coordinates in storage registers as follows. These storage registers may be memory locations in the GPS processor/receiver. Alternatively, these storage registers may be memory locations in a separate memory unit which is accessible by the GPS receiver/processor **125**. At each time interval t_n, the GPS receiver/processor **125** compares the peak error values Error_Lat(t_n) and Error_Long(t_n) with programmed error thresholds Err_Thresh_Lat and Err_Thresh_Long. As with the programmable sliding time window, these thresholds can vary depending on the desired accuracy and/or particular application. These thresholds are defined such that if the peak error values Error_Lat(t_n) and Error_Long(t_n) are within the thresholds Err_Thresh_Lat and Err_Thresh_Long respectively, then it can be assumed that the instantaneous coordinate values Lat(t_n) and Long(t_n) are within acceptable reliability limits. At each time period t_n, if the peak errors of both the latitude and longitude are within the threshold values, then the instantaneous coordinate values are stored in memory registers Lat_reg and Long_reg respectively. If the peak errors for either the latitude and longitude are not within the threshold values, then the instantaneous coordinate values Lat(t_n) and Long (t_n) are not stored in memory registers Lat_reg and Long_reg respectively. This technique assures that the memory registers Lat_reg and Long_reg always contain the most recent reliable latitude and longitude coordinates.

In addition to the information sent by the mobile telephone **120** described above, the following GPS information is sent over the air interface **202** to the mobile telephone system **200** during each time period t_n:

Lat(t_n) and Long(t_n);

Lat_reg and Long_reg;

Error_Lat(t_n) and Error_Long(t_n); and

Err_Thresh_Lat and Err_Thresh_Long.

The MSC **220** operates as described above to initiate the location function of the MLM **230** under certain conditions. The algorithm **238** stored in memory **234** of MLM **230** instructs the processor **232** to operate as described below in conjunction with FIG. **10**. Thus, upon initiation of the location function, the MLM **230** operates according to the flow diagram of FIG. **10** to calculate the location of the mobile telephone **120**.

As discussed above, zone **1** is defined by the geographic coverage area of the cell currently serving the mobile telephone **120** and zone **2** is the location area calculated by the MLM **230** as described above in conjunction with FIGS. **4**–**8**. Zone **1** will generally define an area larger than zone **2**. Referring to FIG. **10**, in step **1004** the MLM **230** determines if the peak latitude and longitude error values for the current time window are within the predetermined threshold error values. If they are, then the instantaneous latitude and longitude coordinates Lat(t_n) and Long(t_n) are considered to be of acceptable accuracy and they are used for further processing in step **1012**. In step **1012** it is determined whether the instantaneous GPS coordinates define a location which is within zone **1**. If not, then the MLM **230** returns the zone **2** location estimate with a moderate confidence level in step **1010**. If step **1012** determined that the instantaneous GPS coordinates define a location which is within zone **1**, then in step **1020** it is determined whether the instantaneous GPS coordinates define a location which is within zone **2**. If they do, then the MLM **230** returns the instantaneous coordinates as the location estimate with a high confidence level in step **1024**. If the instantaneous GPS coordinates do not define a location which is within zone **2**, then the MLM **230** returns the instantaneous coordinates as the location estimate with a moderate confidence level in step **1018**.

If in step **1004** the MLM **230** determines that the peak latitude and longitude error values for the current time window are not within the predetermined threshold error values, then the instantaneous latitude and longitude coordinates Lat(t_n) and Long(t_n) are considered not to be of acceptable accuracy, and the latitude and longitude values stored in the memory registers Lat_reg and Long_reg are used for further processing in step **1006**. In step **1006** it is determined whether the GPS coordinates stored in the memory registers define a location which is within zone **1**. If not, then the MLM **230** returns the zone **2** location estimate with a low confidence level in step **1008**. If the GPS coordinates stored in the memory registers define a location which is within zone **1**, then in step **1014** it is determined whether the GPS coordinates stored in the memory registers define a location which is within zone **2**. If not, then the MLM **230** returns the memory register coordinates as the location estimate with a moderate confidence level in step **1016**. If the GPS coordinates stored in the memory register define a location which is within zone **2**, then the MLM **230** returns the memory register coordinates as the location estimate with a high confidence level in step **1022**.

Once the geographic location area is determined, the MLM **230** routes the information to the appropriate end user destination. The appropriate routing information **240**, in one embodiment, is stored in memory **234** of the MLM **230**. For example, if the location function was initiated because of a 911 call from the mobile telephone **120**, the MLM **230** will route the location information to the appropriate public service provider. If the location function was initiated because the MSC determined that the cellular telephone number belonged to a fleet company, the location information would be sent to the appropriate fleet company. Further, the location information could be communicated to the mobile telephone **120** itself if the request for location information came from the user of the mobile telephone **120**.

The foregoing Detailed Description is to be understood as being in every respect illustrative and exemplary, but not restrictive, and the scope of the invention disclosed herein is not to be determined from the Detailed Description, but rather from the claims as interpreted according to the full breadth permitted by the patent laws. It is to be understood that the embodiments shown and described herein are only illustrative of the principles of the present invention and that various modifications may be implemented by those skilled in the art without departing from the scope and spirit of the invention. For example, the present invention could be implemented using a geometric location technique other than that described herein. Further, the detailed description described a method for calculating a location estimate by using three signal strengths. However, the principles of the present invention could be extended to perform such a calculation using more than three signal strengths. Such an extension could be readily implemented by one of ordinary skill in the art given the above disclosure.

We claim:

1. A method for locating a mobile telephone within the geographic serving area of a mobile telephone system, wherein said mobile telephone is capable of sending signals to and receiving signals from antennas located in cells within the geographic serving area, and wherein said mobile telephone comprises a GPS receiver/processor, the method comprising the steps of:

receiving signal strength data representing the signal strengths of signals being received by the mobile telephone from a first plurality of antennas;

calculating a first location area of the mobile telephone as the geographic coverage area of a serving cell cite;