

CLAIMS

1. A system for determining a user's path comprising:

5 a. a location server arranged to receive location data of a communication device associated with the user, the location data defining the detected position of the communication device at a number of different points in time, the location server further arranged to receive sequence data associated with the location data indicative of the order in which the location data was determined;

10 b. path determining means for determining the user's path passing through points defined by the received location data and the associated sequence data; and

c. a comparator for comparing the determined path of the user with one or more predetermined user paths;

15 wherein the location server processes the received location data depending upon the result of the comparison and corrects the determined user path with the processed location data.

2. A system according to claim 1 in which the location server is further configured to
20 smoothen the determined path or eliminate one or more points on the determined path or interpolate between points on the path based on the result of the comparison.

3. A system according to claim 1 in which the location server is further configured to
25 determine the accuracy of the received location data based on the result of the comparison.

4. A system according to claim 1 in which the location server is further arranged to
30 track the location of user at a point in time on the path based on real time or cached location data.

5. A system according to claim 1 in which the location server is configured to receive
location data comprising timestamp data indicative of when the location of the device was determined.

35 6. A system according to claim 1 in which the location server is further configured to determine the user's dwell time at a particular location or within a zone based on the processed location data.

- 5 7. A system according to claim 1 in which the location server is further configured to determine the number points on the determined user path, and preferably to compare the determined number points with a predetermined threshold stored in a storage means.
- 10 8. A system according to claim 7 in which the location server is further configured to determine the user dwell time only if the number points on the determined user path is greater than the predetermined threshold.
- 15 9. A system according to claim 1 in which the location server is configured to process the location data to eliminate location data associated with an inaccurate path.
10. A system according to claim 1 in which the location server is further configured to determine that a path is inaccurate if the determined user path does not correspond to the predetermined user path.
- 20 11. A system according to claim 1 in which location server is further configured to determine whether the communication device is associated with a staff member or infrastructure located within a zone or whether the communication device is stationary for a substantial period of time.
- 25 12. A system according to claim 1 in which the location server is further configured to process the location data to eliminate location data associated with a staff member or infrastructure or location data of a device which has been stationary for a substantial period of time.
- 30 13. A system according to claim 6 in which the location server determines that the device is associated with a staff member if the determined dwell time is greater than a predetermined threshold.
- 35 14. A system according to claim 1 further comprising a storage means for storing a plurality of predetermined user profiles, for example, a departing passenger profile or an arriving passenger profile or a transfer passenger profile or an airport staff profile, or welcoming staff profile or non-passenger user profile based on the determined user path.

15. A system according to claim 1 further comprising an administration interface for defining a plurality of zones within a region such as an airport.

16. A system according to claim 1 in which the location server is further configured to determine zone data, from the received location data, indicative of which of a plurality of zones the communication device is located in at each point in time.

17. A system according to claim 16 in which the location server is further configured to associate the determined zone data with the determined location data.

18. A system according to claim 1 in which the location server is further configured to profile the user as a departing passenger or an arriving passenger or a transfer passenger or airport staff, or welcoming staff or non-passenger user based on the comparison of the determined user path and the predetermined user path.

19. A system according to claim 14 in which each predetermined user profile is defined by the zone sequence data defining the order in which a user passes through a plurality of zones or the order in which the location data is detected.

20. A system according to claim 19 in which the location server is further configured to profile the user by comparing the sequence of zones of the predetermined user profile with a determined sequence of zones associated with the determined path.

21. A system according to claim 1 in which the location server is further configured to rank the determined user path data based on the number of points which the determined user path passes through or based on the accuracy of the processed location data or based on the frequency of the processed location data.

22. A system according to claim 1 in which the location server is further configured to determine a boundary of one or more zones.

23. A system according to claim 1 in which the location server is further configured to determine a first frequency of location detections when the user device is within a first predetermined distance from a zone boundary and a second frequency of location detections when the user device is further away from the zone boundary.

24. A system according to claim 23 in which the location server is further configured to rank the path based on the first and second frequency of detections.

5 25. A system according to claim 1 in which the location server is further configured to receive location data of a plurality of communication devices and to determine the path of each device and to compare the determined path of each user with one or more predetermined user paths and to processes the received location data depending upon the result of the comparison and to correct each determined user path with the processed location data depending upon the result of the comparison.

