SECURE TRACKING AND TRANSPORT SYSTEM USING RWP AND GPS

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Abstract- In the present era where technology has become a part of our life, every day new applications are developed in every field to serve mankind. Many applications have been developed using GPS (global positioning system) such as aquatic and spacecraft routing, surveying and mapping, precise time reference etc. GPS (global positioning system) enables everyday activities such as banking, mobile phone operations, and even the control of power grids by allowing well harmonized hand-off switching and accurate time. The main contribution of this paper is tracking and transportation of object in a secured way using RWP and GPS. To assure the security of the tracking and tracing application we introduce a method to evaluate the one-hop distance between the target object and all the cooperative nodes in the object's view.

A key factor that increases the project's accuracy and performance is GPS, a common example of wireless which can be interfaced to provide location and time information in all weather conditions. GPS has become a widely adopted and useful tool for commerce, scientific uses, tracking, and investigation. We control the ground session with RWP (random way point) using AODV routing protocol. DOP (dilution of precision).

Keywords: GPS, DOP, RWP

I. INTRODUCTION

A cumulative number of applications has been developed around a GPS with addition, in the last few years the GPS receivers have been used in vehicular networks to upkeep routing (GPSR [1]) as well as a overabundance of location based applications in several domains stretching from agriculture to national security. A key factor that influences the effectiveness and performance of the application is meticulousness and the conviction of positioning. For advanced applications, there is a longing to explore a novel area that falls between navigation and networking and controls the strength of both fields taking the GPS technology outside the mere course-plotting purposes.

This paper emphasis on the distribution-chain tracking. For example, let us assume a precious load or a particularly hazardous material such as pollutants or fuel needs to be transported across two destinations. It is understandably important to have the option to control in real time, the position of such load in order to avoid probable threats for the population or precious loss. We present a different approach to confirm the position of the aimed object by simulating the nodes in RWP along with GPS locating potentials. As an add-on, the analysis of dilution of precision is showed using GPS. The strategic approach of the paper demonstrates the simulations regarding the connection between the cooperative nodes distribution.

II. EXISTING SYSTEM

The basic requirement of this system is to obtain the location statistics at proper time to make accurate decision on time]. According to a simple plan, the CC(control centre) requests all supportive nodes to authenticate the position of the tracked

object. Very supportive node that is in radio range of the target, does the job of calculating its distance from the target and sends the result to the CC. The cc calculates the least mean square of every node because it already knows the position of all the supportive nodes. This one hop distance can be calculated by many ways.

Common methods are based on Time of- Arrival (TOA)[4], Time Difference Of Arrival (TDOA) [6] or Received Signal Strength (RSSI)[5]. The existing system highlights the pitfalls of the NBMS. Since the paper lies its focus on the number of cooperative nodes and their interaction with each other for the purpose of sending and receiving data. The errors caused due to inaccurate position locations have been side tracked. The behaviour of the nodes have been observed for the ground control. The goal of this research has been focused on the availability of the service, i.e. the number of cooperative nodes that are seen on average that allows performing the certification strategy.

III. GROUND ANALYSIS

Scrutinizing the anticipated plan, it is evident that the extent of the reliable nodes plays a significant role in the accessibility of the services. To gauge the position, the number of supportive nodes in vision should be maximum. In a broad spectrum the greater the number of reliable nodes, the enhanced the performance. The greater number of nodes ensures ample availability of data to perform any kind of comparison methods on them. Dilution Of Precision (DOP) that marks the position accessed by the ground positioning system(GPS) is the another crucial factor in the viability of the determining the exact position of the targeted object. The DOP can take huge values since the object moves within the roads. Such a fact can mar the exactitude of the stratagem. Opportunely the accuracy of the positioning is not a stern requirement. The precision of determining this aimed object necessitates interactive cooperative nodes and a GPS System. In the point of view of implementation the cooperative nodes bear no cost.

Lastly the main computational load of the RWP is narrowed by GPS .In addition to the cost benefits, it gives more accuracy to find out the position of the tracked object.

