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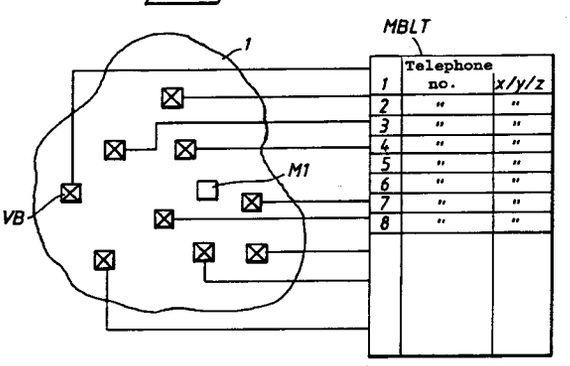
(54) Arrangement, method and application in a mobile system.

(57) In a mobile system for short-range communication, mobile units or vehicles are moving within the coverage area (1) of the system. Beacons (VB, RB) are arranged to communicate with the mobile units for obtaining and delivering information respectively to the mobile units for determining traffic situations, road situations and so forth in the coverage area. As beacons, virtual beacons (VB) are included which are in connection with at least one higher-level unit (NBLT). In the last-mentioned unit, the virtual beacons are represented in tables, preferably through information on access telephone numbers and positions of the virtual beacons in the system.

Fig.1



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TECHNICAL FIELD

The present invention relates to an arrangement in a mobile system, for example the RTI system relating to short-range communication where mobile units or vehicles move within the coverage area of the system and where beacons (radio beacons) are arranged to communicate with the mobile units for obtaining and delivering information from and respectively to the mobile units for determining traffic situations in systems in the coverage area. The invention also relates to an application and a method in the mobile system.

PRIOR ART

American patent specification US 5,126,941 discloses a system for control and guidance of vehicles. The system comprises a central unit with control and storage capabilities and communications units intended to be placed at the edge of the road, for example beacons. The vehicles are provided with equipment for handling guidance and control information from the units. The positions of each beacon are stored in the central memory in the form of two tables with the vertical and, respectively, horizontal coordinates. These coordinates are downloaded to the respective beacon, after which this information can be transferred to passing vehicles.

In European specification 320,913, a method for locating a mobile telephone is described. The fixed base stations send out identity signals and precise time pulses from their fixed locations. Signal transmission is carried out either as a response to an interrogation signal from the mobile or automatically at predetermined time intervals. The mobile unit can utilize internally stored tables of positions of the fixed base stations in calculating its own position. The known method is intended to be used for monitoring and controlling vehicle traffic. The method means that high costs for setting up a new fresh infrastructure for traffic monitoring can be avoided.

American patent specification US 5,043,736 discloses a cellular locating system. The system consists of a portable locating unit which can be used both as mobile telephone and for global positioning. The unit has a receiver for receiving signals from a global positioning system and circuits for calculating the position. The position thus obtained is then transmitted to the central unit via a mobile telephone system. In the central unit, there is a capability for correlating the position obtained with a stored digital map for placing the users at their current location on the map.

DESCRIPTION OF THE INVENTION

TECHNICAL PROBLEM

In accordance with the above, it is already known to store positions for fixed stations which are constituted by real beacons. However, it must be possible to carry out a suitable network planning in this type of beacon system. Algorithms for this are poorly developed, which is why one is mainly reduced to using empirical methods. However, errors in these methods can be costly. This is particularly so when one considers that a traditional beacon system, due to its nature, requires relatively many installations. The invention intends to solve this problem, among others.

The technical arrangements and costs which are linked to network planning of new communications systems are well known in advance. The technical problems and costs which can arise due to inadequate or less effective network planning when adding to existing systems are also known. The invention also intends to solve this problem.

Today there is a requirement for effectively operating support systems which can be utilized by decision makers at different levels. There is also a need for the arrangement in question to be able to manage gained experience in an effective manner and for the gained experience to be accessible to subsequent decision makers which will utilize the system in question.

There is also a need for being able to computerize such a process in an extensive way. The decisions in question should be able to include foundations for the decision, a decision in the form of acceptance and refusal and an electronic signature.

Work and research on, among other things, notations for describing activity and support systems therefor have been going on for a number of years at international level. One of the objects is to be able to refine step by step an overall activity description down to an executing support system. It becomes especially urgent to be able to make activity-driven support systems and general support systems which can execute the activity description and in this manner provide support for those who are working in the activity. A central part in the activity description and in the support systems in question is to describe and act the view of the activity towards its user. The invention also intends to solve this problem.

SOLUTION

The feature which may principally be regarded as characterizing an arrangement according to the invention is that virtual beacons are used as beacons which are in connection with at least one higher-level unit, in which said virtual beacon is represented preferably through the access telephone number and

positions of the mobile units in the system.