10 26. A system according to claim 1 in which the location server is further configured to determine a first frequency of location detections of a first path when the user device within a first predetermined distance of a zone boundary and a second frequency of location detections of a second path when a further user is within a corresponding predetermined distance from the zone boundary.

15 27. A system according to claim 26 in which the location server ranks a path with more location detections within the predetermined distance of a zone boundary higher than a path with fewer location detections within the predetermined distance of the zone boundary.

20 28. A system according to claim 1 further comprising storing means for storing the determined user path.

25 29. A system according to claim 1 in which the location data of the communication device is determined based on signal strength data received by an access point.

30 30. A system according to claim 1 in which the location data is received from a third party server arranged to determine the location of the communication device based on signal strength data received by the third party server.

35 31. A system according to claim 1 wherein the received location data comprises location data defining the detected position of the device at three or more points in time, and wherein the location data is received in a non-periodic or irregular or sporadic manner.

32. A system according to claim 1 in which the location data is determined using a wireless communications system, particularly a wireless communications system employing a wireless protocol according to the Institute of Engineering and technology 802.11 standard.

33. A system according to claim 1 wherein each predetermined path is defined by further location data and associated sequence data indicative of the order of the further location data.

34. A method for determining a user's path comprising:

- a. receiving with a location server location data of a communication device associated with the user, the location data defining the detected position of the communication device at a number of different points in time, receiving, using the location server, sequence data associated with the location data indicative of the order in which the location data was determined;
- b. determining with a path determining means, the user's path passing through points defined by the received location data and the associated sequence data; and
- c. comparing, using a comparator, the determined path of the user with one or more predetermined user paths; and processing with the location server the received location data depending upon the result of the comparison and correcting, using the location server, the determined user path with the processed location data.

35. A method according to claim 34 in which the location server smoothens the determined path or eliminates one or more points on the determined path or interpolates between points on the path based on the result of the comparison.

36. A method according to claim 1 in which the location server determines the accuracy of the received location data based on the result of the comparison.

37. A method according to claim 34 in which the location server tracks the location of user at a point in time on the path based on real time or cached location data.

38. A method according to claim 34 in which the location server receives location data comprising timestamp data indicative of when the location of the device was determined.

39. A method according to claim 34 in which the location server determines the user's dwell time at a particular location or within a zone based on the processed location data.

40. A method according to claim 34 in which the location server determines the number points on the determined user path, and preferably compares the determined number points with a predetermined threshold stored in a storage means.

41. A method according to claim 40 in which the location server determines the user dwell time only if the number points on the determined user path is greater than the predetermined threshold.

42. A method according to claim 34 in which the location server processes the location data to eliminate location data associated with an inaccurate path.

43. A method according to claim 34 in which the location server determines that a path is inaccurate if the determined user path does not correspond to the predetermined user path.

44. A method according to claim 34 in which location server determines whether the communication device is associated with a staff member or infrastructure located within a zone or whether the communication device is stationary for a substantial period of time.

45. A method according to claim 34 in which the location server processes the location data to eliminate location data associated with a staff member or infrastructure or location data of a device which has been stationary for a substantial period of time.

46. A method according to claim 39 in which the location server determines that the device is associated with a staff member if the determined dwell time is greater than a predetermined threshold.

47. A method according to claim 34 further comprising storing in a storage means a plurality of predetermined user profiles, for example, a departing passenger profile

or an arriving passenger profile or a transfer passenger profile or an airport staff profile, or welcoming staff profile or non-passenger user profile based on the determined user path.

48. A method according to claim 34 further comprising defining, using an administration interface, a plurality of zones within a region such as an airport.

49. A method according to claim 34 in which the location server is further configured to determine zone data, from the received location data, indicative of which of a plurality of zones the communication device is located in at each point in time.

50. A method according to claim 49 in which the location server associates the determined zone data with the determined location data.

51. A method according to claim 34 in which the location server profiles the user as a departing passenger or an arriving passenger or a transfer passenger or airport staff, or welcoming staff or non-passenger user based on the comparison of the determined user path and the predetermined user path.

52. A method according to claim 47 in which each predetermined user profile is defined by the zone sequence data defining the order in which a user passes through a plurality of zones or the order in which the location data is detected.

53. A method according to claim 52 in which the location server is further configured to profile the user by comparing the sequence of zones of the predetermined user profile with a determined sequence of zones associated with the determined path.

