



Disaster warning and recovery

Topics

- Early Warning
- Mobilisation of the population (P2P funds)
- Instruction on safe areas, mobile hospitals etc
- Population identification location and well-being
- Loss of base station
- Loss of Base Station Controller

Early Warning

With meteorological services constantly upgrading their quality of data collection and analysis it is increasingly possible to provide sufficient warning of potential disasters such as Tsunamis and Typhoons.

The problem is getting this information to the effected populations in an efficient and timely fashion. In some recent events it has been difficult to connect between those who have the ability to detect potential disasters, governments and the population.

Loss of life is usually far greater in impoverished areas. This is due to the inability to communicate early warning to the populace due to poor communications and infrastructure.

The challenge is to provide strong, effective early warning systems and processes for impoverished areas. This would ideally allow warning to the populace in time for them to take action and avoid danger.

The mobile phone has become a ubiquitous device with over half of the world's population now owning one. Even in impoverished areas, the mobile phone is present with one handset often shared by several families.

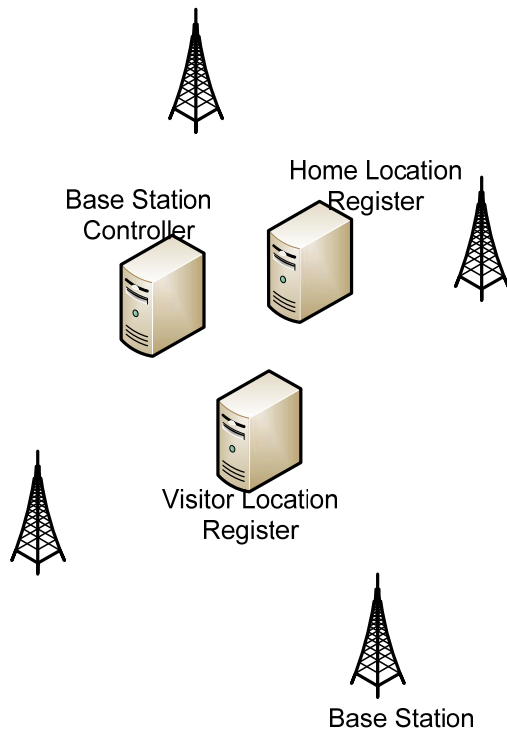
In the event of a threat, text messages could be sent to mobile phones advising people of the threat and also recommending appropriate action. One negative consequence of this strategy however is network overload. In a country such as Thailand with some 25 million mobile phones, the dispatch of 25 million messages could lock up the network for as much as several hours. This would severely hamper emergency services responses.

Also most of the recipients of these messages would not even be in the effected area of threat.

Mobile phone networks are comprised of transmitters (base stations). These transmitters usually are clustered. A Base Station Controller creates harmony between



each base station in a cluster. Also a Home Location Register and Visitor Location Register keeps track of all of the phones currently on the cluster.

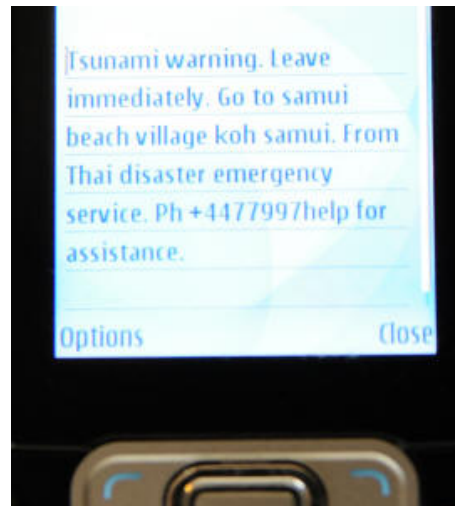


It may be possible to identify the mobile phone clusters which may be effected by a particular threat. If only the mobile phones registered by the network within those areas were to receive a text warning, the network would easily be able to accommodate the load and deliver the messages possibly within 20 minutes.

As the first messages go out, there would also be a physical viral effect of people reading the message and telling other people. This would effect in as few as two minutes.

How could it work?

1. Early detection maps the areas of potential impact
2. An overlay of all cell clusters is brought up and the Home Location and Visitor Location registers identified
3. A call is put into the HLRs and VLRs to serve up all phone numbers currently in use on the clusters
4. These phone numbers are all sent text messages to warn of the threat
5. After 15 minutes a further call is put in to the HLRs and VLRs and any new services are identified and sent the text



Advantages:

Achieves localized outcomes without overloading the national network.
Leverages mostly existing capabilities available within the network (low build costs).
The solution does not adversely impact emergency services access to the network.

Mobilisation of the population (P2P funds)

During Katrina, many people were unable to leave the cities as they had no cash on them to purchase transport tickets. This resulted in massive health and safety issues as well as increased the logistical load on emergency services.

New technologies are emerging in the Peer to Peer funds transfer space. This allows people to instantly send money to friends and family using their mobile phone. The areas of most growth in this evolving space are also the areas most affected by this problem – the rural poor. Family members living in the cities or overseas remit funds home using mobile P2P.

How could it work?

1. Early detection identifies an area of risk.
2. International media is advised and requested to run news items requesting friends and families in the cities and overseas unaffected by the threat to remit money to their friends and family in the effected areas.
3. People in the effected areas instantly have cash accessible by their mobile phone. Often these funds are also accessible via a pre-paid account (such as a VISA or MasterCard pre-paid).



4. They go to an ATM and use their cards to withdraw cash, or use their attached mobile phone ability to transfer money to the bus driver (also via P2P) or to buy tickets via SMS or other forms becoming available.

