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Almassy

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(54) **SYSTEM AND METHOD FOR THE EXCHANGE OF LOCATION INFORMATION IN A TELEPHONE NETWORK**

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(57) **ABSTRACT**

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H04Q 7/20 (2006.01)
(52) **U.S. Cl.** **455/456**; 455/68; 455/457; 455/461; 455/435; 343/760; 340/994; 701/208
(58) **Field of Classification Search** 455/68, 455/457, 461, 435, 446, 566, 456; 343/760; 340/994, 995, 991, 988, 905; 701/208, 213
See application file for complete search history.

A wireless communications system is presented where a mobile station is able to automatically determine its proximity to a second mobile station or landline telephone. Once the proximity determination command has been given, no further actions are required by the users of either telephone. A GPS receiver connected to the first mobile station is able to provide that mobile with its position and direction. The first mobile station makes a request to the other telephone for its position, through SMS messaging for example. A GPS receiver connected to the second mobile station is able to provide the second mobile station with data to enable the position request. Trust determinations can be enabled so that position data is sent to a restricted list of requesting telephone numbers. Likewise, the second mobile station can request position data from the first mobile station. When position information is requested from a landline telephone, the request can be fulfilled by the landline telephone service provider. A method for automatically exchanging position information is also provided.

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34 Claims, 3 Drawing Sheets

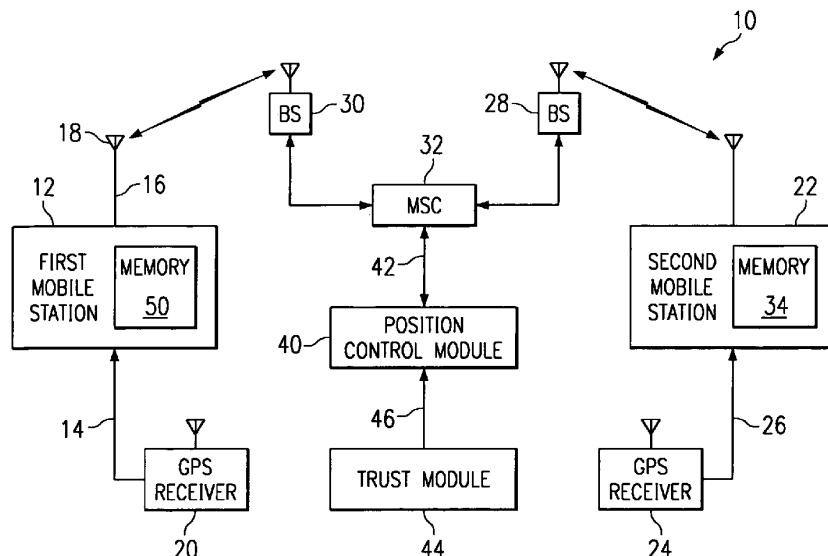


FIG. 1

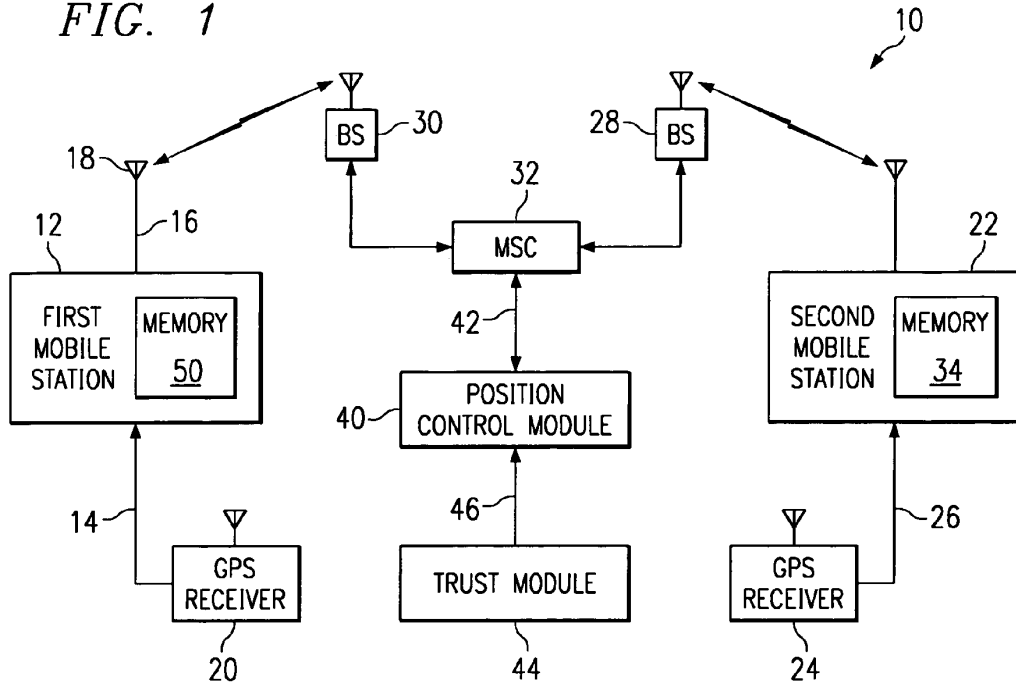
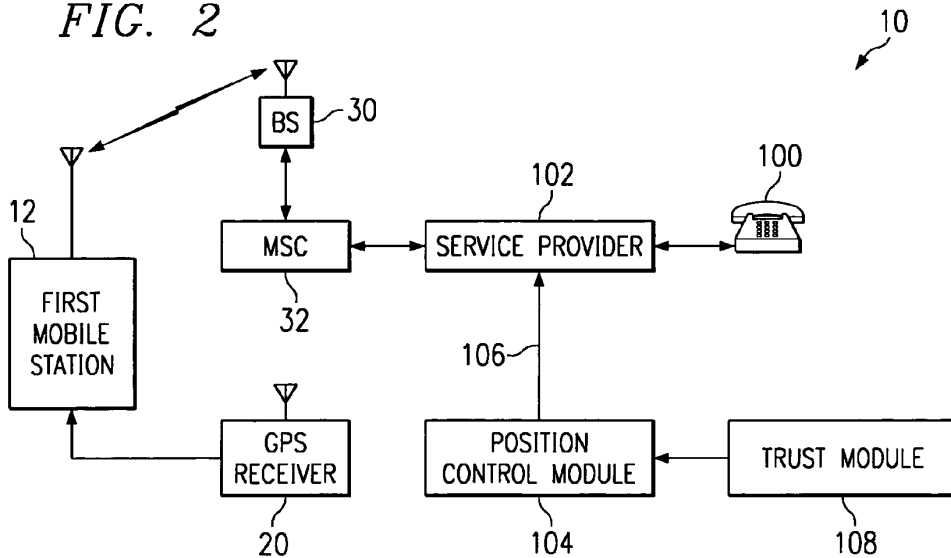