54. A method according to claim 34 in which the location server ranks the determined user path data based on the number of points which the determined user path passes through or based on the accuracy of the processed location data or based on the frequency of the processed location data.

55. A method according to claim 34 in which the location server determines a boundary of one or more zones.

56. A method according to claim 34 in which the location server determines a first frequency of location detections when the user device within a first predetermined

distance from a zone boundary and a second frequency of location detections when the user device is further away from the zone boundary.

57. A method according to claim 56 in which the location server ranks the path based on the first and second frequency of detections.

58. A method according to claim 34 in which the location server receives location data of a plurality of communication devices and determines the path of each device and compares the determined path of each user with one or more predetermined user paths and processes the received location data depending upon the result of the comparison and corrects each determined user path with the processed location data depending upon the result of the comparison.

59. A method according to claim 34 in which the location server determines a first frequency of location detections of a first path when the user device within a first predetermined distance of a zone boundary and a second frequency of location detections of a second path when a further user is within a corresponding predetermined distance from the zone boundary.

60. A method according to claim 59 in which the location server ranks a path with more location detections within the predetermined distance of a zone boundary higher than a path with fewer location detections within the predetermined distance of the zone boundary.

61. A method according to claim 34 further comprising storing, in storing means, the determined user path.

62. A method according to claim 34 in which the location data of the communication device is determined based on signal strength data received by an access point.

63. A method according to claim 34 in which the location data is received from a third party server arranged to determine the location of the communication device based on signal strength data received by the third party server.

64. A method according to claim 34 wherein the received location data comprises location data defining the detected position of the device at three or more points in

time, and wherein the location data is received in a non-periodic or irregular or sporadic manner.

5 65. A system according to claim 1 in which the location data is determined using a wireless communications system, particularly a wireless communications system employing a wireless protocol according to the Institute of Engineering and technology 802.11 standard.

10 66. A method according to claim 34 wherein each predetermined path is defined by further location data and associated sequence data indicative of the order of the further location data.

CLAIMS

1. A system for determining a user's path comprising:
 - a. a location server arranged to receive location data of a communication device associated with the user, the location data defining the detected position of the communication device at a number of different points in time, the location server further arranged to receive sequence data associated with the location data indicative of the order in which the location data was determined; wherein the location server is further arranged to compare the received location data and zone data defining a plurality of zones and to associate the received location data with one of the plurality of zones;
 - b. path determining means for determining the user's path passing through points defined by the associated location data and the associated sequence data; and
 - c. a comparator for comparing the determined path of the user with one or more predetermined user paths;
wherein the location server is further arranged to process the associated location data depending upon the result of the comparison and to correct the determined user path based on the processed associated location data.
2. A system according to claim 1 in which the location server is further configured to smoothen the determined path or eliminate one or more points on the determined path or interpolate between points on the path based on the result of the comparison.
3. A system according to claim 1 in which the location server is further configured to determine the accuracy of the associated location data based on the result of the comparison.
4. A system according to claim 1 in which the location server is further arranged to track the location of user at a point in time on the path based on real time or cached location data.
5. A system according to claim 1 in which the location server is configured to receive location data comprising timestamp data indicative of when the location of the device was determined.

6. A system according to claim 1 in which the location server is further configured to determine the user's dwell time at a particular location or within a zone based on the processed associated location data.
7. A system according to claim 1 in which the location server is further configured to determine the number of points on the determined user path, and preferably to compare the determined number of points with a predetermined threshold stored in a storage means.
8. A system according to claim 7 in which the location server is further configured to determine the user dwell time only if the number points on the determined user path is greater than the predetermined threshold.
9. A system according to claim 1 in which the location server is configured to process the associated location data to eliminate location data associated with an inaccurate path.
10. A system according to claim 1 in which the location server is further configured to determine that a path is inaccurate if the determined user path does not correspond to the predetermined user path.
11. A system according to claim 1 in which location server is further configured to determine whether the communication device is associated with a staff member or infrastructure located within a zone or whether the communication device is stationary for a substantial period of time.
12. A system according to claim 1 in which the location server is further configured to process the location data to eliminate location data associated with a staff member or infrastructure or location data of a device which has been stationary for a substantial period of time.
13. A system according to claim 6 in which the location server determines that the device is associated with a staff member if the determined dwell time is greater than a predetermined threshold.
14. A system according to claim 1 further comprising a storage means for storing a plurality of predetermined user profiles, for example, a departing passenger profile

or an arriving passenger profile or a transfer passenger profile or an airport staff profile, or welcoming staff profile or non-passenger user profile based on the determined user path.

