CLAIMS

1. 1. A computing device comprising:

a processor;

a network interface coupled to the processor to enable communication over a network;

a storage device for content and programming coupled to the processor;

an indoor positioning system (IPS) deployment engine stored in the storage device, wherein an execution of the IPS deployment engine by the processor configures the computing device to perform acts comprising, during a setup phase:

determining a map of an area including one or more regions;

receiving signals from a plurality of ultra-wideband (UWB) nodes and a plurality of Bluetooth Low energy (BLE) nodes in the area, relayed through one or more agents at one or more positions of the area;

for each BLE node: creating a visibility map based on the received signals from the plurality of BLE nodes in the area;

creating a precision map based on a correlation between the received signals from the UWB nodes and the received signals from the BLE nodes; and

identifying locations to place the plurality of BLE nodes based on the precision map. and the visibility map.

2. 2. The computing device of claim 01, wherein execution of the IPS deployment engine by the processor further configures the computing device to upon completing the setup phase, instructing to remove the UWB nodes upon the plurality of BLE nodes being placed based on the precision map.

3. 3. The computing device of claim 01, wherein execution of the IPS deployment engine by the processor further configures the computing device to iteratively repeat the acts of the setup phase until each of the one or more nodes is placed in a location that meets one or more predetermined criteria.

4. 4. The computing device of claim 01, wherein the act of determining the map of the area comprises receiving the map from a computing device of an administrator.

5. 5. The computing device of claim 01, wherein execution of the IPS deployment engine by the processor further configures the computing device to perform acts comprising: receiving constraints of the area from a computing device of an administrator.

~~6.~~ 6. The computing device of claim ~~5,~~5, wherein the constraints comprise, for each region of the area, at least one of: walls, equipment, one or more locations to avoid a BLE sensor placement, or a BLE sensor precision threshold.

~~7.~~ 7. The computing device of claim ~~6,~~6, wherein not all of the one or more regions have the same constraints.

~~8.~~ 8. The computing device of claim ~~0~~1, wherein receiving signals from the UWB nodes and the plurality of BLE nodes in the area comprises: moving at least one of the one or more agents in the area to each of the one or more positions of the area.

~~9.~~ 9. The computing device of claim ~~0, wherein:~~

~~the execution of the IPS deployment engine by the processor further configures the computing device to perform acts comprising, for each BLE node: creating a visibility map based on the received signals from the plurality of BLE nodes in the area; and~~

~~the identification of the locations to place the plurality of BLE nodes is further based on the visibility map.~~

~~10.~~ ~~The computing device of claim 9,~~1, wherein each BLE node having a visibility that is below a predetermined threshold is identified for removal.

~~11.~~ 10. The computing device of claim ~~0~~1, wherein creating the precision map comprises, for each of the one or more positions in the area:

~~calculating~~ a first estimate of a location of the position of the corresponding agent based on the received signals from the plurality of UWB nodes in the area;

~~calculating~~ a second estimate of the location of the position of the corresponding agent based on the received signals from at least some the plurality of BLE nodes in the area;

~~using~~ the first estimate as a ground truth reference for the second estimate;

~~determining~~ a difference between the first estimate and the second estimate; and

~~recording~~ the determined difference in the precision map.

11. The computing device of claim 10, wherein a precision captured in the precision map is based on at least one of:

a variance between the first estimate and the second estimate at a predetermined time; or

a variance between the first estimate and the second estimate over a time period.

~~12.~~ ~~11,~~12. The computing device of claim 10, wherein the first and second estimates of the location are by way of trilateration of the received UWB and BLE signals, respectively.

~~13. The computing device of claim 11, wherein a precision captured in the precision map is based on at least one of:~~

~~13. A~~ non-transitory~~a variance between the first estimate and the second estimate at a predetermined time; or~~

~~a variance between the first estimate and the second estimate over a time period.~~

~~14.~~ ~~A~~ computer readable storage medium tangibly embodying a computer readable program code having computer readable instructions that, when executed, causes a computing device to carry out a method of deploying an indoor positioning system (IPS), the method comprising, during a setup phase:

~~determining~~ a map of an area including one or more regions;

~~receiving~~ signals from a plurality of ultra-wideband (UWB) nodes and a plurality of Bluetooth Low energy (BLE) nodes in the area, relayed through one or more agents at one or more positions of the area;

~~for each BLE node: creating a visibility map based on the received signals from the plurality of BLE nodes in the area;~~

creating a precision map based on a correlation between the received signals from the UWB nodes and the received signals from the BLE nodes; and

~~identifying~~ locations to place the plurality of BLE nodes based on the precision map~~. and the visibility map.~~

~~14.~~ The non-transitory computer readable storage medium of claim ~~13, wherein creating the precision map comprises, for each of the one or more positions in the area:~~

calculating a first estimate of a location of the position of the corresponding agent based on the received signals from the plurality of UWB nodes in the area;

calculating a second estimate of the location of the position of the corresponding agent based on the received signals from at least some the plurality of BLE nodes in the area;

using the first estimate as a ground truth reference for the second estimate;

determining a difference between the first estimate and the second estimate;

recording the determined difference in the precision map.