FIG. 2



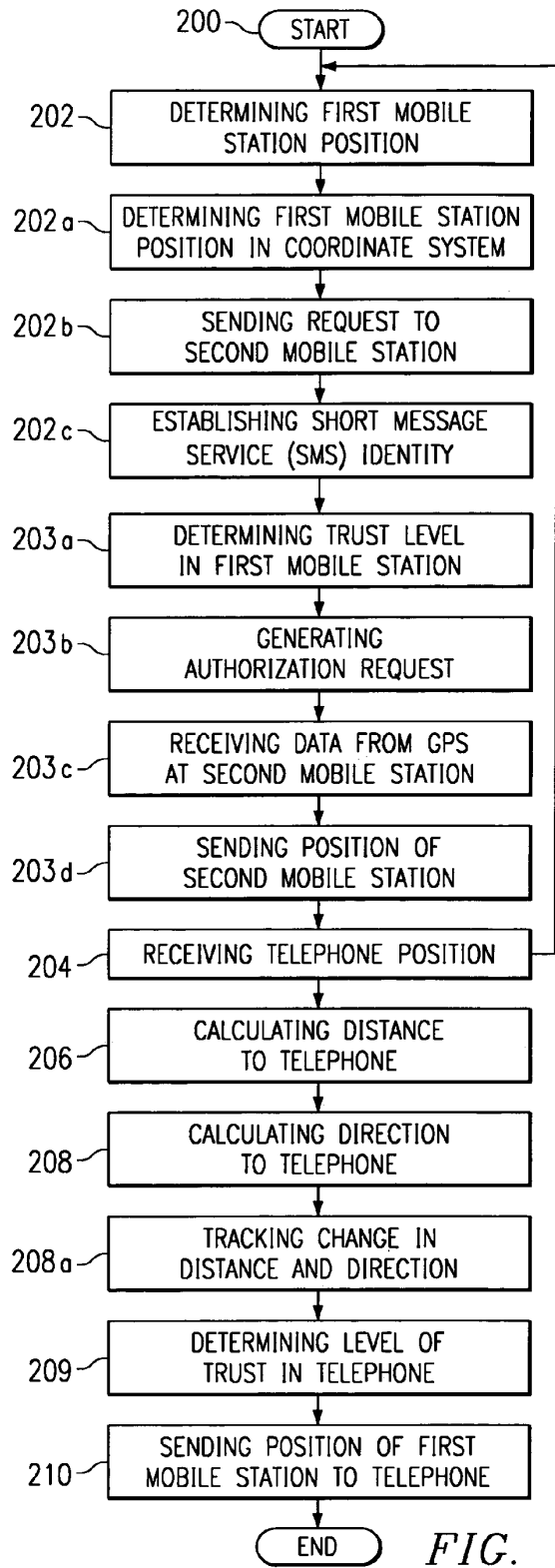


FIG. 3

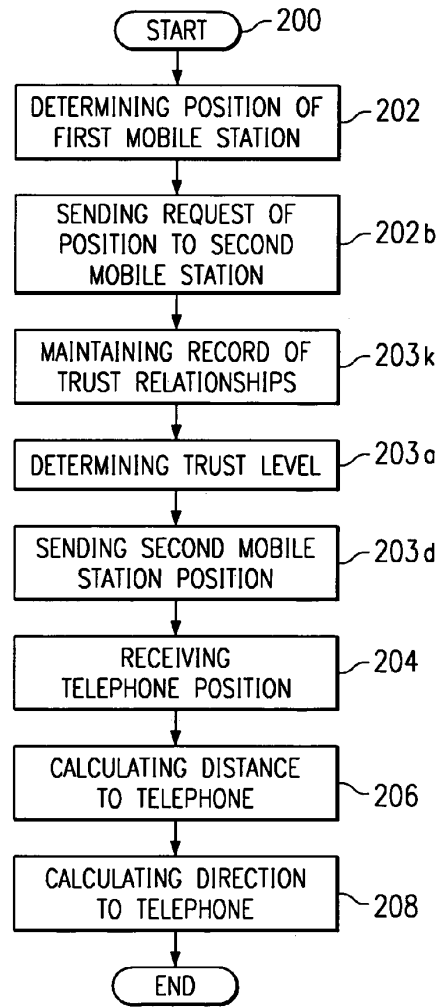


FIG. 5

FIG. 4

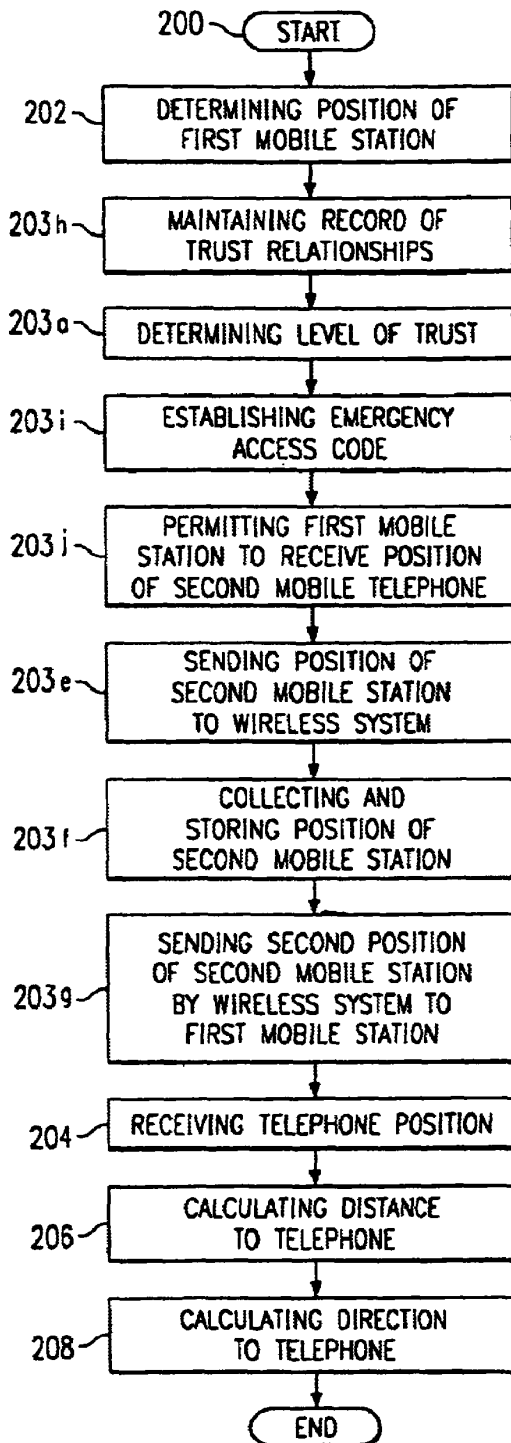
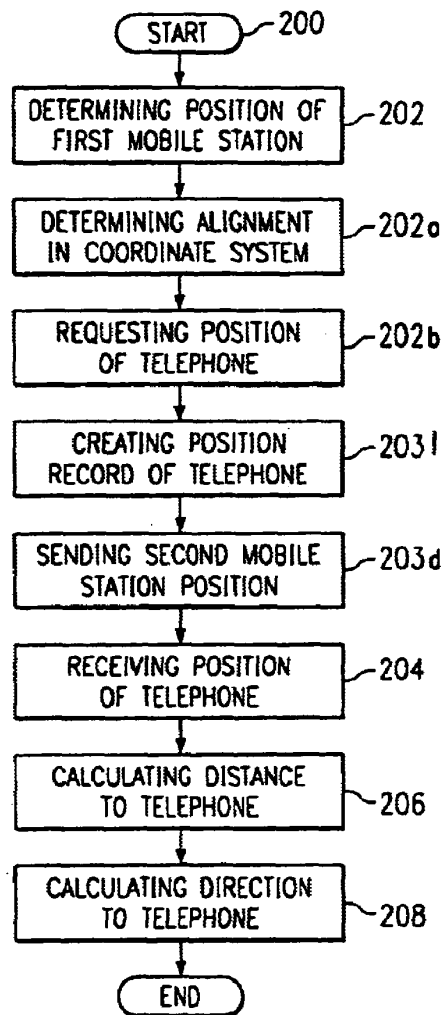


FIG. 6



SYSTEM AND METHOD FOR THE EXCHANGE OF LOCATION INFORMATION IN A TELEPHONE NETWORK

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the field of wireless communications and, more particularly, to a system and method for wireless communications system mobile station to determine distance and direction with respect to another telephone.

2. Description of the Related Art

In most Global Positioning System (GPS) devices, position can be determined with little user involvement. Likewise, from a change in position (at least two locations), absolute direction can be determined. Mobile stations, or mobile telephones have been adapted to interface with a GPS module, such that the distance and direction to targets with known coordinates can be calculated. Alternately, an interfacing GPS receiver allows the mobile station to report its position to another entity, so that the entity can determine its distance and direction from that mobile station.