15. A system according to claim 1 further comprising an administration interface for defining a plurality of zones within a region such as an airport.
16. A system according to claim 1 in which the location server is further configured to determine zone data, from the received location data, indicative of which of a plurality of zones the communication device is located in at each point in time.
17. A system according to claim 16 in which the location server is further configured to associate the determined zone data with the determined location data.
18. A system according to claim 1 in which the location server is further configured to profile the user as a departing passenger or an arriving passenger or a transfer passenger or airport staff, or welcoming staff or non-passenger user based on the comparison of the determined user path and the predetermined user path.
19. A system according to claim 14 in which each predetermined user profile is defined by the zone sequence data defining the order in which a user passes through the plurality of zones or the order in which the location data is detected.
20. A system according to claim 19 in which the location server is further configured to profile the user by comparing the sequence of zones of the predetermined user profile with a determined sequence of zones associated with the determined path.
21. A system according to claim 1 in which the location server is further configured to rank the determined user path data based on the number of points which the determined user path passes through or based on the accuracy of the processed associated location data or based on the frequency of the processed location data.
22. A system according to claim 1 in which the location server is further configured to determine a boundary of one or more zones.
23. A system according to claim 1 in which the location server is further configured to determine a first frequency of location detections when the user device within a first

predetermined distance from a zone boundary and a second frequency of location detections when the user device is further away from the zone boundary.

24. A system according to claim 23 in which the location server is further configured to rank the path based on the first and second frequency of detections.
25. A system according to claim 1 in which the location server is further configured to receive location data of a plurality of communication devices, to compare the received location data and the received zone data and, if it is determined that the received location data is in a given zone, to produce associated location data associating the received location data with the given zone, and to determine the path of each device and to compare the determined path of each user with one or more predetermined user paths and to process the associated location data depending upon the result of the comparison and to correct each determined user path with the processed associated location data depending upon the result of the comparison.
26. A system according to claim 1 in which the location server is further configured to determine a first frequency of location detections of a first path when the user device within a first predetermined distance of a zone boundary and a second frequency of location detections of a second path when a further user is within a corresponding predetermined distance from the zone boundary.
27. A system according to claim 26 in which the location server ranks a path with more location detections within the predetermined distance of a zone boundary higher than a path with fewer location detections within the predetermined distance of the zone boundary.
28. A system according to claim 1 further comprising storing means for storing the determined user path.
29. A system according to claim 1 in which the location data of the communication device is determined based on signal strength data received by an access point.
30. A system according to claim 1 in which the location data is received from a third party server arranged to determine the location of the communication device based on signal strength data received by the third party server.

31. A system according to claim 1 wherein the received location data comprises location data defining the detected position of the device at three or more points in time, and wherein the location data is received in a non-periodic or irregular or sporadic manner.
32. A system according to claim 1 in which the location data is determined using a wireless communications system, particularly a wireless communications system employing a wireless protocol according to the Institute of Engineering and technology 802.11 standard.
33. A system according to claim 1 wherein each predetermined path is defined by further location data and associated sequence data indicative of the order of the further location data.
34. A method for determining a user's path comprising:
 - a. receiving with a location server location data of a communication device associated with the user, the location data defining the detected position of the communication device at a number of different points in time, receiving, using the location server, sequence data associated with the location data indicative of the order in which the location data was determined and receiving zone data defining a plurality of zones; further comprising comparing, with the location server, the received location data and the received zone data and, if it is determined that the received location data is in a given zone, producing associated location data associating the received location data with the given zone;
 - b. determining with a path determining means, the user's path passing through points defined by the associated location data and the associated sequence data; and
 - c. comparing, using a comparator, the determined path of the user with one or more predetermined user paths; and processing with the location server the associated location data depending upon the result of the comparison and correcting, using the location server, the determined user path based on the processed associated location data.