IV. SIMULATIONS AND CONSEQUENCES

To understand the relation between various cooperative nodes and the accessibility of services, a ascendable network simulator- QUALNET [8] has been used where various nomadic setups have been taken into consideration. Development of the system uses ANSI-C routines and is being linked to a simulator. In order to show the availability of the services, the simulations have been run with various cooperative nodes distributions movement replicas. Errors due to positioning or distance assessment are not the objectives of the study, instead the focus has been laid upon the availability of the nodes that permit to pinpoint the accurate object positioning.

The scenario being observed for these simulations is RWP (Random Way Point). RWP is the most extensively used and considered mobility mode [9][10]. This model allows the nodes to move liberally within a certain area. In accordance with RWP the host arbitrarily picks a terminus called waypoint and proceeds towards it in a conventional line. After reaching the destination it halts for some time and then again replicates the process. In this model, the distribution of the nodes is in the mid of the intended area.[11].The source and the destination nodes are connected using a CBR line. Settings for the parameters have being done for every node individually.

The general parameters of the simulations are as follows.

PARAMETERS	VALUES
Channel Frequency	2.4[GHz]
Data Rate	2[Mbps]
Interface Type	802.11b
Antenna	Omnidirectional
Height	1.5[m]
Radio Range	215.869[m]
Path Loss Model	TWO-RAY [8]
MAC Protocol	MACDOT11[8]
Distribution Of Nodes	Uniform

TABLE 1-General parameters of simulation

The following table demonstrates the study of cooperative nodes in RWP with mobile scenario. The portable scenario has an edge over fixed scenario as these portable nodes can be used in various portions of the area and need not be installed A further plus point is that dese rootless nodes give the coverage to the tracked object over a huge area, hence giving an exact situation of it. . But to enhance the validation of the position, a Global Positioning Satellite (GPS) system needs to be used for these nomadic nodes. The following figure illustrates the overall parameters for RWP scenario.

PARAMETERS	VALUES
Map Dimension	3000*3000[m]
RWP Speed	10 to 20[m/s]
RWP Pause Time	15[s]
Simulation Time	900[s]
Number Of Nodes	10 to 30
Seed	10

TABLE 2- Analysis parameters of nomadic nodes in RWP scenario

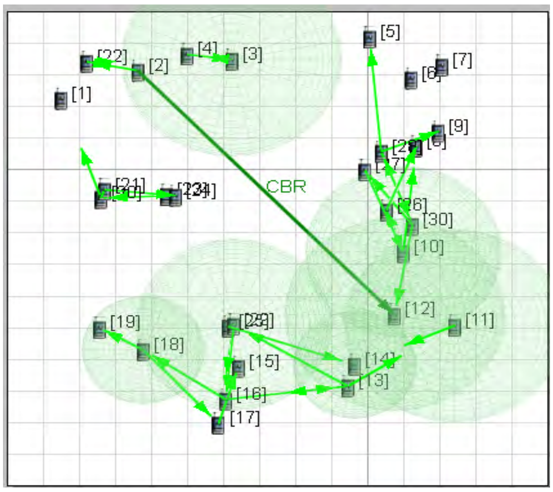
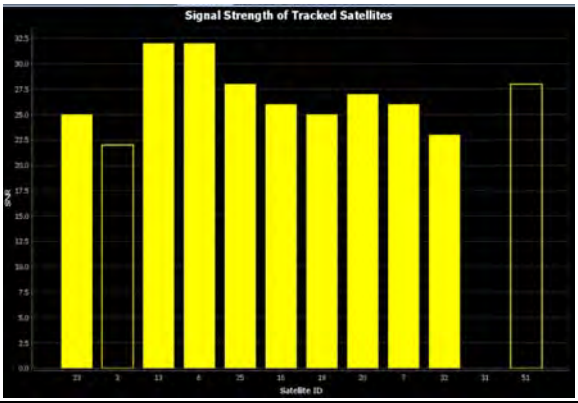


Figure1- Interaction of cooperative nodes in RWP scenario

The simulations have been implemented with the parameters mentioned in the above tables [Table 1 and 2]. The number of nodes has been changed from five to fifty per cent of the aggregate number of nodes in the given area .At the time of simulation every node gathers the data from the link layer saving in the radio coverage, the number of nodes .Here each node sends packets to the fellow nodes .At a particular point of time some nodes are active and the others are dormant and vice versa .Since these nodes are scattered over a large area, almost covering the route of the tracked object, it is easier for the nodes nearest to the object to return the precise locus of the object.

