**Business Case**

**GARUD – Emergency Accurate Location Finder**

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# Executive Summary

This business case outlines how the current Location Finder when someone calls on emergency numbers are not accurate. We will address current business concerns, the benefits of the solution we are presenting, and recommendations and justification of the project. The business case also discusses detailed project goals, performance measures, assumptions, constraints, and alternative options.

## Issue

Because of an increase in the number of crimes in recent times and the emergency numbers are not efficient in getting the accurate location. As nowadays whenever someone dials 100 or 111(Emergency Numbers) and in hurry not able to tell the address then the operators use the Cell Tower Triangulation method to get the location of the person.

There are many places where there are fewer cell towers available, such as in the fringes of the cities and out in the country. **If you have fewer than three cell towers available, pinpointing a mobile device can become a lot less precise**. In cities where there are lot more vertical structures which can be barriers to cell phone broadcasting and receiving, there have to be many more cell towers distributed in order to have good service. In the countryside, there are relatively fewer cell towers and a phone’s signal may be picked up only by a single one at much greater distance.

**Even nowadays we are not able to get the floor number of the person calling for help and it becomes difficult to provide help in high rise buildings.**

## Proposed Solution

As nowadays people have moved from LTE signals to VoLTE(Voice Over LTE) for calling purposes. We are planning that to get the accurate location of the person calling the emergency numbers with the help of VoLTE. When someone calls the emergency numbers we will send a script in form of data to the person’s phone and that script will run on the phone of the person and will get us the data of the sensors like accelerometer, barometer and GPS to get the location of the person.

* **Barometer Sensor:** With the help of the barometer readings we will manage to tell the Floor as pressure changes with height.
* **Accelerometer Sensor:** We will manage to predict the speed of the vehicles if something is happening in moving vehicle and we can easily manage to tell the police to reach this place in this much time.
* **GPS Sensors:** To get the accurate location of the person. We can use geolocation APIs from Google, Uber to provide the location to the script.

# Product Development Team

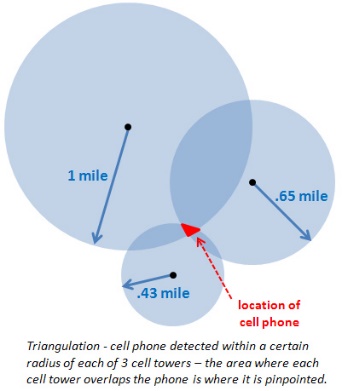
The following individuals comprise the Product Development Team. They are responsible for the analysis and creation of the Project.

| **Role** | **Description** | **Name/Title** |
| --- | --- | --- |
| Research Area/VoLTE | Researched about current methods and techniques. | Harshit Jaiswal |
| Android Sensor Work | To access data from the sensors and android. | Mayank Mishra |
| Python Scripts and Execution | Writing the Python codes and executing it for VoLTE.  Developing the platform for the Operators. | Mayank |

# Problem Definition

## Problem Statement

While dialing the EMERGENCY NUMBERS (100 or 101), the operators are able to get the location of the person from the nearest Cell Phone Tower. The technique used nowadays are called Cell Tower Triangulation.



In a best-case-scenario, a cell phone’s signal may be picked up by three or more cell towers, enabling the “[triangulation](http://en.wikipedia.org/wiki/Triangulation)” to work. From a geometric/mathematical standpoint, if you have the distance to an item from each of three distinct points, you can compute the approximate location of that item in relation to the three reference points. This geometric calculation applies in the case of cell phones, since we know the locations of the cell towers which receive the phone’s signal, and we can estimate the distance of the phone from each of those antennae towers, based upon the lag time between when the tower sends a ping to the phone and receives the answering ping back.

But nowadays certain problems have arrived:

* High Rise Buildings are getting increased so operators are not able to get the exact floor number of the person. As no such technique exist now to get the building number and exact floor number. It becomes time consuming to provide help timely to these places.
* Many places still don’t have so many towers so cell phone triangulation will not be able to possible so we will only able to get the location around one tower.

As these problems hinder the possibility to provide faster response in emergency

situations.

## Impact

This project will provide a positive impact in everyone’s life and will ease the works of the operators sitting in control rooms of emergency centers. It will help to provide help at much faster rate reducing the crime rate and saving more lives. The emergency numbers will become more trustworthy to people.

## Technology Migration

In order to effectively develop the project, a phased approach has been developed which will result in minimal time to build the project. The following is a high-level overview of the phased approach:

Phase I: Researched about the current prevailing methods and drawbacks of the Emergency systems.

Phase II: Learned about VoLTE method and the working of the sensors and ways to get the data from them and to send to the operator via VoLTE techniques.

Phase III: Developing the Platform for the Operators and trying and testing of the platform.

Phase IV: Scripts to get the data from the Android Phone of the victims every time someone calls on the number.

