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Low Cost Emergency Android Base Paging

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ABSTRACT
Number of disasters is increasing day by day. A large number of people get affected by these disasters. The most immediate action to take once some disaster has occurred is to visit that location and provide facilities to the victims of disaster. This approach i.e. to provide services to the affected victims should be as timelier and as soon possible to save maximum lives and other properties from disasters. This paper discusses and analyzes that how are the services provided by disaster management systems by detection of disaster in immediate manner, how we can improve this system to identify the affected area immediately and to reach over there with minimum delay. It also discusses that what sort of network architecture and paging mechanism can be designed for better communication with minimum delay.

General Terms
Disaster Management

Keywords
Multipath Interface, Paging Center, Paging Service, Transmitters, vulnerability, Emergency logistics, Natural disasters, Disaster Prevention Service

1. INTRODUCTION
With every passing moment our world is developing and changing fast, making people more vulnerable to disasters and is faced with situation of violence, financial crises and growing uncertainty without proper support from their government. There are serious repercussions as a result of these disasters such as Typhoons, hurricanes and tsunamis often cause harsh flooding, resulting in the spread of waterborne bacteria and malaria, food can become scarce, particularly traumatic for young children. These disasters no matter of what kind they are a serious disorder towards the community and the society. Disasters engross widespread of material, economics and environmental impact which becomes impossible for the effected community or a society to handle. Although there are several organization such a Red Cross and Red Crescent working for the management of resources and responsibilities in order to deal with all kind of emergencies and to lessen the impact of disasters [10]. Apart from the help from such organization one should also design systems which will combine citizens and public organizations in all phases of the processes. We can also use social media for citizen participation in facing these challenges. And there are several such technologies already deployed to achieve this goal. Let's discuss such techniques made for this sole purpose [1].

2. LITERATURE REVIEW
LEAP: Low Cost Emergency Android base Paging provides a wireless means of communication between entities with internet accessibility; it's one way and allows users the facility of reliable communication in an era where missed calls and dropped messages are very common.

2.1 Related Work
2.1.1 iBleep
iBleep [32] is a 24 hours paging solution used on cell phone for medical purposes which is very effective in 'out of hours' period and over weekends. This ensures communication between doctors and hospital staffs. iBleep system make sure that each and every call should be monitored at the central coordinator. iBleep provides only one way communication. As a result patients never have to go through negligence in hands of hospital staff and suffer health risks. This also reduces stress and work load for doctors during fatigue hours especially junior doctors. This offers feature of priority call which in turn ensures that no call goes unanswered [31]. Keeping this in mind let us through some light on our research project LEAP. The main and foremost difference between iBleep and LEAP is that iBleep is for medical purpose whereas LEAP is for general purpose. And it is freeware application. It allows communication between rescue teams and institutes such as hospitals, riggers etc. unlike iBleep it provides its users with two way communication.

2.1.2 On-page
On-Page application is a new and improved version of pager app and secure messaging app. The main and foremost concern in the app is to ensure that no important message is ever missed. Users are given the ability to priorities their call according to their needs. It also provides four different ways to initiate the message i.e. by phone, e-mail, cell phone to cell phone, on-page console. LEAP uses basic structure of a traditional pager and aims at achieving instant messaging through wifi. Every message and call in LEAP is taken at high priority and also ensures its deliverance. The messages in LEAP are fully encrypted and ensure user full security of their messages. Users can easily send any voice or picture attachment when there is any need for [33].

2.1.3 Vview
Vview [34] app another solid example of modern day pager app used over cellular network. The basic purpose of such app is to use instant messaging facility and provide connectivity globally. Thus one can easily say that you can connect with anyone anywhere. This app syncs your mobile contact list and thus you don't necessarily have to set up separate list for the app. Using wifi or 3G, anyone can make audio video call on landline cell phones and can even share their location. This app is focused on cross platform ability. LEAP uses the same advantage of instant messaging through wifi to make it less cost effective, fast and reliable. LEAP does not provide users with ability to make calls to anyone it's very much secure in that regard. LEAP is android based only.

2.1.4 Earthquake Alert

Earthquake Alert is an app that's entirely focused on creating awareness among users relating to earthquake issues. This app consists of earthquake news and summaries of those affected areas as well. This provides information such as magnitudes of earthquake and users can also download the information if they need it. And users can in turn create further awareness by sharing it on social sites as well. You can also share your experiences as well. LEAP does create awareness but only among parties concerned. LEAP does maintain data at the back end as well about the kind of activities carried out by the rescue teams. It does not provide any kind of connectivity between social networking sites. It can be used at global scale as well. In case of earthquakes the rescue team can contact nearest heavy machinery company and can request for right kind of equipment's need on the site [23].