Instruction on safe areas, mobile hospitals etc

It is necessary to ensure people in the effected areas who cannot get fully clear can be informed about safe places, mobile hospitals and other services. This is very difficult in the pre and after-math of a disaster.

As part of emergency planning these safe places are usually identified already. Each of these can be given “catchment areas”. This means any people / mobile phones in the catchment area would be directed to the particular safe place.

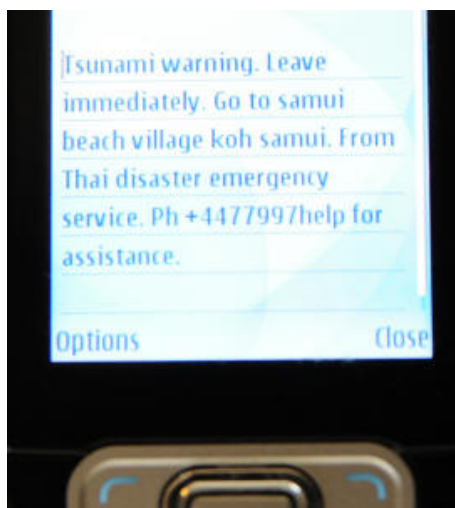
It is possible to identify what phones are in each catchment area at a particular point in time.

Most Mobile phone networks have the ability to tell where a particular mobile phone is (positioning). This may be done either from Global Positioning in the handset - accessible by the network – or by the network itself.

By requesting this information of the network, each phone could then be sent a text message with the details of the nearest safe places hospitals etc.

How would it work?

1. Likely areas for safe places identified in prior planning
2. Ability to quickly draw the required positioning and mobile phone information from the networks
3. This information is electronically overlaid on the catchment areas for the safe places / refuges / hospitals
4. Text messages are sent to all mobile phones in the effected areas advising the user of their closest refuge.





Population identification location and well-being

After a disaster, it is very difficult to tell where people are, who is OK and who is not. The more quickly people can be ruled as safe and well the more focus can be placed on people who are in real danger.

Strategies in this area would need to deliver easy and fast ways to electronically identify people, get their response as to whether they are OK and to tell where they are.

User Identification:

Technologies and strategies are evolving which provide electronic identification for consumers and the general population. Some of these relate to mobile banking and commerce applications and also to new initiatives such as national electronic ids, user identification and authorization relating to release of health records and other private information and so on.

Strong voice biometrics technologies are being introduced into environments where it is imperative to identify a person who is remote or “not present”. Whilst this is a relatively new technology, it is in use now.

Location:

Tying this in with the mobile phone network ability to tell where mobile phones are can provide automatic location capture.

Well Being:

Computers can now phone people, ask questions and capture the responses as text. Also technologies which require people to press 1 to do this or 2 to do that have been around for over 20 years.

How would it work?

1. HLR and VLR are queried for all mobile phones active in the effected clusters.
2. Where electronic ID is in use, the service used to provide the identification is instructed to call each mobile phone.
3. When the user answers the phone, the computer asks them a range of questions: “This is the National Disaster Recovery service. We wish to identify you then check if you are OK. Please enter your national security PIN (or say the required words for your voice security). Thank you (person’s name). We now wish to know if you are OK or if you need assistance. Please press 1 if you are OK. If you are not OK and need help, press 2 now.
4. The computer captures the response from the user and the location of the phone. If the user is OK it is noted in a register. If the user presses 2 emergency response is immediately notified.



5. In addition the location of “not OK” responses are overlaid on a map. This can very quickly identify particular areas of need where the “not OK” response rates are high.
6. Friends and family can access the “person OK” register and know their loved ones are well and safe.



Loss of base station

Areas most effected by disaster are also most likely to have base station failure. As emergency services increasingly rely on mobile services, Base station failure can severely hamper rescue efforts.

Technologies exist which enable small base stations (for example picocells) to be set up. Sometimes these are called a “Base Station in a Briefcase”.

These can link back into the mobile network via satellite or other means and can be set up within minutes.

How does it work?

1. An area of need is identified.
2. A Base Station in a Briefcase is deployed
3. This ideally allows emergency services to make a number of simultaneous calls within a limited range.

<http://www.rivanetworks.com/nano/nano.htm>

<http://www.inmarsat.com/about/Newsroom/00024169.aspx>



Loss of Base Station Controller

A whole transmitter cluster can crash during a disaster. This makes it very difficult for both the emergency services and the general population. The impact of the loss of a whole cluster is generally catastrophic and takes a long time – possibly days – to fix.

However often most of the transmitters within the cluster are OK, but all of the transmitters in the cluster goes down.

The loss of a cluster could be due to a range of issues including the loss of the Base Station Controller, and / or the HLR / VLR. The network usually backs up information for such a case, so the network can be reinstated once the cause is rectified.

Due to the nature of mobile phone networks it may be possible to use another (spare) Base station controller and / or HLR / VLR. If spare infrastructure can be maintained for such an emergency, then the backup could be loaded onto the spare, which then drives the available working base stations in the cluster.

This would be good investment on the part of the carriers as they do not generate revenue in these instances. Maintaining such infrastructure would bring the base stations on sooner generating revenue.

How would it work?

1. A cluster falls over during a disaster
2. The cause is identified (eg- BSC catastrophic failure.)
3. A remote BSC kept for this purpose is programmed with the failed BSC backup.
4. The HLR / VLR IP addresses for the cluster are directed to the remote BSC (which could be a thousand kilometers away)
5. The temporary BSC brings all unaffected transmitters in the cluster online.