35. A method according to claim 34 in which the location server smoothens the determined path or eliminates one or more points on the determined path or interpolates between points on the path based on the result of the comparison.
36. A method according to claim 1 in which the location server determines the accuracy of the associated location data based on the result of the comparison.
37. A method according to claim 34 in which the location server tracks the location of user at a point in time on the path based on real time or cached location data.
38. A method according to claim 34 in which the location server receives location data comprising timestamp data indicative of when the location of the device was determined.
39. A method according to claim 34 in which the location server determines the user's dwell time at a particular location or within a zone based on the processed associated location data.
40. A method according to claim 34 in which the location server determines the number of points on the determined user path, and preferably compares the determined number of points with a predetermined threshold stored in a storage means.
41. A method according to claim 40 in which the location server determines the user dwell time only if the number points on the determined user path is greater than the predetermined threshold.
42. A method according to claim 34 in which the location server processes the associated location data to eliminate location data associated with an inaccurate path.
43. A method according to claim 34 in which the location server determines that a path is inaccurate if the determined user path does not correspond to the predetermined user path.
44. A method according to claim 34 in which location server determines whether the communication device is associated with a staff member or infrastructure located

within a zone or whether the communication device is stationary for a substantial period of time.

45. A method according to claim 34 in which the location server processes the location data to eliminate location data associated with a staff member or infrastructure or location data of a device which has been stationary for a substantial period of time.
46. A method according to claim 39 in which the location server determines that the device is associated with a staff member if the determined dwell time is greater than a predetermined threshold.
47. A method according to claim 34 further comprising storing in a storage means a plurality of predetermined user profiles, for example, a departing passenger profile or an arriving passenger profile or a transfer passenger profile or an airport staff profile, or welcoming staff profile or non-passenger user profile based on the determined user path.
48. A method according to claim 34 further comprising defining, using an administration interface, a plurality of zones within a region such as an airport.
49. A method according to claim 34 in which the location server is further configured to determine zone data, from the received location data, indicative of which of a plurality of zones the communication device is located in at each point in time.
50. A method according to claim 49 in which the location server associates the determined zone data with the determined location data.
51. A method according to claim 34 in which the location server profiles the user as a departing passenger or an arriving passenger or a transfer passenger or airport staff, or welcoming staff or non-passenger user based on the comparison of the determined user path and the predetermined user path.
52. A method according to claim 47 in which each predetermined user profile is defined by the zone sequence data defining the order in which a user passes through the plurality of zones or the order in which the location data is detected.

53. A method according to claim 52 in which the location server is further configured to profile the user by comparing the sequence of zones of the predetermined user profile with a determined sequence of zones associated with the determined path.
54. A method according to claim 34 in which the location server ranks the determined user path data based on the number of points which the determined user path passes through or based on the accuracy of the processed associated location data or based on the frequency of the processed location data.
55. A method according to claim 34 in which the location server determines a boundary of one or more zones.
56. A method according to claim 34 in which the location server determines a first frequency of location detections when the user device within a first predetermined distance from a zone boundary and a second frequency of location detections when the user device is further away from the zone boundary.
57. A method according to claim 56 in which the location server ranks the path based on the first and second frequency of detections.
58. A method according to claim 34 in which the location server receives location data of a plurality of communication devices, compares the received location data and the received zone data and, if it is determined that the received location data is in a given zone, produces associated location data associating the received location data with the given zone, and determines the path of each device and compares the determined path of each user with one or more predetermined user paths and processes the received location data depending upon the result of the comparison and corrects each determined user path with the processed associated location data depending upon the result of the comparison.
59. A method according to claim 34 in which the location server determines a first frequency of location detections of a first path when the user device within a first predetermined distance of a zone boundary and a second frequency of location detections of a second path when a further user is within a corresponding predetermined distance from the zone boundary.

60. A method according to claim 59 in which the location server ranks a path with more location detections within the predetermined distance of a zone boundary higher than a path with fewer location detections within the predetermined distance of the zone boundary.
61. A method according to claim 34 further comprising storing, in storing means, the determined user path.
62. A method according to claim 34 in which the location data of the communication device is determined based on signal strength data received by an access point.
63. A method according to claim 34 in which the location data is received from a third party server arranged to determine the location of the communication device based on signal strength data received by the third party server.
64. A method according to claim 34 wherein the received location data comprises location data defining the detected position of the device at three or more points in time, and wherein the location data is received in a non-periodic or irregular or sporadic manner.
65. A system according to claim 1 in which the location data is determined using a wireless communications system, particularly a wireless communications system employing a wireless protocol according to the Institute of Engineering and technology 802.11 standard.
66. A method according to claim 34 wherein each predetermined path is defined by further location data and associated sequence data indicative of the order of the further location data.