2.1.5 FEMA

FEMA fully focuses on making users capable enough to face such disasters and train them for facing such challenges. It gives users some tips that are how they can keep safe before, during and after disasters. Subscribed users can also receive alerts that inform them hourly or daily. Users can also save the information they might need for future use. This also allows users to share their information online if they want. LEAP helps and ensures that no time is wasted in order to find right kind of facilities for the victims and thus reduces health risk as well. In case victims needs shelter then rescue team can also contact nearest NGOs as well. Victims don't have to go through such a fatigue of helping themselves when our app ensures that right kind of institution is working for them 24/7 [35].

3. PROPOSED PAGING SYSTEM

3.1 Server

The primary responsibilities of XMPP Server include.

- Administer XML streams from local clients and send XML stanzas to clients which are consider under negotiated XML streams.
- Under take server-to-server communication, administer XML streams with other foreign servers and route XML stanzas to servers that are considered under negotiated XML streams.

The secondary responsibilities of XMPP server are:

- Storing XML data that is used by clients (e.g., contact lists for users of XMPP-based instant messaging) in this case, the relevant XML stanza is handled directly by the server itself on behalf of the client and is not routed to a foreign server or delivered to a local entity.
- Hosting local services that also use XMPP as the basis for communication.

3.2 Client

Client is an entity that establishes an XML stream with a server by authenticating using the credentials of a local account and that then completes resource binding in order to enable delivery of XML stanzas via the server to the client. A client then uses XMPP to communicate with its server, other clients, and any other accessible entities on a network. Multiple clients can connect simultaneously to a server on behalf of a local account, where each client is differentiated by the resource identifier portion of an XMPP address (e.g., <node@domain/home> versus <node@domain/work>). The *RECOMMENDED* port for TCP connections between a client and a server is 5222.

3.3 Network

Each server is identified by a network address and server-to-server communication is a straightforward extension of client-to-server protocol. In practice the system consists of a network of servers that inter-communicate. Thus, for example, <juliet@im.example.com> is able to exchange messages, presence, and other information with <romeo@example.net>. This pattern is familiar from messaging protocols (such as [SMTP]) that make use of network addressing standards. Communication between any two servers is *optional*. The *RECOMMENDED* port for TCP connections between servers is 5269.

3.4 Functionality

The purpose of XMPP is to enable the exchange of relatively small pieces of structured data (called "XML stanzas") over a network between any two (or more) entities. XMPP is implemented using a client-server architecture, wherein a client needs to connect to a server in order to gain access to the network and thus be allowed to exchange XML stanzas with other entities (which can be associated with other servers). The process whereby a client connects to a server, exchanges XML stanzas, and ends the connection is:

- Determine the hostname and port at which to connect
- Open a TCP connection
- Open an XML stream
- Complete TLS negotiation for channel encryption
- Complete SASL negotiation for authentication
- Bind a resource to the stream
- Exchange an unbounded number of XML stanzas with other entities on the network
- Close the XML stream
- Close the TCP connection

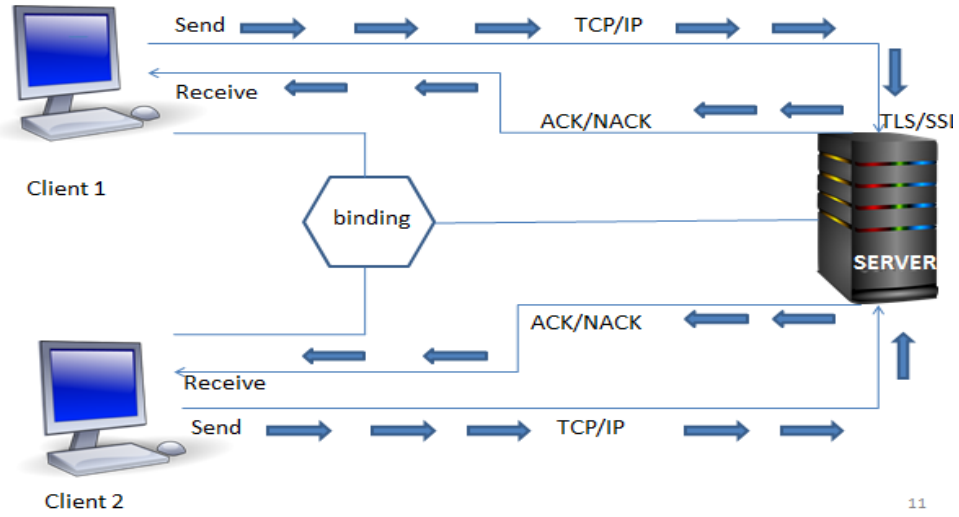

Figure 1: XMPP Architecture

4. IMPLEMENTATION

This part of paper includes a brief introduction of the tools that are used for the implementation of the project and screenshots of whole implementation.