V. GPS CONTROL

The GPS receiver takes the source code as input. For user to start the application, it is essential to specify serial port (COM3) which is connected to usb interface. Determination of position information from GPS receiver is the output of this module. We find the impact of the DOP (Dilution of precision), or geometric dilution of precision (GDOP). The additional multiplicative result of GPS satellite geometry on GPS precision is called as DOP. Broad angular separation between the satellites used in calculating GPS unit's position results in lower DOP value which denotes GPS's accuracy of position. Varieties of information about the GPS satellites, position coordinates, and navigational information is available in GPS position window. The GPS Mode displays the type of position being calculated by the GPS receiver. GDOP consists of four major modes, which are, PDOP-Position Dilution of Precision (3D), HDOP – Horizontal Dilution of Precision (Latitude and Longitude), VDOP – Vertical Dilution of Precision (Height), TDOP – Time Dilution of Precision



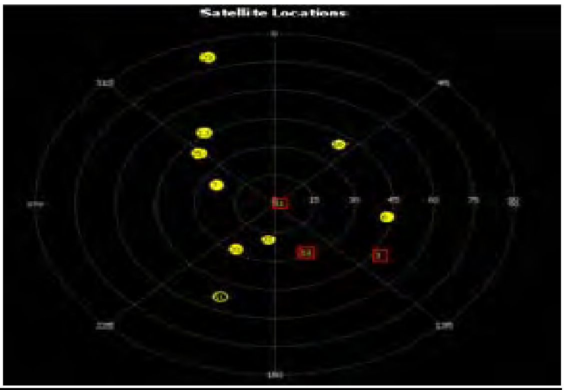


Figure 2: Signal strength of tracked satellites Figure3: satellite locations

GPS devices rely on the data received through the radio signals sent by GNSS. A GNSS can be defined as a network of satellites orbiting the earth that send data regarding the altitude, longitude, and latitude of the GPS receiver. Based on the data sent by these satellites, our GPS device computes the location of target object and helps in tracking its position. Figure2: shows different

The GPS (Global- satellites on the x- axis and their strength on the y-axis with respect to GPS device used to track the target object Positioning-System) consists of 24 satellites scattered around the earth. GPS network allows a user to determine their precise position on the surface of the Earth to very high accuracy by using an appropriate device. Figure3, shows the location of satellites which determines the location of target object. The satellites are represented in yellow circles. Satellites involved in determining the position of the object are shown in solid yellow and the satellites which does not take part is shown in circle outlined with yellow. Tracked objects are shown in red outlined squares. BU-353 GPS receiver has been used in our project for receiving the satellite signals and then decoded in a way which is acceptable as input in windows operating systems. BU-353 uses NMEA protocols for interaction between electrical and other devices like GPS. NMEA is a serial communication protocol which works in data link layer and manages the data transmission between a single talker and multiple listeners. It also works in application layer for effective communication between multiple listeners. Multiple sensors can be made to communicate with a single computer port by using multiplexers. BU-353 has an inbuilt active patch antenna providing highest accuracy. Using BU-353 makes the tracking system cost effective as it uses USB for connectivity, power and data transfer which does not require external power source. The GPS user interface uses java thus making it user friendly.

Typical baud rate	4800
Data bits	8
Parity	None
Stop bits	1
Handshake	None

Table 3: Shows serial configuration of NMEA in data link layer.

VI. CONCLUSIONS

The paper emphasizes on the elementary problem of providing accurate position of the tracked object to an agency regulating the supply of hazardous goods.

The existing model encountered many weaknesses of NBMS. This paper suggests the simultaneous work of RWP and GPS to overcome these pitfalls of NBMS. The grouping of these two methods ensures the vital trust in the position. An effort has been made to measure DOP using GPS . Minor Dilution Of Precision ensures the accuracy of the GPS system. A GPS system accumulates to the validity of the position ,hence providing the anticipated position accuracy of the object to the user.

Future efforts are dedicated to expand the GPS interface and fetch maximum accuracy in position validity .Finally the impact of the DOP in different scenarios has to be analyzed

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