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SECURE REAL TIME WIRELESS MOBILE COMMUNICATION USING ADHOC NETWORK FOR DISASTER MANAGEMENT

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ABSTRACT

Natural calamities and disasters create the need for announcement between and among the effected public and backup responders as well as other parties such as administrative agencies and assistance organizations. Such communications include the distribution of key information such as migration orders and locations of emergency accommodations. In particular, the coordination of efforts between responding organizations require additional communication solutions that typically rely heavily on wireless communications to complement line infrastructure due to the ease of use and movability. While the deployment of temporary mobile networks and other wireless tackle following tragedies has been effectively skillful by governmental agencies and network providers following previous disasters, there appears to be little optimization effort involved with respect to maximizing key presentation measures of the deployment or minimizing overall cost to deploy.

Keyword: - *Wireless Communications, Disaster Planning and Management, Optimization.*

I. INTRODUCTION

Among the whole communication system available today the popularity of wireless networks has been valued due to their wide range of applicability and flexibility. It has modernized the modern communication technology world like nothing before and had a momentous impact on the modern society. Mobile adhoc network (MANET) is one of the most popular wireless networks used in the area; where establishing other type of network is either difficult or infeasible. It has many specific applications; disaster management is one among them. Disaster may occur due to natural calamities or may be due to any other causes, which in turn aspects large numbers of people causing loss of different resources. Irrespective of scientific and scientific development in the last few decades the losses caused by disaster has not been reduced substantially. Looking to this fact united nation in its general assembly declared the decade 1990-1999 as the international decade for disaster reduction. Many countries in this globe have been vulnerable to the natural calamities due to their geo-climatic condition, India is one among are by natural calamities in each year. Though in the last few years the promptness and alertness of the disaster management has been enhanced significantly but still the disaster management and mitigation strategy has a lot of scope of improvement. It has been seen in many cases that late identification of the severity of the damage and insufficient rapidity to the address the situations increases the damage in term of property and life.

II. LONG TERM EVOLUTION

The purpose of using MANETS Mobile Ad hoc Networks in multichannel cluster based architecture is to provide efficient routing topology among multiple sink nodes that are responsible for intra cluster communication. Each sink node is responsible for maintaining a cluster tree structure by sending a signal to neighboring node in process of establishing a channel for message sharing and in broad cast of information form one node to another. Some of the authors had focused their research towards using hybrid network including base stations, terminal nodes, sink nodes and relay nodes deployed inside a particular building for data collection in particular disaster conditions. Due to some shortcoming in the existing network models for rescue operations in case of disasters especially when the disaster situation occurs the base stations are unreachable or base station destroys. In this case Ad hoc relay stations are responsible for transmitting the information specifically to sink node. The sink node in this network architecture is responsible for forwarding this information to base station that will be GSM based if cellular network is available otherwise wimax based Antenna is responsible for further broadcasting the information to Emergency operation center as mention in above Figure. The Proposed network architecture for rescue operations in case of disaster circumstances can further be classified into three sub types elaborated as wireless sensor network field, emergency response data base center and satellite communication infrastructure.

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III. BLOCK DIAGRAM

Sensor node N1, N2, N3, N4 which are deployed in the affected area will establish communication with the base station and transfer the real time data which are collected through sensors connected to the node can be upload on the base station As shown in the block diagram the.

Base station can evaluate the data and takes the necessary action like informing administration agency, medical facility, and disaster management agency. While performing the above tasks the major challenge is power consumption, during the real time communication with the base station power requirement for the sensor node N1, N2, N3, N4 increase that sensor node consumes the max current up to 2Ampere during the transmission burst and in ideal mode it consumes the current up to 40mA.

Sensor node is powered by 4.2V 1200mA external battery rechargeable battery which can stand up to 30hr in ideal mode.