In further developments of the concept of the invention, the representations of the mobile units can be changed in the unit (the central unit) with a view to making possible removal, addition, changes in function and so forth of, or, respectively, in a respective beacon. The said representation function is utilized in network planning of a beacon system. Different configurations of the beacon placements can be tested in connection with network planning of a beacon system in question. Trials can be started in dependence on the selected configurations and the result of the trial or test can be utilized in network planning for placing real beacons. In an exchange of a virtual beacon for a real beacon, the said unit (NBLT) is arranged to make possible the execution of downloading to the real beacon which replaces the earlier virtual beacon of data which can be associated with the virtual beacon. The configurations of the beacon placements can be tested in practice with the aid of test runs with vehicles in the system, which is a suitable way especially in a system with little load. Tests can also be carried out with the aid of network and traffic statistics, which is preferably done with high traffic.

The invention also relates to an application of an arrangement in a mobile system, for example the RTI system providing short-range communication. In accordance with the above, the system is assumed to include mobile units and beacons between which units and beacons information can be exchanged when a respective mobile unit is passing a respective beacon. The application is characterized in that the arrangement is used in planning of a network with virtual beacons.

In one embodiment of this concept, the arrangement is used both in network planning and penetration of both real and virtual beacon systems. In a further embodiment, a unit (MBLT) which forms a higher-level unit for said virtual beacons is used for downloading data/information when the virtual beacon is exchanged for a real beacon.

ADVANTAGES

The invention proposed above provides possibilities for simulating a beacon network by placing out virtual beacons and storing their positions in a memory in a higher-level unit. Such an arrangement and application is superior to earlier network planning methods in which there are difficulties in implementing empirical experience in a cost effective way and in which mistakes can easily be made.

DESCRIPTION OF THE FIGURES

A presently proposed embodiment of an arrangement which exhibits characteristics significant of the invention will be described below, at the same time referring to the attached drawing in which :

Figure 1 shows in a basic diagram form a mobile system for short-range communication and including a virtual beacon connected to a higher-level unit, and

Figure 2 shows in a basic diagram form a similar mobile system according to Figure 1 but exhibiting real beacons which are likewise connected to a higher-level unit in the system.

DESCRIPTION OF AN EXEMPLARY EMBODIMENT

In Figure 1, the coverage system for a short-range communications system, for example the already well known RTI system, is specified by 1. Since the system as such is assumed to be already known, it will not be described here in its configuration or function. The system is provided with a number of beacons which have the form of so-called virtual or apparent beacons (radio beacons) VB in Figure 1. Within the coverage area, mobile units or vehicles M1 are moving. A number of such vehicles are moving within the area and, when passing a respective beacon VB, an information exchange occurs between a respective mobile unit and a respective virtual beacon. The information or data exchanged can thereby be associated with the traffic situation. A respective VB reports, to a respective mobile unit which is passing, on the traffic situation, at least in the closest surrounding area. The mobile unit M1 in turn reports on the traffic situation or road situation on the route which it has last travelled through. A said virtual beacon is represented in a higher-level unit MBLT (Master Beacon Location Table) included in the system. In the said MBLT unit, the virtual beacons are represented through their access telephone numbers and positions. The representation can also include second or alternative information.

Figure 2 relates to a corresponding mobile system 1' in which mobile units M1' move in a corresponding manner and real beacons RB are arranged in a manner corresponding to the virtual beacons. The said position information and telephone access numbers are in this case stored in a respective beacon. At a higher level, all beacons within the coverage area can be controlled at least to a certain degree from a higher-level unit E which, however, does not have the same task as the MBLT unit mentioned above.

In the system with the said virtual beacons according to Figure 1, changes of the virtual beacons can be carried out in the unit MBLT. Beacons can be added, removed and possibly changed in their function. This changeability in the representation in the MBLT unit is advantageously used in planning beacon-oriented systems. Configurations, one of which is

shown in Figure 1, can be introduced in the system and tested in practice, for example due to the fact or with the aid of the fact that vehicles M1 are allowed to move in the coverage area. Such a practical testing can be suitably carried out with low traffic. With high traffic or normal traffic, the planning or fine-tuning can be done with the aid of network traffic statistics. When the planned or configured system proves to be functioning well, the virtual beacons VB can be exchanged for real beacons RB according to Figure 2. The exchange can be carried out in such a manner that all or some of the virtual beacons are replaced by real beacons. A beacon system according to Figure 2 can be fine-tuned by random introduction of virtual beacons and so forth. In this manner, empirical tests can be carried out in a virtual environment which surpasses all forms of simulation and is cost-effective compared with the costs for real empirical tests.

On exchange of a virtual beacon VB for a real beacon RB, the unit is intended to download the information to the real beacon RB when the exchange has taken place.

The invention can be used in the RTI environment, for example MOBITEX, GSM and so forth (specialized service).

The invention is not limited to the embodiment shown above by way of example, but can be subjected to modifications within the scope of the patent claims following and the concept of the invention.