4.1 System Implementation Tool

4.1.1 Android Studio

Android studio is integrated development environment (IDE) that provides android platform. Android studio supports android development. Android studio supports more features to enhance the productivity for android apps. Every android studio project contains more modules with resource files and code files. Multiple features supported by android studio [37] are:

- Flexible Gradle build system.
- App features supported by code template.
- Build multiple APK file generation
- Layout editor supports drag and drop theme.
- Supports built in google cloud platform to integrate messaging and app engine.

4.1.2 Supporting Language Java

Java is used as a general purpose computer programming language that is based on classes and object orientation language. Java virtual machine supports byte code to compiled java applications. Both java and java script are different in nature. In fact they are not related. Java script is basically scripting language whereas java is totally application based programming language.

4.1.3 Openfire

Openfire known as Jive Messenger provides instant messaging and group Chat server. It is XMPP server based, work under apache license. It runs on 9090 (HTTP) and 9091 (HTTPS) ports by default.
Features of Openfire are:

- Web based administration design
- Uses Plugins
- Can be customized
- User friendly
- Provides data base connectivity
- Platform independent
- Purely java based
- XMPP client
- Supports above 50,000 users

5. RISK ELEMENTS

5.1 Problems in Natural Disaster Management System

Generally, it is not possible to avoid man-made and natural disasters but we are trying to minimize their impacts by maximizing greater effort to implement risk management against natural disasters. Disaster risk includes three major elements i.e hazard, exposure and vulnerability. It is difficult for a man to exercise on these extreme events manually so we have to provide effective services against any disaster by analyzing disaster risks and reducing vulnerability and exposures. We have to change the ideas of government and stakeholders slowly gradually to enhance vulnerability and reduce human losses. These methodologies would become better to provide comfort against natural disasters in future [11].

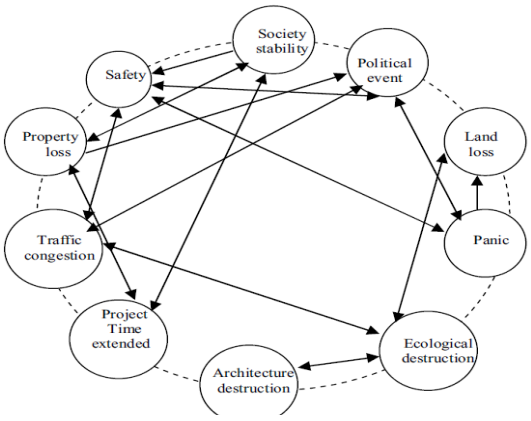

Figure 2: Factors affected by Disaster [16]

5.2 Reliability in Disaster Data Model

The current objective of this research paper is to elaborate paging architecture regarding to data processing and provide accuracy in disaster data information. Its main objective is to provide low cost communication attributes and data design models [12].

5.3 Network Embedded Framework with Low Cost Paging Mechanism in Disaster

Generally, when natural disaster happened first of all network breakage occur due to congestion, overwhelming, miss-configuration and security attacks. According to this research paper our current objective is to provide network security and reliable network usage that provide help in alarming situation through low cost paging mechanism [13].

This low cost paging mechanism alerts ambulances, rescue teams and doctors in hospital to help victims of disaster and provide better aids. This system works on real-time issues to isolate disaster and monitor the performance of pager [13].

Hence network availability become most important at the time of alarming condition and that availability can be properly managed by using low cost communication mechanism through pager [13]. Paging techniques can also be used in emergency response activity and that can be defined briefly in a table below:

Table 1: Emergency Response Techniques [12]

No	Activities
1	Disaster response study quickly
2	Proper planning about disaster operations in emergency
3	Notify all organization regarding to disaster
4	Provides free Aid of distribution
5	Medical sources for injured victims
6	To monitor emergency operations
7	To find out missing victims

6. LOW COST PAGING SYSTEM

6.1 Paging Networks

Paging networks are used for communication to send notification messages at required destination point. Base stations are used to sends messages and alerts organizations through pager. The messages through pager can be any type like alphabets, numbers and voice messages etc [18].