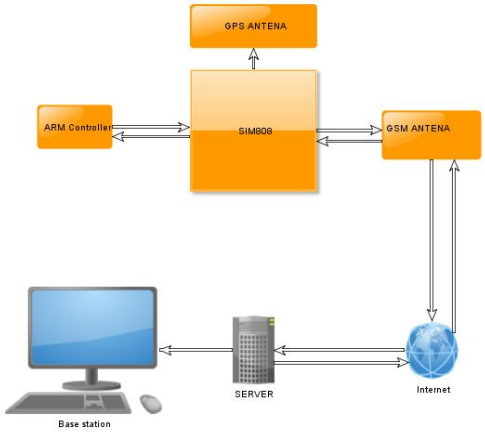

Fig.1 Block Diagram of System

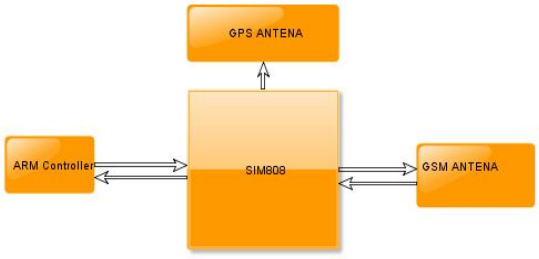

Fig.2 Block Diagram of Sensor Node (N1, N2, N3, N4)

IV. SECURITY CHALLENGES FOR WIRELESS SENSOR NETWORKS IN THE EMERGENCY RESPONSE

A crisis management system, called GeoBIPS, has been proposed to provide timely and up-to date information during crisis situations. The GeoBIPS is a self-forming broadband wireless mesh network used by reconnaissance team members (RT) and commanding center (CO). The relay network is serving as an interface between RT and CO passing information in both directions. This enables CO to acquire up to date information from RT members, con-vey information to the crisis center for decision making and send useful data and instructions to RT members. The GeoBIPS architecture is shown in figure 10. The portable access router (PAR) receives digital video data and sends it over a wireless interface to CO and embedded server. The mobile access router (MAR) connects to the crisis center by using a local hotspot, general packet radio service (GPRS) or a universal mobile telephone system (UMTS) connection. The security is provided through IP security (IPSec) tunnel between MAR and PAR for secure voice and video communications. The MAR is provided with pre-shared authentication key used to sign all OLSR routing messages to prevent malicious nodes from entering the net-work. The privacy is achieved through IPSec service.

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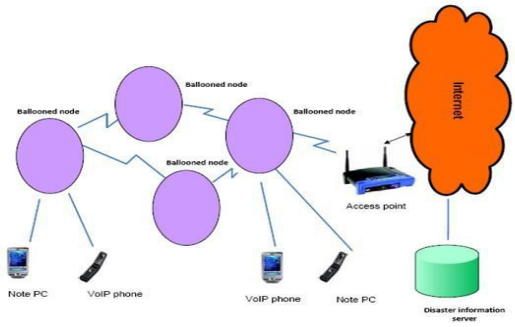

Fig.3 Ballooned emergency response network

V. WORKING OF SENSOR NODE

Sensor node hardware design we have used the SIMCOM 808 communication module and STM32F0P6F6 Arm controller which is responsible for performing the all the operation following is the flow chart which shows the working of Sensor node.

