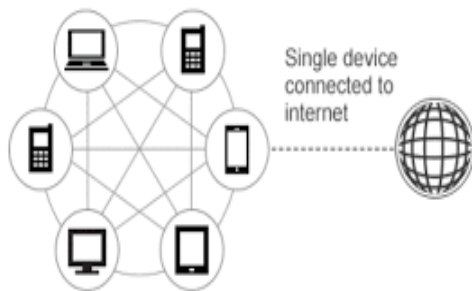


fig..2 Mesh Network

**PROCESS:**

In the first mobile we have to open the Serval mesh app click on connect then select the portable Wi-Fi hotspot and the other side open the application click on connect then select the Wi-Fi. Whenever we connect Wi-Fi automatically first mobile reference will appear in the second one. After the connection establishment we can easily transmit the data and make the phone calls without any cost. The below Figures 3,4,5,6,7tells the connection establishment, calling, file sharing.

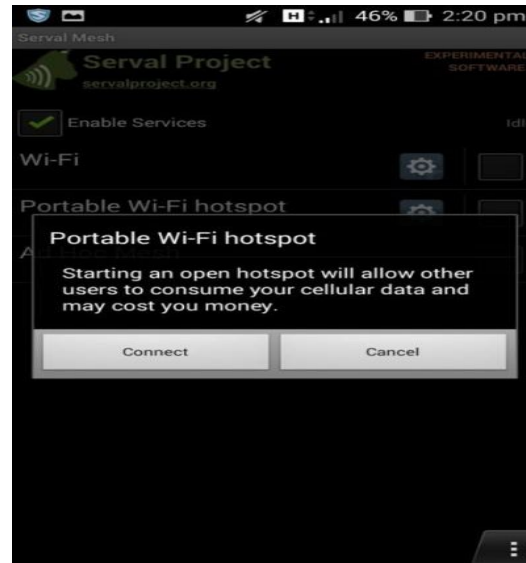


fig3..Connection establishment at source



fig4..Connection establishment destination



fig5.. Incoming call at the Destination side

V. APPLICATIONS

- i. Disaster Management
- ii. Military operations
- iii. Virtual class rooms
- iv. Personal Area Network

**Disaster Management:** “Disaster Management”[4] is a process to save the people from the effect of Disaster. If any Disaster occurs at that case the



fig6..File sharing at source

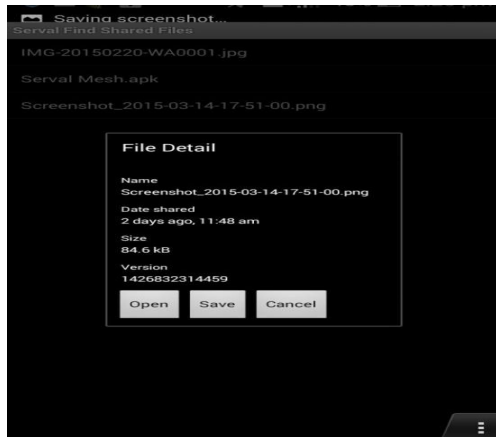


fig7..File received at Destination side

**Technologies:** Bluetooth technology [8] also supports the information exchange but the problem is the range of Bluetooth is 10meters in real time. If we take the adhoc technology, the range of adhoc is 30 meters. We can exchange information by using adhoc in two ways through laptops and smart phones. In case of laptops we can exchange information in laptops through the adhoc [6]. Problems associated with laptops are laptops are too costly as compared with smart phones and time consuming is more whenever data is transfer in network. Carrying laptops is difficult. In case of smart phones we can easily carry the mobiles than the laptops. Smart phone provides more services like Wi-Fi calling [7], messaging [8].

VI. EXPERIMENTAL RESULTS

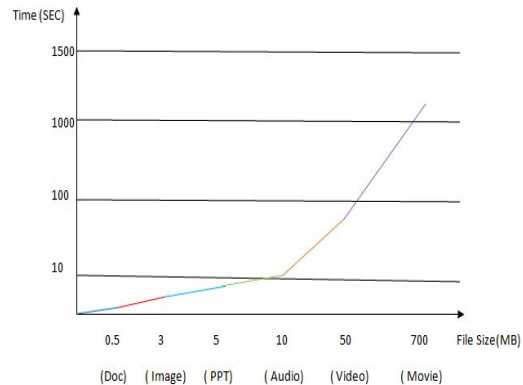
All these results were taken when the network is good i.e. if the size of the file increases automatically the time taken to reach the destination also increases. In the below Table

Representation and Graphical Representation the time is measured in seconds and file size is measured in MB’s.

Table Representation:

Flie Size	Time(seconds)
Document(doc):0.6	Milli Seconds(Fraction of Seconds)
Paper Presentation(ppt):6	10sec
Movie:800	1200sec
Video:60	92sec
Audio:18	18sec
Image(img):3	7sec

Graphical Representation:



CONCLUSION AND FUTURE ENHANCEMENT

Finally we conclude that we are creating a Mobile adhoc network through the smart phones which will helpful at the post disaster cases. We are providing the services to the disaster victims through the rescue teams. So the MANET application and Serval mesh application is flexible and reliable communication system at the post disaster. In future, we are going to plan to do the multi hop communication by using routing protocols like OLSR, Adhoc On Demand Distance Vector Routing.

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