# Project Overview

The Emergency Accurate Location Finder Project overview provides detail for how this project will address the business problem. The overview consists of a project description, goals and objectives for the Project, project performance criteria, project assumptions, constraints, and major milestones. As the project is approved and moves forward, each of these components will be expanded to include a greater level of detail in working toward the project plan.

## Project Description

**Voice over Long-Term Evolution** (**VoLTE**) is a standard for high-speed [wireless communication](https://en.wikipedia.org/wiki/Wireless_communication) for [mobile phones](https://en.wikipedia.org/wiki/Mobile_phone) and data terminals — including IoT devices and wearables. It is based on the [IP Multimedia Subsystem](https://en.wikipedia.org/wiki/IP_Multimedia_Subsystem) (IMS) network, with specific profiles for [control](https://en.wikipedia.org/wiki/Control_plane) and [media planes](https://en.wikipedia.org/w/index.php?title=Media_plane&action=edit&redlink=1) of voice service on [LTE](https://en.wikipedia.org/wiki/LTE_(telecommunication)) defined by [GSMA](https://en.wikipedia.org/wiki/GSMA) in PRD IR.92. This approach results in the voice service (control and media planes) being delivered as data flows within the LTE [data bearer](https://en.wikipedia.org/w/index.php?title=Data_bearer&action=edit&redlink=1). This means that there is no dependency on (or ultimately, requirement for) the legacy [circuit-switched](https://en.wikipedia.org/wiki/Circuit-switched) voice network to be maintained.

VoLTE has up to three times more voice and data capacity than 3G UMTS and up to six times more than 2G GSM. Furthermore, it frees up bandwidth because VoLTE’s packets [headers](https://en.wikipedia.org/wiki/Header_(computing)) are smaller than those of unoptimized VoIP/LTE.

We will be using this technique while someone calls on emergency numbers to get the data

from various sensors over the network to get the exact floor number and location from the

call. We are building a platform for the operator which will help to easily get the required

information.

## Goals and Objectives

The project directly supports solutions to several of the problems faced by the people calling emergency numbers. The following table lists the goals and objectives that the project supports and how it supports them:

| **Goal/Objective** | **Description** |
| --- | --- |
| Timely and accurate reporting | Sensor based method to get the exact location of the person in requirement of help. |
| Sending help timely | As with the help of sensor data we are able to get the exact floor number too leading to sending help timely. |
| Moving Vehicle Accurate Location | With the help of accelerometer’s data we will be able to predict the accurate location and speed of the vehicles. |
| Reduce overhead costs | Fewer staff required will reduce the cost of the government agencies. |

## Project Assumptions

The following assumptions apply to the Project. As project planning begins and more assumptions are identified, they will be added accordingly.

* Funding is available for purchasing software permissions from the Phone Companies.
* Cell Tower Triangulation data will be provided by the current methods as it is done nowadays and our platform will combine this data with the sensor data to get the exact location.
* An automated voice needs to provided to the person calling, to get the permission to run a script to get the exact location of the person.

## Project Constraints

The following constraints apply to the Project. As project planning begins and more constraints are identified, they will be added accordingly.

* There are limited number of phones with VoLTE facility in it and proposed method work with VoLTE only.
* The government will require to get permission from the Android Phone companies for running that script and from the Phone users to run the script every time.
* As implementation will be done internally and not by the product developers or vendors of the Android Phones, there will be limited support from the hardware/software providers.

## Major Project Milestones

The following are the major project milestones identified at this time. As the project planning moves forward and the schedule is developed, the milestones and their target completion dates will be modified, adjusted, and finalized as necessary to establish the baseline schedule.

| **Milestones/Deliverables** | **Target Date** |
| --- | --- |
| Project Research about Current Project and their drawbacks. | 04/03/2019 |
| Project Idea Submission | 06/03/2019 |
| Project Kickoff | 09/03/2019 |
| Phase I Complete | 06/03/2019 |
| Phase II Complete | 17/03/2019 |
| Phase III Complete | 25/03/2019 |
| Phase IV Complete | 03/04/2019 |
| Closeout/Project Completion | 05/04/2019 |

# Cost Analysis

As the Emergency numbers belong to the Government so they need to ask for permission from the Cell Phone Agencies to get them right to run the script every-time someone dials emergency numbers from there phone. This will require time and money to buy the servers to host the scripts and send it every time someone calls to their phone.

Rest the platform for the operators will be a software so it requires no cost as this will be deployed locally on the machines.

# Alternatives Ideas

The following alternative options have been considered to address the business problem. These alternatives were not selected for a number of reasons which are also explained below.

| **Alternative Option** | **Reasons For Not Selecting Alternative** |
| --- | --- |
| Android Application to Send Data every time the person calls. | * Not Every Person who need help will have the App installed in the phone. * Application will track the person in non-emergency situations leading to breach in the privacy of the person. * Lack of automation |
| Cell Tower Triangulation | * Current Method used and is very inefficient in case of high-rise buildings. * Timeframe required is too long |