Claims

1. Arrangement in a mobile system, for example the RTI system providing short-range communication, where mobile units M1 or vehicles are moving within the coverage area (1) of the system and where beacons (radio beacons) are arranged to communicate with the mobile units for obtaining and delivering information from or respectively to the mobile units for determining traffic situations, road situation, etc., in the coverage area, characterized in that, as beacons, virtual beacons (VB) are included which are in communication or connection with at least one higher-level unit (MBLT), in which said virtual beacons are preferably represented through access telephone numbers or the positions of the beacons in the system.

2. Arrangement according to Claim 1, characterized in that the representations of the virtual beacons in the unit (MBLT) are changeable with the aim of permitting movement, removal, addition, changes in function etc. of or, respectively, in a respective beacon.

3. Arrangement according to Claim 1 or 2, characterized in that the representation function is included as change parameter in network planning of the beacon system.

4. Arrangement according to Claim 1, 2 or 3, characterized in that on testing different configurations of beacon placement in connection with network planning of the system, tests are carried out in dependence on the selected configurations, and that the result of the testing is utilized in network planning for placement of real beacons (RB).

5. Arrangement according to any of the preceding claims, characterized in that on exchange of a virtual beacon for a real beacon, the said unit (NBLT) is arranged to make possible the execution of downloading to the real beacon which has replaced the earlier virtual beacon and data which can be associated with the virtual beacon.

6. Arrangement according to any of the preceding claims, characterized in that configurations of the beacon placements can be tested in practice with the aid of test runs with vehicles in the system, which is especially suitable in a system with low loading.

7. Arrangement according to any of the preceding claims, characterized in that the configurations of the beacon placements can be tested in practice with the aid of network and traffic statistics, which is especially suitable in normal or high traffic.

8. Application of an arrangement in a mobile system, for example the RTI system providing short-range communication, comprising mobile units (M1) and beacons, between which units and beacons information can be exchanged when a respective mobile unit is passing a respective beacon, characterized in that the arrangement is used in planning of a network with virtual beacons.

9. Application according to Claim 8, characterized in that the arrangement is used in both network planning and fine-tuning of both real and virtual beacon systems, and/or that a unit (NBLT) which forms a higher-level unit for the said virtual beacons is used for downloading data/information when the virtual beacon is exchanged for a real beacon (RB).

10. Method for utilizing the arrangement in a mobile system where beacons communicate with mobile units when they are passed by the units for obtaining and delivering information, for example for determining traffic situations, road situation and

so forth, characterized in that, with network planning of the mobile system, virtual beacons are introduced and tested and/or the traffic in the system is calculated with virtual beacons thus introduced.

Fig. 1

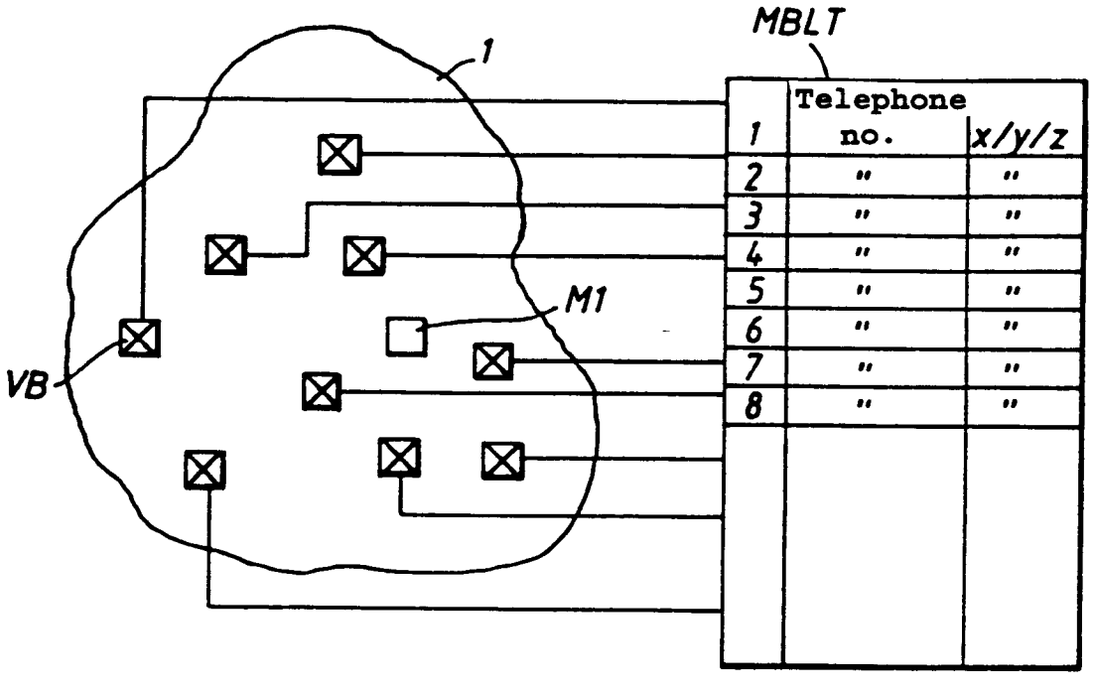

Fig. 2