

MOBILE POSITIONING SYSTEM – MPS

A study on the methods of using mobile network received signal levels to estimate the position of user device.

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ABSTRACT

Mobile positioning is a key requirement in today's context due to location based services for users and technical requirements like drive testing. This research is to evaluate the possibility of using mobile network data to estimate UE location at an absence of GPS data.

A drive-test is done and collected data in a selected sample cluster. Extracted the six best-serving cell received signal levels against the relevant cell identification information for each and every sample location. Location coordinates also extracted using a GPS module. Network base station coordinates were verified with a data audit in order to generate a base station database.

With the information of best serving signal levels at a point and relevant base-station coordinates, tried to estimate the coordinates of receiver device. Device location should be in the weighted midpoint of said base station locations. Weight is to be derived from received signal levels.

Received signal level is inverse-proportional to the free space path loss (FSPL) and FSPL is proportional to the square of distance and frequency. Base-stations were weighted based on said FSPL factor for each single sample point separately.

Initial attempt was done using four best serving cells at a point. Estimated coordinates were benchmarked against actual GPS coordinate. This method estimated locations with deviation mean of 0.88km and SD 0.51. Then the calculation mechanism changed using six best serving cells at a location and to optimize the algorithm. Estimated coordinates of new calculation shown some better results with mean deviation 0.55km and SD 0.33.

With the test results, it is proven that the concept of estimating device location using mobile network parameters is possible with certain accuracy. Once proven, test is repeated for a larger dataset of 15,000 samples and proven the concept for different terrain.

Concept is proven successfully and recommended some possible enhancements to the concept for better value addition, which is to be tested and implemented.