~~15.~~ ~~14,~~15. The non-transitory computer readable storage medium of claim 13, further comprising: upon completing the setup phase, instructing to remove the UWB nodes upon placing the plurality of BLE nodes based on the precision map.

~~16.~~ 16. The non-transitory computer readable storage medium of claim ~~14,~~13, further comprising: iteratively repeating the acts of the setup phase until each of the one or more nodes is placed in a location that meets one or more predetermined criteria.

~~17.~~ 17. The non-transitory computer readable storage medium of claim ~~14,~~13, further comprising, receiving from a computing device of an administrator, constraints of the area, comprising, for each region of the area at least one of: walls, equipment, one or more locations to avoid a BLE sensor placement, or a BLE sensor precision threshold.

~~18. The computer readable storage medium of claim 14, further comprising, for each BLE node: creating a visibility map based on the received signals from the plurality of BLE nodes in the area, wherein the identification of the locations to place the plurality of BLE nodes is further based on the visibility map.~~

~~19. The computer readable storage medium of claim 18,~~18. The non-transitory computer readable storage medium of claim 13, wherein each BLE node having a visibility that is below a predetermined threshold is identified for removal.

~~20. The computer readable storage medium of claim 14, wherein creating the precision map comprises, for each of the one or more positions in the area:~~

~~calculating a first estimate of a location of the position of the corresponding agent based on the received signals from the plurality of UWB nodes in the area;~~

~~calculating a second estimate of the location of the position of the corresponding agent based on the received signals from at least some the plurality of BLE nodes in the area;~~

19. ~~using the first estimate as a ground truth reference for the second estimate;~~

~~determining a difference between the first estimate and the second estimate;~~

~~recording the determined difference in the precision map.~~

~~21.~~ A method of deploying an indoor positioning system (IPS), comprising:

~~during~~ during a setup phase:

~~determining~~ determining a map of an area including one or more regions;

~~receiving~~ receiving signals from a plurality of ultra-wideband (UWB) nodes and a plurality of Bluetooth Low energy (BLE) nodes in the area, relayed through one or more agents at one or more positions of the area;

~~creating~~ creating a precision map based on a correlation between the received signals from the UWB nodes and the received signals from the BLE nodes; ~~and~~

~~for each BLE node: creating a visibility map based on the received signals from the plurality of BLE nodes in the area; and~~

identifying locations to place the plurality of BLE nodes based on the precision map; and

upon completing the setup phase, removing the UWB nodes upon placing the plurality of BLE nodes based on the precision map. and the visibility map.

22. 20. The method of claim 21 19, further comprising: iteratively repeating the acts of the setup phase until each of the one or more nodes is placed in a location that meets one or more predetermined criteria.

23. The method of claim 21, further comprising, for each BLE node: creating a visibility map based on the received signals from the plurality of BLE nodes in the area, wherein the identification of the locations to place the plurality of BLE nodes is further based on the visibility map.

24. The method of claim 23, 21. The method of claim 19, further comprising: removing each BLE node having a visibility that is below a predetermined threshold.

The 22. A method of claim 21, deploying an indoor positioning system (IPS), comprising:

during a setup phase:

determining a map of an area including one or more regions;

receiving signals from a plurality of ultra-wideband (UWB) nodes and a plurality of Bluetooth Low energy (BLE) nodes in the area, relayed through one or more agents at one or more positions of the area;

creating a precision map based on a correlation between the received signals from the UWB nodes and the received signals from the BLE nodes; and

identifying locations to place the plurality of BLE nodes based on the precision map; and

upon completing the setup phase, removing the UWB nodes upon placing the plurality of BLE nodes based on the precision map,

25. wherein creating the precision map comprises, for each of the one or more positions in the area: ;

calculating a first estimate of a location of the position of the corresponding agent based on the received signals from the plurality of UWB nodes in the area;

calculating a second estimate of the location of the position of the corresponding agent based on the received signals from at least some the plurality of BLE nodes in the area;

using the first estimate as a ground truth reference for the second estimate;

determining a difference between the first estimate and the second estimate;

recording the determined difference in the precision map.