Disaster Management Network by TCOE-IITM-JICA

During or after a disaster, there is a chance of failing of normal modes of communication, and it is not possible to get reliable news from the affected area. Survivors may not be able to communicate with outside world. The system developed by IIT Madras found a solution for all these problems.

The network diagram of the system is shown in Fig.1. GSM Server communicates with BTS to provide voice and SMS services. GSM gateway provides the connectivity with the GSM system and also outside world to provide call center features.

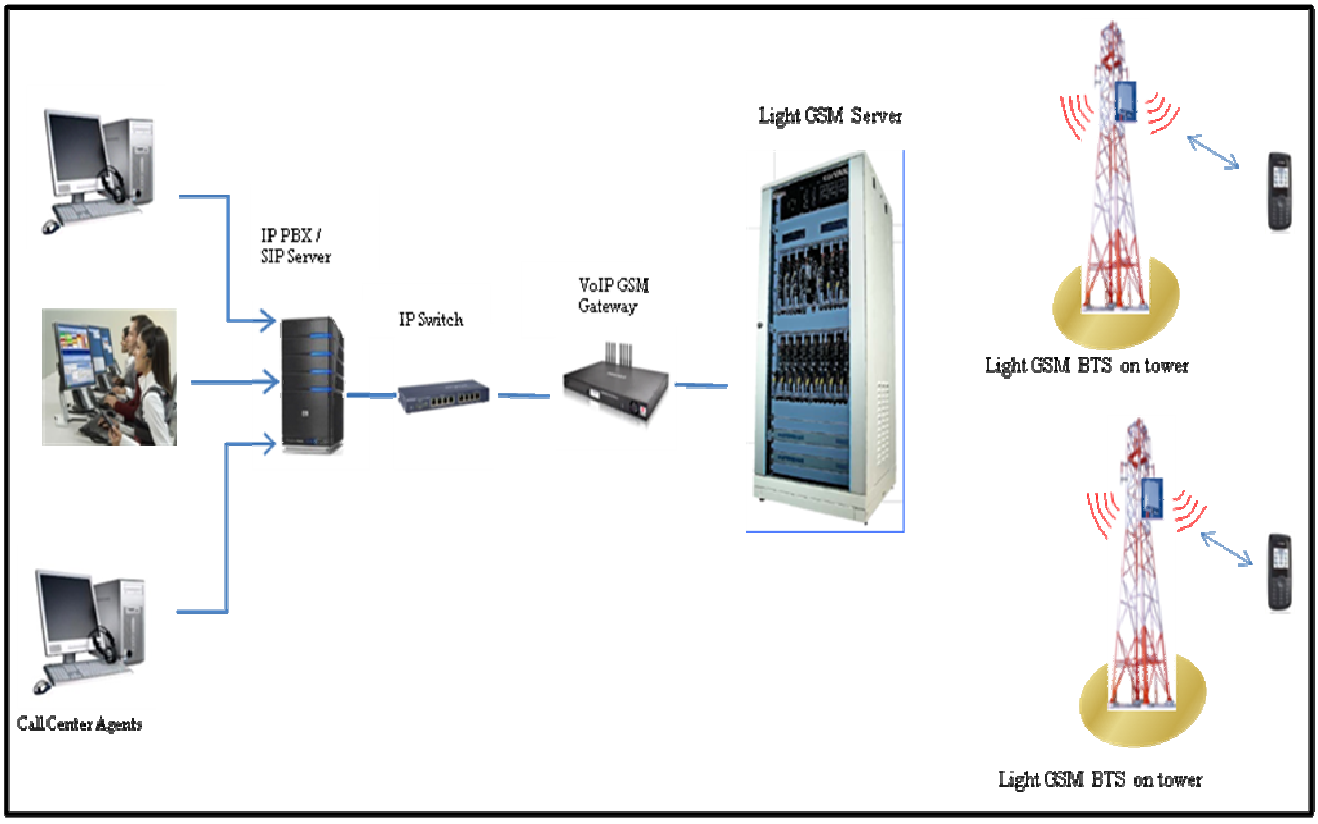

Fig 1.DISASTER network

LTE system is used as backhaul for data transport between Primary Disaster Area (PDA) and Master Operation Center (MOC) in the area affected by disaster. The LTE system provides the high bandwidth connectivity within the disaster site. The LTE transport system under this situation provides an alternative, congestion-free communication link that will aid in speedy rescue operations. Deployment of PDA and MOC is shown in Fig.2

