Claims

1. A system for estimating an indoor location using a satellite signal generation device, the system comprising:

a receiving antenna for receiving satellite signals;

a central controller for periodically receiving and storing an update of real-time satellite information of all actual satellites, extracting satellite time from the satellite signals received from the receiving antenna, and selecting at least 4 satellite numbers available for location estimation among all the actual satellites based on information on the satellite time; and

at least one satellite signal generation device receiving satellite numbers allocated by the central controller, and generating satellite signals corresponding to the satellite numbers allocated by the central controller,

wherein the system provides an environment that enables an indoor satellite signal receiving terminal user to estimate his or her location based on the satellite signals corresponding to the at least 4 satellite numbers transmitted from the satellite signal generation device.

2. The system according to claim 1, wherein the central controller or the satellite signal generation device calculates distances between the actual satellites and the corresponding satellite signal generation devices with respect to the selected satellite numbers based on actual orbit coordinates of the corresponding satellite numbers and previously estimated location coordinates of the corresponding satellite signal generation devices and calculates delay transmission time by dividing the calculated distance by light speed.

3. The system according to claim 2, wherein the satellite signal generation device generates satellite signals corresponding to the selected satellite numbers in a manner of being delayed by the delay transmission time received from the central controller or autonomously calculated.

4. The system according to claim 1, wherein the satellite signal generation device receives at least four allocated satellite numbers, and generates satellite signals corresponding to the allocated satellite numbers.

5. The system according to claim 1, wherein the central controller selects at least 4 satellite numbers available for location estimation among all actual satellites existing in visibility based on the information on the satellite time.

6. The system according to claim 1, wherein the central controller selects at least one satellite existing in visibility among all the actual satellites and at least 3 satellites existing around within 120 degrees latitude and longitude with respect to the satellite.

7. The system according to claim 1, wherein the kinds of satellites comprise GPS, Galileo, and GLONASS.

8. A method for estimating an indoor location using a satellite signal generation device, the method comprising:

receiving satellite signals by a receiving antenna and transmitting the received satellite signals to a central controller;

extracting satellite time from the received satellite signals, and synchronizing the system based on the extracted satellite time;

selecting at least 4 satellite numbers available for location estimation among all the actual satellites based on real-time satellite information of all the actual satellites and information on the satellite time and allocating the selected satellite numbers to the satellite signal generation device;

calculating distances between the actual satellites and the corresponding satellite signal generation devices with respect to the selected satellite numbers based on actual orbit

coordinates of the corresponding satellite numbers and installation location coordinates of the corresponding satellite signal generation devices and calculating delay transmission time by dividing the calculated distance by light speed;

generating satellite signals corresponding to the selected satellite numbers in a manner of being delayed by the delay transmission time by the satellite signal generation device; and

estimating a location of an indoor satellite signal receiving terminal user based on the satellite signals corresponding to the at least 4 satellite numbers transmitted from the satellite signal generation device.

CLAIMS

1. A system for estimating an indoor location using a satellite signal generation device, which can build a seamless location estimation system environment in which handover is freely performed between an outdoor location estimation environment and an indoor location estimation environment without changing hardware or software of a user terminal, the system comprising:

a receiving antenna for receiving satellite signals;

a central controller for periodically receiving and storing an update of real-time satellite information of all actual satellites, extracting satellite time from the satellite signals received from the receiving antenna, and selecting at least 4 satellite numbers available for location estimation among all the actual satellites based on information on the actual satellites and the satellite time; and

at least one satellite signal generation device receiving satellite numbers allocated by the central controller, and generating satellite signals corresponding to the satellite numbers allocated by the central controller,

wherein the central controller calculates distances between the actual satellites and the corresponding satellite signal generation devices with respect to the selected satellite numbers based on actual orbit coordinates of the corresponding satellite numbers and installation location coordinates of the corresponding satellite signal generation devices, transmits delay transmission time calculated by dividing the calculated distance by light speed to the corresponding satellite signal generation devices, and eventually enables the satellite signal generation device to generate satellite signals corresponding to the selected satellite numbers in a manner of being delayed by the delay transmission time received from the central controller.

2. A system for estimating an indoor location using a satellite signal generation device, which can build a seamless location estimation system environment in which handover is freely performed between an outdoor location

estimation environment and an indoor location estimation environment without changing hardware or software of a user terminal, the system comprising:

a receiving antenna for receiving satellite signals;

a central controller for periodically receiving and storing an update of real-time satellite information of all actual satellites, extracting satellite time from the satellite signals received from the receiving antenna, and selecting at least 4 satellite numbers available for location estimation among all the actual satellites based on information on the actual satellites and the satellite time; and

at least one satellite signal generation device receiving satellite numbers allocated by the central controller, and generating satellite signals corresponding to the satellite numbers allocated by the central controller,

wherein the satellite signal generation device calculates distances between the actual satellites and the corresponding satellite signal generation devices with respect to the selected satellite numbers based on actual orbit coordinates of the corresponding satellite numbers and installation location coordinates of the corresponding satellite signal generation devices, calculates delay transmission time by dividing the calculated distance by light speed, and eventually generates satellite signals corresponding to the selected satellite numbers in a manner of being delayed by the delay transmission time.

3. The system according to claim 1, wherein the satellite signal generation device receives at least four allocated satellite numbers, and generates satellite signals corresponding to the allocated satellite numbers.

4. The system according to claim 1, wherein the central controller selects at least 4 satellite numbers available for location estimation among all actual satellites existing in visibility based on the information on the satellite time.

5. The system according to claim 1, wherein the central controller selects at least one satellite existing in visibility among all the actual satellites and at least 3

satellites existing around within 120 degrees latitude and longitude with respect to the satellite.

6. The system according to claim 1, wherein the kinds of satellites comprise GPS, Galileo, and GLONASS.

7. A method for estimating an indoor location using a satellite signal generation device, which can build a seamless location estimation system environment in which handover is freely performed between an outdoor location estimation environment and an indoor location estimation environment without changing hardware or software of a user terminal, the method comprising:

receiving satellite signals by a receiving antenna and transmitting the received satellite signals to a central controller;

extracting satellite time from the received satellite signals;

selecting at least 4 satellite numbers available for location estimation among all the actual satellites based on real-time satellite information of all the actual satellites and information on the satellite time and allocating the selected satellite numbers to the satellite signal generation device;

calculating distances between the actual satellites and the corresponding satellite signal generation devices with respect to the selected satellite numbers based on actual orbit coordinates of the corresponding satellite numbers and installation location coordinates of the corresponding satellite signal generation devices and calculating delay transmission time by dividing the calculated distance by light speed;

generating satellite signals corresponding to the selected satellite numbers in a manner of being delayed by the delay transmission time by the satellite signal generation device; and

estimating a location of an indoor satellite signal receiving terminal user based on the satellite signals corresponding to the at least 4 satellite numbers transmitted from the satellite signal generation device.