6.2 Multipath Interference

Messages are termed as pages, received by simulcasting where each transmitter covers greater area that sometimes leads to overlapping and this process is called multipath interference and that can be operated at low speed [19].

6.3 Components Working

Paging architecture consists of smart device (telephone), paging center, paging services, base stations, transmitters and pager. Messages are made by using telephone, and then paging services get the Messages, and send to the paging center. Paging center delivers the message towards base station through transmitters and then message received to the desired destination point. All of this working uses radio frequency [18, 19].

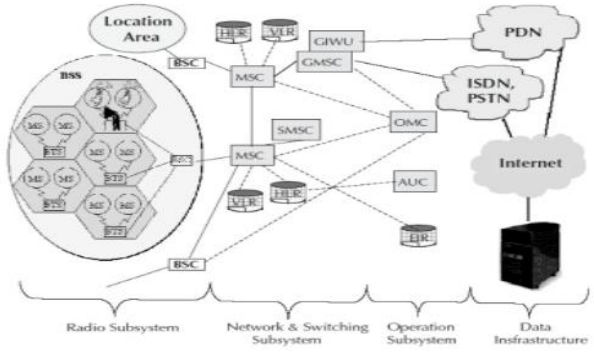

Figure 3: Paging Communication Architecture [19]

7. PAGING NETWORK SYSTEM

There are two basic types of Paging Networks i.e.

Automated System

Manual System

7.1 Manual System

It is similar to just like a call center having operator to control the flow of messages along with pager number to send pages to required destination [20].

7.2 Automated System

*N*o operator in automated system, through telephone messages is send with the help of keyboard. Each pager having a specific pager number through which destination device0 is detected. Here software works similar as an operator works in manual system [20].

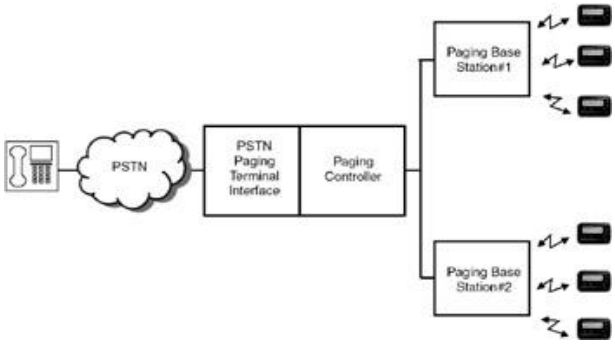

Figure 4: Paging Mechanism through Base Station [21]

8. PROPOSED ENHANCING MODEL OF DISASTER MANAGEMENT

There are several shortcomings in the existing model of disaster management for performing rescues operations. Major problem that are faced usually whenever some disaster occurs the infrastructure fails. Base stations usually destroy or

they cannot be reached soon after the occurrence of disaster [25].

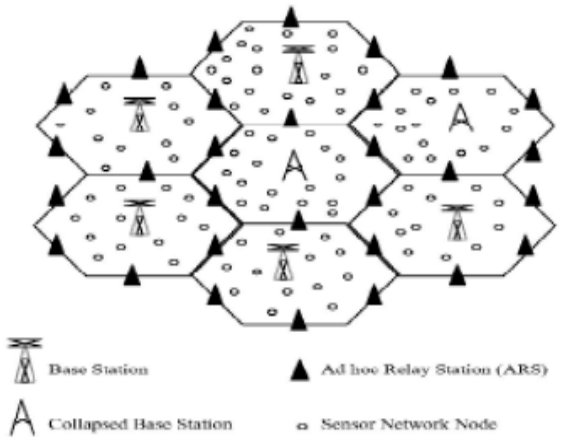

Figure 5: Transmission Infrastructures [26]

In this case when base stations get failed Ad hoc stations play a very important role for carrying out the transmissions properly especially the sink node. Sink nodes plays vital role in putting forward the information to base station and this forwarding will be GSM based In case of availability of cellular network, and if it is not available further broadcasting is carried out by WiMAX antenna to the emergency station [26]. The network architecture that we are proposing can be divided into three further types:

a. Wireless sensing field for network.

b. Data base center for emergency response.

c. Infrastructure for satellite communication

9. CONCLUSION

This system helps in emergency conditions especially in any disaster either man-made or natural. It provides low cost messaging services through internet. For this purpose resources should be good enough to manage time and fulfilled productively. This system works to support unpredictable data handling mechanism with suitable implementation.

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