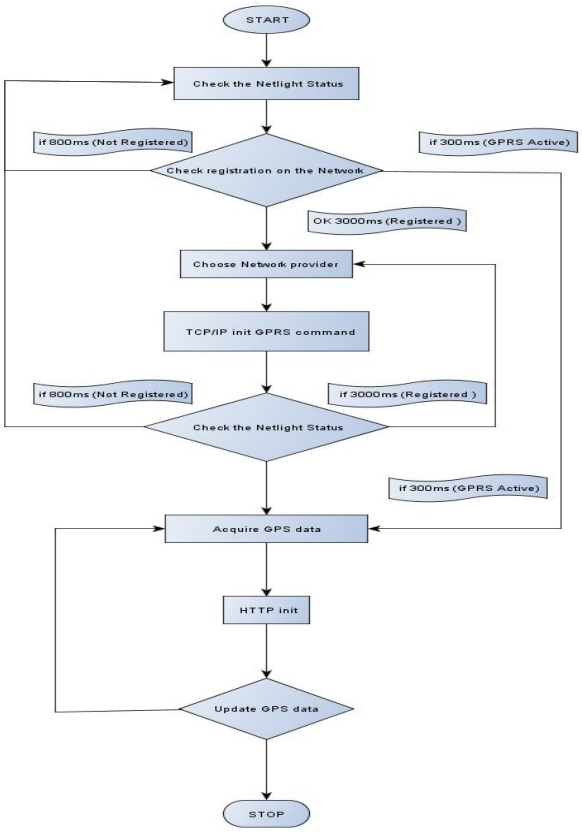

Fig.4 Flow chart sensor node system (N1, N2, N3, N4)

Net-light is the Pin No-50 of the SIM0808 module on this pin we can get the status of the network in the form of PWM pulses as shown below

STATUS	SIM0808 Behavior
Off	SIM808 not running
64ms on/ 800ms off	SIM808 not Registered the Network

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64ms on/ 3000ms off	SIM808 Registered to the Network
64ms on/ 300ms off	SIM808 GPRS communication established

FiTable.1network registration (PWM pulses) (N1, N2, N3, N4)

Configure the controller Timer in indirect Input capture mode (Tim1->ch1->PA8) read the PWM from Net-light pin of SIM808.At after power on SIM808 kit it takes 10 pulses of 64ms on/ 800ms off to registered on the network during this period controller has to wait or in ideal state. Once registration done user get the pulses of 64ms on/ 3000ms off that can be captured on controller's timer. Status is the Pin No- 49 of the SIM0808 module indicates Power on status this Pin is High during the Power on and Low during power off. Before checking PWM on net-light we can check the Status pins make sure SIM808 in power on condition, once SIM808 registered on the network user can go for applying the GPRS setting , but before applying GPRS setting user has to identify the which service providers SIM card is used for that We can use AT Command -> AT+CSPN? It will give the service providers name. GPRS setting can do using AT Commands , once GPRS connection established apply the TCP/IP setting here we can retrieve the some parameter which might be required to send on server. Here in this project IP Address retrieve for making TCP/IP call to wake a core via Ring indicator (RI). Ring indicator is the Pin No- 10 of the SIM0808 module on this pin we can get the external incoming data call ring, voice call ring. This pin is connected to PA0 pin of the Controller which is configured as EXTI (External interrupt) pin , on generating interrupt on this pin we can do necessary action like core wakeup , data transmission , answer the incoming call etc. After successfully establishment of GPRS connection we have acquire the gps data to track the vehicle location this can be done as follows. Power on > GPS (AT+CGPSPWR=1).Reset GPS > (AT+CGPSRST=1 cold start mode) after sending last command (AT+CGPSINF=2) we will get the response of the GPS in following manner. AT+CGPSINF=2 > +CGPSINF: 2,123038.102,1838.1762,N,07347.4831,E,1,5,1.47,631.9,M,-64.4,M, From this response we can extract Time (GMT), Latitude (Degree), Longitude (Degree), and Altitude (Meter). This acquire data has to convert into IST time, Latitude in hr:mm:ss , Longitude in hr:mm:ss . This data we can append to the string and send on the server using following http command which also contain IMEI no, IP address, Alerts. After transmitting this command if we receive following response, +HTTPACTION: 0, 200, 92 --------> Success, +HTTPACTION: 0, 500, 48 ------> internal server error, +HTTPACTION: 0,400,311 ------> Bad request if we get response +HTTPACTION: 0, 200, 92 it indicates that data successfully updated on the server. Otherwise for other cases data will not updated on server.

VI. CONCLUSIONS

We have designed the communication system which will improve the throughput, data loss, latency of the data over the previous design. The reduction of the partial products gives us a very fast communication network. We have lowered the amount of required memories and power usage.

VII. ACKNOWLEDGEMENT

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