In some situations it would be desirable to determine the position of a second phone as a target location for the mobile station. It would be possible to create software and a calculating device that would permit the mobile station to enter a second phone's location as a target location, and then track its location with respect to the target location. However, the second telephone position data it can only be processed through user intervention. That is, the user of the second "target" telephone must call the mobile station (or the mobile station must call the second telephone) to communicate its location to the requesting mobile station. Then, the mobile station must enter this location into a calculating device that can calculate distance and relative direction to the target location. A small (handheld) display could be connected to the calculating device to indicate the results. Alternately, a mobile station could be equipped with sufficient processing power, memory, and display to calculate and present the distance calculations.

It would be advantageous if a system could be devised to automatically permit a mobile station to track its position with respect to a second telephone.

It would be advantageous if a mobile station could automatically track its position with respect to a second telephone without a voice connection in a traffic channel to communicate the position information.

It would be advantageous if a mobile station could calculate its proximity to a landline telephone with a fixed location, so as to locate stores, restaurants, commercial establishments, and residences.

SUMMARY OF THE INVENTION

Accordingly, a method is provided which permits telephones with position determination and caller identification capabilities to exchange location information. The mobile station initiating the exchange uses the information to calculate distance and, if an absolute direction has been established, the relative direction to the other telephone. This invention allows mobile, fixed wireless (wireless local loop), and landline phones to exchange location information without immediate user involvement, while guaranteeing the privacy of both parties.

Specifically, the method comprises: a first mobile station determining its position, typically through the use of an

associated GPS receiver; the first mobile station receiving the position of a telephone; and, the first mobile station calculating the distance to the telephone. When the telephone is a second mobile station, its position is determined with the use of an associated GPS receiver. When the telephone is a landline telephone, its position can be stored in memory with either the telephone itself, with the service provider, or in the memory of the first mobile station. In some aspects of the invention, the first mobile station determines its alignment in a coordinate system, so that the direction to the telephone can also be calculated.

The method further comprises: the telephone determining a trust level that it has in the first mobile station. Then, the first mobile station receives the position of the telephone in response to the level of trust determined at the telephone. Alternately, the trust level determination is made by the service provider when the telephone is a landline telephone, or a wireless communications system when the telephone is a second mobile station. In some aspects of the invention, a manual step is inserted in the process. A request is made to the telephone user to authorize the transmission of position information to the first mobile station.

In some aspects of the invention, the method further comprises: establishing a short message service (SMS) identity corresponding to an SMS message to transmit and receive position requests and the transfer of position data. Alternately, the position information can be received through a general message, or even a traffic channel audio message.

In some aspects of the invention, the method further comprises: the first mobile station sending its position to the telephone. As with the sending of the telephone position information, a level of trust determination can condition the first mobile station response.

In a wireless communications system, a mobile station apparatus capable of determining its distance from another telephone is also provided. The system comprises a first mobile station having an input for receiving data to determine its own position and an port to request the position of a telephone. A telephone automatically sends its position to the first mobile station in response to the request. The first mobile station determines the distance to the telephone in response to receiving the telephone position. Details of the system are similar to those summarized above for the present invention method.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic block diagram of a wireless communications system that permits a mobile station to determine its distance from another telephone.

FIG. 2 is a schematic block diagram of a wireless communications system that permits a mobile station to determine its distance from a landline telephone.

FIG. 3 is a flowchart illustrating a method for a mobile station in a wireless communications system to determine proximity to a telephone.

FIG. 4 illustrates the method of FIG. 3, where aspects of the position transmission and trust determination functions are accomplished at the communications system level.

FIG. 5 is the flowchart of FIG. 3, specifically describing the performance of the position transmission and trust analysis functions being performed in the second mobile station.

FIG. 6 is a flowchart related to FIG. 3, specifically illustrating the landline telephone aspect of the invention.

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