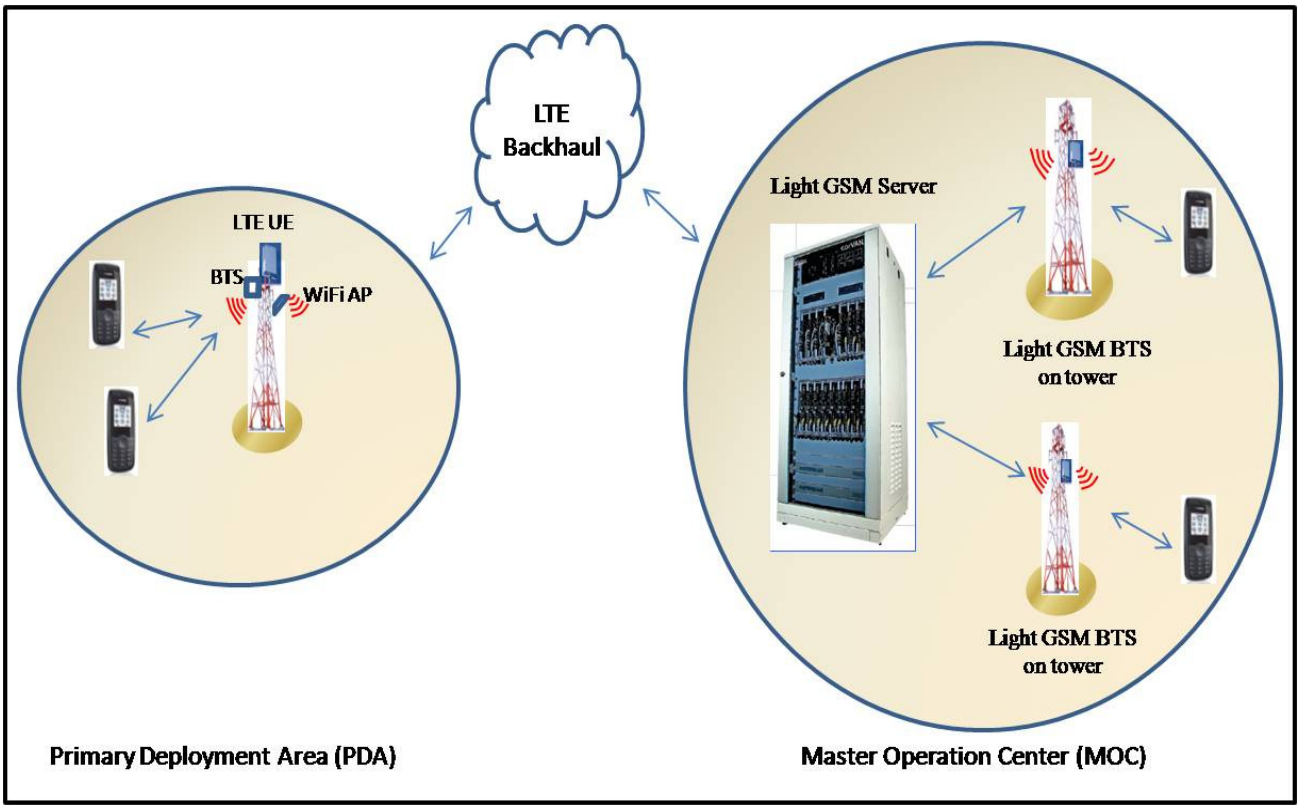

Fig.2. Deployment of PDA and MOC

The equipment used to communicate can be easily carried in a small vehicle even to remote areas. Along with the system, small antennas at few meters high will be set up, having a range of 1-3 km for voice and text communication and WiFi access in a radius of about 100 meters. To extend the range of communication a balloon-mounted base station can be set up. The balloon can be inflated and be up in the air in a few hours. The balloon will be at a height of 30-40 m and is estimated to have coverage in a radius of about 10-20 km, hence it will be placed in nearby regions which were not hit as badly, so that the main switching centre and databases can be set up near it. These will serve as the link to the outside world via either satellite communication or the existing infrastructure in less severe disasters. System setup in a disaster area is shown in Fig.3.

Once the system is set up, it will allow survivors to connect to the system without much difficulty and also get in touch with the rescue workers and request assistance on a helpline in the form of text or voice messages. Their personal details will be obtained from their mobile number. All of this data will then be stored in a database for everyone around the world to find their details.

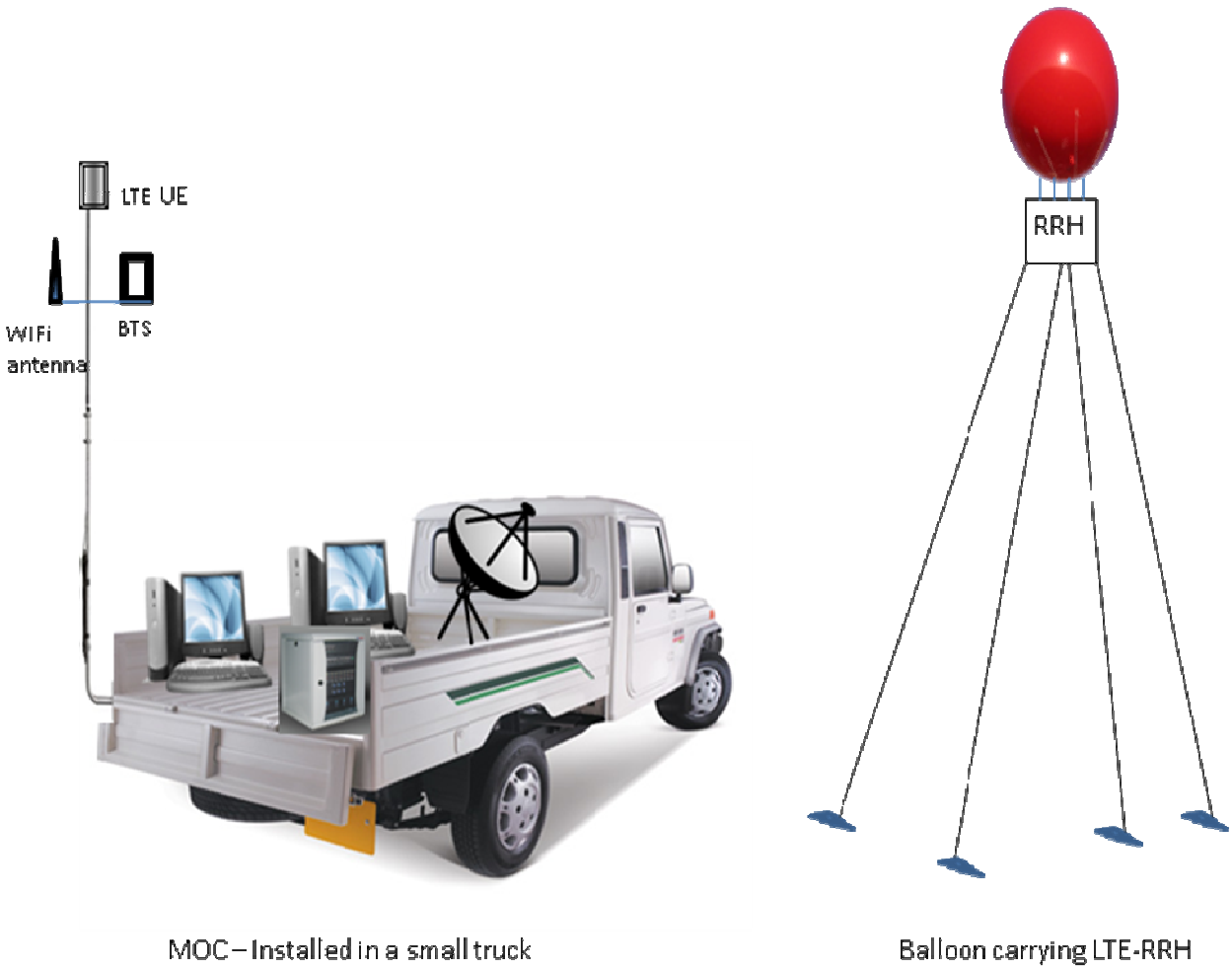

Fig.3. Installation in the field

Rescue workers connected with this system can send real-time videos and images to the world at large, providing an accurate, up-to-date view of the situation. The databases will authenticate information coming from the survivors as well as rescue workers and convert it into standard, searchable formats along with videos and images for the outside world.

The system also has FM capabilities for broadcasting. Information of rescue operations will be broadcasted continuously to avoid the panic situation among the survivors.

Development work By TCOE

As a part of this system, TCOE has developed the following value added features.

Automatic Registration: unlike the commercial networks, the GSM system allows the automatic registration of the survivors. GSM network will be displayed when the survivors

search for the network in their mobiles,. Once they choose this network, they will receive a SMS with the details of how to register their personal mobile number with GSM network and how to use the emergency call service and SMS service. Survivor should dial 108 followed by their own 10digit mobile number. This will allow the system to have the survivor his own number connected with the system. There on, the calls and SMS made by the survivor will be registered with his mobile number and his database will be displayed in the web. People can search and find out the details of the survivors.

Emergency Calls: Survivors can dial a pre defined emergency number which is sent to them by SMS and leave their voice message which will be recorded for 30 seconds. This message will be stored in the database and displayed on the web. The number of calls a survivor can make will be limited to avoid the network congestion.

Emergency SMS: Similar to Emergency calls, the survivor can send the SMS also to a predefined number. These SMSs will also be stored in a server and displayed on the web to facilitate the public to know the whereabouts of survivors.

Auto restart of BTS: The Base Transceiver station which is on a tower or tied to the balloon may have chances of temporary failures. Not to take chance, an automatic script will keep on pinging the status of BTS and will be restart the BTS whenever it hangs or fails to communicate with the Master Operation Control system.